QUADERNI DI ETNOMUSICOLOGIA 1

Reflecting on Hornbostel-Sachs's *Versuch* a century later

Proceedings of the international meeting
Venice, 3-4 July 2015

Fondazione Ugo e Olga Levi
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a Febo Guizzi

Reflecting on Hornbostel-Sachs's *Versuch*
a century later

Davide Croff

Foreword

We are honoured to present here the *Atti*, the records of an intense and productive exchange on the theme of the classification and the description of musical instruments.

Our first thoughts go to Febo Guizzi, to whom we will be forever grateful for proposing this initiative for the one hundred year anniversary of the publication of the classification system created by Erich Moritz von Hornbostel and Curt Sachs in 1914. Guizzi worked intensively on this subject, and we believe that his contribution – in continuity with the research carried out by and with Roberto Leydi – is extremely important.
In 1985, on the occasion of the international year of music, the Fondazione Levi, too, along with numerous other associations, participated in the proceedings by holding an important conference on the restoration of musical instruments. Evidence of this fact can be found in the *Atti*, which were edited by Elena Ferrari Barassi and Marinella Laini. Febo Guizzi took part in the conference and published an articulate intervention on *La classificazione degli strumenti musicali popolari: appunti per una riflessione critica* (The classification of folk music instruments: notes for a critical reflection). In the title itself, as in his methodical elaboration, we find the man Guizzi, his ability to work in the field and to collect objects and information on how those objects are used, that is, objective data that he would later reflect upon critically, in depth, and with dedication. The transcription of the debate which took place at the end of the conference and is found in the *Atti* also holds one of his lectures on the theme, a lecture in which he speaks of the research carried out together with Roberto Leydi in various regions of southern, central and northern Italy in order to collect documentation on musical instruments, on the use of those instruments, and on the history, both ancient and modern, of their evolution using iconography – reconstructing the evolution processes of instruments and how they were played. This presented the chance to make hypotheses on the reconstruction of sound in the distant past.

The defence of the Hornbostel and Sachs classification system – which is

moving towards a revision, as we can see from the *Atti* of this conference – remains a strong instrument for historical-critical understanding, which makes organology one of the elements of a complex system of references that mirror each other, dialogue with each other, and come together, returning constantly to the relationship between the diachronic plane and synchronous plane where they enlighten one another. In the meantime, the revision of the classification system is a formidable work carried out by Guizzi, and it is presented here in Italian and in English.

In 2014, Luisa Zanoncelli, the then President of the Scientific Committee of the Fondazione Ugo e Olga Levi, took up the suggestion, which was celebrative only in appearance, and created the aforementioned conference of which this publication is the result. The Fondazione Levi is extremely grateful to her for the realization of this work, which has finally come to light.

We now extend our thanks to Cristina Ghirardini, who oversaw this collection of works, first with the collaboration of Luisa Zanoncelli, and later autonomously. She is a worthy pupil of the school of Italian ethnomusicology to which this work on the systematics is ascribed. Her preparation, her method of uniting fieldwork and historical and iconographic sources, her method of critically analysing every sort of document, together with her *pietas*, that of a pupil who is forever grateful to her *maestro*, have made her the person who was most qualified and suited to carry out the long and meticulous work needed to complete this work.

As always, the Fondazione Ugo e Olga Levi now leaves to the specialists of the world the task of assessing this attentive work: this can be done *on line* by accessing the *LEVIdata* database, a link also to their institutional site, and a limited print edition.

[Translated from Italian by Matilda Colarossi]

Reflecting on Hornbostel-Sachs's *Versuch* a century later

Cristina Ghirardini

Introduction

> Ma che cos'è l'idea, che costituisce l'omonimia dei molteplici sinonimi, e che, insistendo in ogni classe, ne riprende i membri dalla loro appartenenza predicativa, per farne dei semplici omonimi, per esibire la loro pura dimora nel linguaggio? Ciò, rispetto a cui il sinonimo è omonimo, non è né un oggetto né un concetto, ma è il suo stesso aver-nome, la sua stessa appartenenza, o il suo essere-nel-linguaggio.
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> Giorgio Agamben, *La comunità che viene,* Torino, Bollati Boringhieri, 2001, p. 61.

The conference *Reflecting on Hornbostel-Sachs's* Versuch *a century later* was the last international conference organized by Febo Guizzi before his untimely death. When he asked Luisa Zanoncelli, at that time the President of the Scientific Committee of the Fondazione Ugo e Olga Levi in Venezia, if the Foundation would be willing to organize an international meeting to celebrate the hundred-year anniversary of the Hornbostel-Sachs classification, Febo Guizzi was working on his lengthy revision of the systematics. Thanks to the generous hospitality of the Fondazione Levi, the conference took place in Venezia on 3-4 July 2015, and just a few days before it began, the final version of Febo Guizzi's Italian translation, along with the results of his emendations, were shared with the participants of the conference. As he was known to do, Guizzi worked until the very last minute; and this version, published at the end of these proceedings, is now available. His indefatigable and somewhat rushed endeavour was edited and translated into English thanks to the collaboration of Matilda Colarossi.

Febo Guizzi worked on the Hornbostel-Sachs classification for more than thirty years. His first important emendations date back to the early 1980s. At that time, he was collaborating with Roberto Leydi in field research throughout Italy (paying special attention, for the very first time, to musical instruments). This research brought to light the exceptional and astonishing musical diversity still alive in Italian traditional culture. The most important result of the research, for its impact on a general audience, was the exhibition *Gli strumenti della musica popolare in Italia* (The instruments of folk music in Italy), which was held in Venezia (Teatro La Fenice), Angera (Rocca Borromea), Bologna (Teatro

Comunale), Milano (Teatro alla Scala), Castelfidardo and Roma (Museo Nazionale delle Arti e Tradizioni Popolari) between 1983 and 1984. The catalogue of the exhibition was published in a special issue in the journal «Culture musicali», and later in a volume [Leydi and Guizzi 1985]. It is in the catalogue of this exhibition that Febo Guizzi describes the voice disguiser made of two halves of a gourd called *ravi* or *cusa* in Piedmont. The two symmetric parts vibrate when placed near one's mouth while singing, thus changing the timbre of the voice. For this instrument he proposed to add the *taxon* 15 «Singing idiophones (idiophonic mirlitons): idiophones solicited by the pressure of sounding waves» to the existing Hornbostel-Sachs classification [Guizzi 1985, 302].

A few years later, Febo Guizzi was invited by Giuliana Zanetti to take part in the scientific committee of the exposition of pre-Columbian art entitled *Prima dell'America* (Before America), which took place in the Museo Archeologico in Bologna from 30 March to 30 June 1992. In the catalogue of the exhibition, Guizzi [1992] published, for the first time ever, a partial translation from German into Italian of the Hornbostel-Sachs classification. Only the musical instruments and sound devices displayed in the exhibition were taken into account, however; in addition to the Italian translation, he also proposed a series of improvements concerning the pre-Columbian flutes. It was in the 1990s that Febo Guizzi realized his Italian translation of the whole Hornbostel-Sachs classification, which was largely discussed with other researchers, and his students at the Facoltà di Conservazione dei Beni Culturali (Faculty of Preservation of Cultural Heritage) of the University of Bologna, located in Ravenna, where he was a lecturer in Organology, and from 1999 at the University of Torino, where he became Professor in Ethnomusicology. At the same time, while Febo Guizzi was involved in various projects of cataloguing musical instruments in private and public collections, other researchers (many of them trained in Roberto Leydi's courses on Ethnomusicology at the University of Bologna) were doing extended fieldwork on the instruments of Italian folk music, and on the various sound devices documented during their research. Both Febo Guizzi's own experience as an organologist in various museums, and his passionate discussions with researchers and students were a determining factor in the realization of his translation, his revisions, and his additions to the Hornbostel-Sachs classification, which were published in 2002 [Guizzi 2002, 409-482].

In 2004 Guizzi met Domenico Torta, the musician, composer, and researcher from Riva presso Chieri (Torino). Torta possessed a huge collection of musical instruments, clay whistles, hunting calls, toy instruments, flutes, reedpipes, horns made of bark, and noise makers used in the countryside not far from Torino, and Guizzi greatly regretted having made this acquaintance only after the publication of his 2002 book. However, Domenico Torta soon became his and our – Febo Guizzi's students in Torino – close friend; and we immediately

found ourselves participating in the creation of the Museo del paesaggio sonoro (Soundscape Museum) in Riva presso Chieri, which was greatly improved in 2011 in accord with the plan laid out by Domenico Torta and Guido Raschieri [Raschieri 2011].

The main achievements of Guizzi's revision of the Hornbostel-Sachs system are listed in Guizzi's article which is the presentation he himself made during the conference. Although he was not completely satisfied with the text, he, unfortunately, did not have time to revise it, and we have decided to present the text exactly as is. His main contribution in these proceedings is the last version of his revision of the Hornbostel-Sachs classification, in which the numerous examples and the long footnotes document the thinking process that allowed him to achieve his fine revision.

It was Febo Guizzi himself who suggested which participants should attend the conference, and the Fondazione Levi was more than willing to comply. Along with the Italian researchers with whom he was known to have extremely impassioned discussions regarding the Hornbostel-Sachs classification, Guizzi invited international researchers whose noteworthy achievements had been published in recent years, and those who, although they did not work specifically on the Hornbostel-Sachs classification, could help with the historical background that led to the 1914 *Versuch*, and shed light on the relationship between the systematics of Hornbostel-Sachs, Victor Mahillon, and André Schaeffner. At that time we were not aware of Roderic Knight's recent and important revision of the Hornbostel-Sachs classification, which was published in the 2016 «Galpin Society Journal» [Knight 2016], and which proposed interesting and different solutions to many of the questions Febo Guizzi, too, had raised. The conference was also an occasion to listen to some critical voices on the usefulness of the taxonomical approach in today's digital era; and, in particular, on questions regarding the hierarchical structure and the problems posed by the class of electrophones, which Hornbostel and Sachs never developed.

In these proceedings, Renato Meucci's article focuses on Curt Sachs and on his works before leaving for the United States, especially on *Geist und Werden der Musikinstrumente*, where the taxonomic approach experimented in the 1914 *Versuch* remains in the background, providing solely the terminology for Sachs's diffusionist theory on the development of musical instruments.

Ignace De Keyser tries to answer «the unanswered question», that is to say, Mahillon's apparent lack of reaction to the Hornbostel-Sachs 1914 *Versuch*: Mahillon had, in fact, laid the foundation for the Hornbostel-Sachs classification in his *Essai de classification*. Then, he goes on to question the very necessity of a taxonomy based on a unique principle in the definition of the classes and its impermeability to the emic perspective; and he puts forth the idea of establishing a permanent discussion group, open to researchers from the natural sciences,

and, more generally, from those life sciences whose disciplines also make use of taxonomies.

Lars Christian Koch explores the relationship between the Hornbostel-Sachs classification and the Indian theory of music as it was disseminated throughout Europe by Raja Sir Sourindo Mohan Tagore in the 1870s. Moreover, he reflects upon the scarce use of the systematics by its authors in their later works, focusing especially on Eric M. von Hornbostel, whose archive and 'Black Box', which contains cards with measurements and data resulting from the examination of different musical instruments, are now preserved at the Indiana University Archives of Traditional Music in Bloomington.

Gian Nicola Spanu discusses the reasons behind Italy's general lack of attention to the taxonomies of musical instruments created by Mahillon and by Hornbostel-Sachs between 1880 and the 1930s: in fact, the only relevant exception was Eugenio de' Guarinoni's translation of Mahillon's classification in the catalogue of the musical instruments of the Museum of the Conservatory in Milan, which he published in 1908. He did not, however, properly reference his source and simply thanked his «friend» Mahillon «for his precious advice and precepts».

Florence Gétreau focuses on André Schaeffner's classification of musical instruments, published first in 1932 and later in 1936 as an appendix to his *Origine des instruments de musique*. After considering its reception in the international organological domain, she examines the interesting contributions that another great French scholar, Geneviève Dournon, published on Schaeffner's classification and, more generally, on the systematics of musical instruments. As an appendix, Florence Gétreau has transcribed the handout distributed by Geneviève Dournon when teaching Organology at the University of Nanterre, Paris (1991), which contains some of her observations on how to develop the principles of Schaeffner's classification. In continuity with the French approach to the classification of musical instruments, Marie-Barbara Le Gonidec proposes an English translation of the outstanding classification of flutes, which she published in 1997 in the journal «Pastel». It was conceived in the Musée de l'Homme in Paris, where some years before, Geneviève Dournon had engaged her to reorganize the flute collection. Moreover, she offers a series of considerations on the problem of the classification of bagpipes based on her fieldwork and her experience as a curator of the exhibition *Les cornemuses de George Sand* at the Musée de Montluçon, France (1996).

Jeremy Montagu has been working on the classification of musical instruments since the early 1970s, when he published his project for a new classification co-authored with John Burton [Montagu and Burton 1971]. After having proposed a series of revisions [Montagu 2009] that have been adopted by the MIMO version of the Hornbostel-Sachs classification, in these proceedings he addresses a series

of major questions concerning the higher levels of the subdivisions, focusing principally on the aerophones.

Roger Blench questions the morphological criterion which is dominant in the Hornbostel-Sachs classification, focusing on instruments which can be played using different techniques, on multiple-feature (*polyorganisch* in the original text by Hornbostel and Sachs) instruments, and on instruments played by more than one player.

Together with Nico Staiti, Vincenzo La Vena had been one of Febo Guizzi's main collaborators in the revision of the Hornbostel-Sachs classification since early 1990. Vincenzo La Vena's 1996 volume on the sound devices from Terranova da Sibari [La Vena 1996] has revealed an extremely lively world of sound producers used in everyday life by children and adults in a small village in Calabria, Italy. In his book, he makes use of the Hornbostel-Sachs classification, undertaking to give proper Hornbostel-Sachs codes to instruments played in various ways or constructed with different materials. For Febo Guizzi this work was particularly inspiring when he was working on his 2002 and 2015 revisions of the classification. In his proceedings, Vincenzo La Vena goes back to the main questions posed in his 1996 book, enriched by his experience as a teacher who is constantly exposed to the many unconventional and joyful ways children have of playing instruments, and their use of non-orthodox techniques.

Margaret Birley attended the conference on behalf of the MIMO consortium, which adopted a revised version of the Hornbostel-Sachs classification for the MIMO online database of musical instruments collections. Febo Guizzi had some perplexities concerning the consortium's choices on the classification of musical instruments, and, before the conference, he sent Margaret Birley a series of questions by way of the organizing committee. The article that Margaret Birley wrote together with Arnold Myers and Rupert Shepherd provides a series of thorough answers to the questions posed by Febo Guizzi.

Nico Staiti had been collaborating with Febo Guizzi since the 1980s, especially in fieldwork and in the iconographical research of bagpipes, Italian shawms, and the frame drum. In these proceedings, starting from André Schaeffner's criticism of the Hornbostel-Sachs classification, he deals with reedpipes, especially those with a membrane reed, a subject which had already challenged Vincenzo La Vena and the MIMO consortium and which is also largely addressed by Febo Guizzi in his revision of the classification.

Stéphanie Weisser, in collaboration with Maarten Quanten, is the author of an important essay published in the 2011 «Yearbook for Traditional Music» [Weisser and Quanten 2011]. In these proceedings she questions the opportunity of using the Hornbostel-Sachs classification to study musical instruments in today's digital era, calling for a non-hierarchical environment instead of an arborescent classification.

My own paper is the text I presented at the conference, and it deals with the punctuation system suggested by Hornbostel and Sachs to construct the proper numerical code for polyorganic instruments: it is often neglected by researchers because of its counterintuitive use; however, it is essential when dealing with instruments that combine different vibrating bodies; and the correct use of punctuation forces us to significantly reconsider the supposed inelasticity that is often attributed to the system.

Maarten Quanten is the author of the classification of electrophones proposed in his 2011 article (co-authored with Stéphanie Weisser and used by MIMO). In these proceedings, he questions the principles on which the Hornbostel-Sachs classification is grounded, beginning with the perspective of the modular and hybrid construction of electric, electronic, and experimental instruments.

Febo Guizzi's 2015 revision of the Hornbostel-Sachs classification was tested during the project *Sound Archives and Musical Instruments Collections* (SAMIC) directed by Ilario Meandri at the University of Torino.[1] This aimed to create a digital catalogue of the musical instruments of the Museo del paesaggio sonoro by making use of the Linked Open Data technology, and adapting the standard for cataloguing musical instruments put forth by Febo Guizzi [Meandri and Ghirardini 2019]. For Guizzi, too, the Museum's outstanding collection was a remarkable field in which to test the coherence of the system. Guizzi's important emendation of the subdivision of aerophones (especially reeds and flutes) is not only due to his previous efforts on pre-Columbian instruments, but also to his countless discussions with Nico Staiti, Vincenzo La Vena, Domenico Torta, and with his students in Torino, especially those involved in the activities of the Museo del paesaggio sonoro. One of his major efforts was aimed at including whistles with two concentric holes, which Laurence Picken classed 420.1 and called «edge instruments that are not flutes» [Picken 1975, 376-380], and which are known as both toy instruments or hunting calls. It is here that it is possible to find a particularly interesting discrepancy in Guizzi's emendation, which we did not notice while he was working on his revision in 2015.

If Guizzi had not passed away, I would not have had to write this *Introduction*. This sad and unforeseen circumstance, however, requires me to take his place, and I would, therefore, like to pay homage to my mentor. In doing so, I would like to explain why Guizzi's massive revision of the Hornbostel-Sachs classification is extremely valuable by discussing this small discrepancy of which I became aware while cataloguing the musical instruments in his most beloved museum along with other pupils in the SAMIC project.

Febo Guizzi did not address the macro inconsistencies which are found in

1. http://museopaesaggiosonoro.org/sound-archives-musical-instruments-collection-samic/. The catalogue of the Museo del paesaggio sonoro is now available here: https://dati.museopaesaggiosonoro.org/.

the Hornbostel-Sachs classification, and which Jeremy Montagu has often underlined [in 2009 and in his contribution in this volume]. It is, therefore, to be expected that there is a resistance on the part of other researchers to adopt Guizzi's revisions. Personally, I agree with Guizzi's respect for the general structure of Hornbostel and Sachs, provided that, as its authors explicitly state, we don't use it as an unalterable set of labels, but rather as a flexible system, one which can grow in specific directions, and not in others, depending on the interests and the needs of the researchers. I believe that we have to give up the idea of a 'universal' classification system, benefiting instead from the possibility of allowing the tree to germinate in various and different directions. Contrary to what Jeremy Montagu writes in this volume, I do not think that the Hornbostel-Sachs classification is «culture- and language-bias free»; instead, I believe that it allows us to think about the linguistic nature of the instruments used by humans to produce sound and to make music. Moreover, it allows us to find a way into the labyrinth of synonyms and homonyms which, as Curt Sachs knew very well, is so peculiar in the world of musical instruments. In short, especially when dealing with the Hornbostel-Sachs classification, my opinion is that ontology is a matter of language [Cimatti 2018a; 2018b, 143-174].

When describing the «edge-tone instruments that are not flutes», Picken [1975, 376] writes:

> The distinctive acoustic mechanism of whistles of this type has not hitherto been recognized. If the term 'edge-tone' is reserved for sounds generated by an edge, set at an appropriate distance from, and in the plane of, a slit from which an efflux of air at suitable velocity occurs, these whistles are not, strictly speaking, edge-tone instruments, since here the plane of an annular edge is at right angle to the air-stream. Nevertheless, the edge of an orifice is the discontinuity at which the exciting tone is generated. For the present it is convenient to regard them as relatives of edge-tone instruments.

The other peculiar characteristic of these whistles is the presence of a very small resonator, which can be closed or open, with two concentric holes [*ibidem*]:

> In the simpler type (a), because of the structural symmetry of the system, with two opposed circular holes opening into a small, closed chamber the maximal diameter of which lies in a plane parallel to the planes of the two holes, the whistle operates on sucking as well as on blowing. It seems likely that each annular vortex generated at the internal face of the exit aperture excites the chamber-resonance, and this then acts on the incoming air-stream, so as to cause another vortex to be formed. The formation of vortices therefore occurs in a periodic fashion and at a frequency determined by the cavity. The exit aperture and the small, enclosed resonating space, together form a coupled system of generator and resonator. Because the cavity is strongly coupled to the air-stream, small variations in the velocity of the airflow produce large variations in the frequency excited, and the resulting tone is with difficulty held at even an approximately constant pitch.

> Within the second type (b), in which the chamber is open, a strong tone is obtainable by coupling a second air-cavity, defined by the rolled tongue, with the resonating system of the whistle. The capacity of this latter cavity determines the pitch of the whistle for a given air-velocity.

The upper subdivisions of 421 «Edge instruments» in Febo Guizzi's revision of the Hornbostel-Sachs classification follows the original model, distinguishing 421.1 «Flutes without duct (with no blowing devices)» from 421.2 «Channelled flutes (with blowing device)». In order to find a correct place in the system for these whistles where the «annular edge is at is at right angle to the air-stream», Febo Guizzi has subdivided the *taxon* 421.1 «Flutes without duct» in two groups: 421.11 «Edge-tone instruments that are not flutes, or wind instruments orthogonally blown» and 421.12 «Edge instruments not orthogonally blown». The call for blackbirds in figure 1, corresponding to Picken's type a, belongs to 421.11 and for its closed structure it may be considered 421.111 «With closed and fixed chamber» (421.112 «With open and variable chamber» corresponding to Picken's type b). The subdivision of 421.12 then develops the large category of end-blown flutes, whether tubular or vessel.

In the subdivisions of 421.2 «Channelled flutes (with blowing device)» it is possible to locate other hunting calls both orthogonally and non-orthogonally blown. It is interesting to notice that, contrary to Picken, for Guizzi the fact that the air-stream reaches the edge of the instrument at a right angle is not so relevant for the distinction between flutes and edge instruments which are not flutes. However, it is interesting to observe that under the 421.2, in the classification revised by Guizzi, we only find sound devices with a 'proper' resonator.

In Guizzi's system it is possible to define a series of orthogonally blown flutes with blowing device, both with and without what he calls «external chamber». For example, the call for jays in figure 2 corresponds to 421.211.1 «Channelled flutes with external chamber with a central hole on the wall of a vessel chamber», while the call for capercaillies in figures 3 and 4 corresponds to 421.211.2 «Channelled flutes with external chamber, the hole is obtained by the upper end of a tube». Instead, the call for magpies in figure 5 can be easily defined by adding to Guizzi's system the *taxon* 421.212 «Channelled flutes with orthogonal edge-device without external chamber», while the call for female pheasants in figure 6 is an end-blown flute with external duct which corresponds to the *taxon* 421.222.1 «Vessel flutes with external duct with single duct». The system seems to work very well up until this point; however, problems seem to emerge when considering calls for blackbirds like the one in figure 7, which is made of a circular body with two concentric holes provided with a sort of blowing device. Like the one in figure 1, it can be played both by sucking and blowing, contrary

Figure 1.
Call for blackbirds
Museo del paesaggio sonoro, Riva presso Chieri (Torino)
(inv. 0397SM)

Figure 2.
Call for jays
(inv. 0303SM)

Figures 3-4.
Call for capercaillies
(inv. 0306SM)

Figure 5.
Call for magpies
(inv. 0304SM)

Figure 6.
Call for female pheasants
(inv. 0396SM)

Figure 7.
Call for blackbirds
(inv. 0066SM)

PHOTOS 1-7 ILARIO MEANDRI

to the instruments which are properly defined as flutes. In fact, their peculiar characteristic is not only the fact that they are orthogonally blown, but also lies in the fact that, as Picken points out, «the exit aperture and the small, enclosed resonating space, together form a coupled system of generator and resonator». In Guizzi's system, however, as observed above, this kind of spurious resonator is not taken into consideration in the subdivision of the flutes with blowing devices 421.2. This is relevant because this morphology undoubtedly questions the nature of the flute. If it is the peculiar «coupled system of generator and resonator» which is considered more hierarchically relevant, it would be necessary to modify the system at the very beginning of the subdivision of edge-tone instruments, making possible the existence, among the flutes without duct, of orthogonally blown instruments provided with a kind of blowing device. A possible solution, for example, would be the removal of the definition «*(with no blowing devices)*» that Guizzi added to 421.1 «*Flutes without duct*» and the addition to 421.111 «Edge-tone instruments that are not flutes, or wind instruments orthogonally blown with closed and fixed chamber» of the further subdivisions 421.111.1 «Without blowing device» and 421.111.2 «With blowing device». Of course, 'duct' must not be used as the synonym of 'blowing device' because the former describes a structural element which directs the air stream towards the edge according to an exact and fixed angle, while the latter is an embouchure, a capsule that creates a chamber which effects the strength of the air stream rather than the angle of incidence, and the acoustic function of which is still unknown. Moreover it makes it easier to hold the sound device in one's mouth with no hands.

On the contrary, if we accept to include the body with two concentric holes as a borderline variant of the morphology of the flutes' resonators, this may be referred to as a further subdivision of 421.21 «Channelled flutes with orthogonal edge-device», maybe as 421.213 «Channelled edge-tone instruments that are not properly flutes». Here again, the nature of the 'channel' can be questioned: I believe there is no doubt that 'duct' (according to the meaning given above) can be considered a blowing device of the call for magpies in figure 5 and of the call for female pheasants in figure 6, however, we can hardly think that the blowing devices of the call for jays in figure 2 and of the call for capercaillies in figures 3 and 4 perfectly determine the right angle for the air-stream to reach the edge, being instead embouchures with an unclear acoustic function, like the one of the call for blackbirds in figure 7.

At the end of the SAMIC project we did not make a decision: only a part of the hunting calls of the Museum have been catalogued; and I believe that a better choice will only be possible when we are able to deal with the entire collection.

What is essential, I believe, is the awareness of the importance of language in defining musical instruments. The extreme mobility of the names of musical

instruments should be studied in relationship with the possibility to establish classes which define them without claiming to make the perfect choice that everybody will accept regardless of their use of language. The Hornbostel-Sachs classification is helpful only as far as it is used to think about the utterance of musical instruments, on the words used to imagine them, and to find relationships between synonyms and homonyms. As Febo Guizzi has taught us, it becomes interesting and challenging when exploring its limits, and probably its main strength is the very fact that it is unachievable.

Febo Guizzi was deceived by the fact that his work on the Hornbostel-Sachs classification from the 1980s to the early 2000s was not internationally acknowledged as it deserved to be. However, I believe that this lack of attention was providential, because it prevented his system from becoming an institutional and fossilized list of statements, and it encouraged him to make the tree grow in different directions.

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Febo Guizzi

Reflecting on Hornbostel-Sachs's *Versuch* a century later

I would like to begin this paper by providing a short autobiographical statement: I started studying the systematics of musical instruments before I was thirty years old. Since then I have continued to cultivate an interest in them, and although my attention has been discontinuous, it has never betrayed my underlying motivations. One of these – perhaps the one that is most dear to me – stems from a critical reflection that was highly in vogue at that time, one that censured what was considered a wrong, unilateral way of viewing the complexity of the system, that is: 'not seeing the forest for the trees'. For the complexity of the system needs one to take both the 'trees' and the 'forest' into consideration. The intellectual appeal of the Hornbostel-Sachs systematics largely consisted, for me, in the fact that it allows us to perform this cognitive operation, without the risk of excluding one of the two modalities, the analytical nor the synthetic one. In other words, to see the 'whole' and to conceive, in its unrenounceable importance, the aggregative datum of the abstraction, which defines the 'forest' as a reality that is not less important than the disaggregated units of which it is composed. Complementarily and simultaneously, this means the ability to see the consistency of the individual elements that make up the generalized abstraction of the whole, that is to say, each of the trees in the specificity and the non-episodic differences that separate it from other objects, which we will refer to, for the sake of simplicity, as 'tree'. It means devoting adequate attention to all the analytical elements that constitute the particularity and specificity: foliage, leaves, stems, roots, of every variety of tree. And each variety is, in turn, essential and inseparable from the totality, where its contribution to the concurrently abstract and concrete realization of the 'forest' outlines itself: therefore, all trees, all 'the' trees, on which the reality of a forest depends, starting with, of course, the specific forest we are taking into consideration each time. To make this metaphorical argumentation clearer, we must obviously replace the word 'tree' with the term 'instrument'; but the concept of 'forest' is hard to replace because there are no terms commonly used in the various languages to indicate – in a synthetic and unitary way – an organic aggregate of instruments. This fact also helps us clarify a point that is necessary for the comprehension of the *Systematik*: natural entities possess their own network of evolutionary

connections, which is very different from the labyrinth of culturally elaborate human objects, such as musical instruments, which are more unpredictable and arbitrary in their endogenous transformations. From these transformations derive a close network of relations, a network that the *Systematik* has uncovered for the first time in scientific terms, at least with regard to the morphology and the functionality of sound devices. In this perspective, as already pointed out by Picken [1975, 560], the numerical designation of the *taxa* not only sidesteps the obstacle of linguistic differences when naming the items, but also allows the abstract levels of the taxonomy to be hierarchically and relationally enunciated, even if behind it there lies a real world of artificial objects, not caused by an abstract structure of generative rules.

I then also realized that this vision, based on the interaction between the individual elements and the whole, the abstract and the concrete, had also been theorized by the Gestalt school of psychology. It is an important school of thought that helped the development of scientific methodology in modern human sciences, one of the few which not only resisted the passing of time, but the radical epistemological transformations in cultural trends, in the passage from modernism to post-modernism. The Gestalt psychology puts forth the relationship between the 'figure' and the 'background', the evaluation of perception as a unitary process, general and structured, but also susceptible to internal modulations based on the position of the elements that compete to make up the whole and acquire meaning from the perception of the totality. The primary epistemological advantage is the principle according to which 'the whole is other than / more than the sum of its parts'.

I have often stated, when writing about the *Systematik*, that it is a powerful way to give order to chaos. This is the expression I used in the proposal I put forth for this conference. It is a metaphor that solemnizes an undoubtedly more complex process, expressing a polarized view of what really happens. Moreover, the relative 'chaos' refers to the initial state, potentially random and arbitrary, of the museum collections. This is not, in fact, the overall reality of the situation. In reality, the vast world of objects adopted and constructed by mankind to produce sound respond to processes which, in turn, create a precise cultural order compared to the disorder of material life in which the experience of 'being in the world' manifests itself. The invention of musical instruments, as André Schaeffner [1936] explained, is an on-going process of the transformation of the intellect in method, through behaviour. It is not a deductive, rationally driven process of descent from the 'general' to the 'particular', or from the 'abstract' to the 'concrete', but is, in itself, a result of the complex modalities of the cultural development and of the achievements of an enlightening experience: what anthropologists call 'to build humanity'. It is, in itself, a fundamental way to reduce 'chaos' – the primary role of culture – to govern the complexity of

reality. So, it may appear that the merits of the *Systematik* should be restricted to ordering collections and formalizing, in terms of conventional abstractions, what belongs on other planes in real life, planes where pragmatic flows, which are not rationally governable, prevail. If this were the case, the outcome would indeed be a great one.

However, since I started trying to master this powerful intellectual medium, I continue to believe there is something more. Much more. Meanwhile, using an expression coined by Claudio Magris [2011, 17], an Italian intellectual who is very dear to me for several reasons, I would like to say that «it is in classifications that life flashes through so tantalizingly, in the registers that attempt to catalogue it and in so doing expose its irreducible residuum of mystery and enchantment». For this reason I believe that classifying instruments – the most important material part of music – is not a reductive, merely pragmatic course; and I do not believe it is arid, something that pits the vitality of the world of sounds against a cold and separate version of it. There are, of course, different types of classifications. And, more importantly, there is a way to use the systematic perspective which, thanks to an intrinsic quality, questions the organizational and deductive frame of the classification, trying to draw from it a part of the «tantalizing flashes», evoked by Magris, which it is able to reveal, or at least, to suggest.

How does the Hornbostel-Sachs systematics keep from robbing an object of its cognitive function while separating it from its stratified ties with the living world? How is it able to allude to things that, in direct terms, are beyond its application? First of all, it does so because of its enormous ability to create universality – in an extremely dispersed and differentiated field – without imposing assessment hierarchies, but rather by safeguarding the egalitarian disposition of the analytical consideration of the objects. Secondly, because of a principle, the driving principle behind the classification itself: the identification of the action that generates sounds in every sound device.

It goes beyond the mere qualitative accumulation of a thesaurus, and forces you to understand, for all its differences, the concrete cases in which the principle manifests itself. In other words, it is the central idea of the Hornbostel-Sachs systematics itself which links it to real phenomena; they, in turn, are strengthened by the conceptual energy obtained from the generative mechanism of the deductive apparatus, by the high speculative efficacy that uses abstractions and the solidity of logic. At the service of experience. The nucleus of the entire apparatus, focalized on the primary ways in which sound is generated through the specific material form of the objects (morphology) and determined by basic ways of playing them (playing techniques), is proposed according to a general methodological guarantee of the scientific proceedings, that is to say, the property of falsification, as explained by Karl Popper. Which also allows new/different data to be introduced so that the former prevision may be corrected.

I truly believe that the system does not exclude the consideration of instruments as the centre of complex cultural relations; on the contrary, it makes it possible to take them into account because of the interconnection between morphological description, functional reference and connection with the core expressions of the body's movements. I also believe that a review of the 1914 *Systematik* from an ethnomusicological perspective helps us uncover various specific qualities of this working tool. I have no intention whatsoever of devaluing its use within museum collections: at the very least, it allows museums worldwide to order their collections taxonomically in an extraordinary fashion; but apart from that, given its conceptual framework, it provides strong stimuli for the development of an understanding of the instruments as objects produced in many different forms by different cultures. This may be achieved both by enabling the best understanding of what is empirically observable in them, and by improving the development of the very idea of 'sound device', and, at the same time, proposing various hypotheses on the genesis and the transformative dynamics of objects created by humans to produce sound.

The efficient cause of this possibility is represented by the deductive form and by the sagacious interpretive adherence of some fundamental sound-poietic gestures, as well as by the meticulous commitment to consider the forms applied to matter as a specific creative field, in turn generating a second level of creativity, which is that of the functionality deployed by the instruments, namely the sound/music they produce. If music is «humanly organized sound» [Blacking 1973], much of this organization, created by mankind, exists through the instruments: the organization is both mental process, and pragmatic behaviour; both of these activities must be tracked by 'reading' each instrument according to the original principle of its invention and the specific forms it subsequently assumes. This is what the system offers as an interpretational apparatus.

In fact, in the past one hundred years, there have been several attempts to revise, integrate, develop and expand the Hornbostel-Sachs classification. Most of these attempts have not undermined the *Systematik* but, on the contrary, have made some of its intrinsic qualities, which were not immediately manifest, more obvious: determining merits have emerged, such as – by way of example – the ductility, the ability to accommodate various proposals for change without these affecting the logic of those relations on which the Hornbostel-Sachs systematics is based, and the ability to extend its effectiveness to entire unexplored fields.

This makes the critical process that is sparked when considering its limits, deficiencies, and the inevitable inaccuracies in the original draft, a *Versuch* (an attempt), a constructive one. The very process of revision and amendment is made possible by its intrinsically logical structure and its simple but effective hierarchical system based on its fundamental binary forms. In this regard, I would like to disagree with Laurence Picken [1975, 558]: Picken excluded that

the hierarchical order of the Hornbostel-Sachs systematics was stronger than that present in any system that incorporates «taxa of more than one order». And he justly underlined the procedural nature of the classification, compared to the static one that transpires when it is simple «print on paper». The fact is that the hierarchy is modulated through a transition from the level of 'categorical abstraction' to that of 'abstraction from concreteness', which is where the crucial presence of typological data is made manifest, and that opens to the levels of concreteness of real objects. This hierarchy is questionable even theoretically, which is another aspect which Picken defines 'apparent'; but it is precisely the hierarchy put forth that allows the insightful transition from a theoretical plane to an empirical one. And, if I can attempt a conceptual risk, each plane completes the other; with, here and there, different levels of effectiveness, no doubt; but with a general validity. In turn, in the transition to the «smaller groups», the arrangement based on «dichotomously branching key» [*ibidem*, 559], which here manifests itself explicitly, would be arbitrary and not structural. I would like to put forth another critical observation: it is true that the binary form does not appear everywhere and at all costs. If it did, we would be in the presence of a rigid and dogmatic system. It manifests itself as a determining factor to allow, through specific and often 'liminal' characteristics, objects to be considered in accordance with a transcendental criterion (in the Kantian sense of the term), which highlights the fundamental 'mutual implication'. This is a 'rule' enacted by dichotomies which are not only logical, but also functional or morphological, expressed as without/with, simple/composite, free/confined etc. We know that these last two (simple/composite, free/confined) appear at the highest level of the two classes of chordophones and aerophones. Each case provided, in other words, plays the role of one part of a whole, and then refers back constantly to the whole. Whenever one expresses close precision, the 'negative' features of the connected cases are logically engaged. This establishes circular relationships that move through all the levels permitted by the hierarchy. Each *taxon*, each instrument, is, therefore, simultaneously defined both by its closer and more remote 'baggage', made up of an entire local system of its articulations and – in the final analysis – in the entire system tout court. Each segment is connected to the others, and relationships dominate the frame, instead of being excluded from it.

Let us consider a number of examples:

1. Given that the activation of the natural environment in itself, in which a human being is immersed as a sound source, hypothetically represents a primary creative aptitude, if we understand the specific workings of a free aerophone, we are also taking a huge step forward in the understanding of this cultural challenge. The same thing happens if we put forth the question of what acts

conceptually 'more' or 'differently' in the engineering/architectural gestural experience of the exploitation of the dichotomously opposite situation, when you put the air contained in a hollow body in vibration. Equally effective is the stimulus provided by the hermeneutical synthesis between these two major operative fields, which occurs when you investigate the specific ways in which the vibration of the environmental air can be adapted to the confined air. This happens, for example, when pairing an interruptive type device – such as reeds – and a hollow body that is functionally elevated to the class of 'resonator'; it presents itself as a specific shape, both rigid and fluid matter, from which the generative properties of the creative process of 'sound sources' are greatly enhanced. We must bear in mind that this synthesis takes place in the reality of things and not only on the logical-formal plane. The various proposals to rethink the world of interruptive aerophones (the reeds), some of which are also found in the papers of this same conference, including those that I have reconsidered, altering and enriching the entire category of these important devices in the *Systematik*, do not simply regard the filling of fields in a list: they are the answers to questions posed by means of the system, the 'well-ordered' interface of reality.

2. Similarly, in chordophones, the presence of a neck along which strings are stretched, means an operative condition that is totally different for the hands and thus for the body of the player (according to the system) from a plurality of strings stretched before him on a «simple» bearer.
These oppositions do not need a complete systematic apparatus to be conceived. But a systematic apparatus leads the oppositions to work as a part of a hermeneutic engine and not only as a display of juxtaposed empirical data. This is not only relevant from the perspective of rebuilding a large generative design, as is the one contained in the *Origines* by Schaeffner [1936], but also as a description of the cultural and technical potentialities, which may become heuristic prescriptions in field research: in the presence of concrete cultural options that shape sound devices, the knowledge of the binary logic that dynamically regulates their possible developments, the performance practice, the constructive process, and the presence of any signs of indirect traceability to the processes of transformation of an instrument, etc., are more likely to be questioned on the basis of the implications included in the protocols of a digging tool, carefully structured in this way and tested throughout the past century. To this regard, I would like to conclude by putting forth an existing case: starting with field research and the consequent results, continuing with the observation of a mechanical and acoustic behaviour never before encountered, and then finally taking advantage of both the taxonomic analogy contained in the system and the logical-relational device of the implication, it was possible to

create a subclass which had not been taken into account in the *Systematik*. So an existing *taxon*, present in one of the four classes (specifically in the second, that of membranophones) evoked its reciprocal 'negative', allowing what was formerly considered 'absence' in another class to be seen as 'positive': I am referring to the research carried out in Piedmont up until 1983, which regarded an instrument that works by vibrating under the effect of primary sound waves, acting on its own substance, which owing to its solidity and elasticity, yields sounds without requiring stretched membranes or strings. In other words, it is an idiophone that acts as a kazoo. Ethnography provided the case; the *Systematik* posed the problem of its specificity, simultaneously with the question of a strong analogy; the logical structure of the system and the relationships contained within it and articulated through the mutual implication generated an important amendment: and so, in 1985, I described the gourds of Piedmont and Liguria used as voice-modifiers, and decided to amend the Hornbostel-Sachs systematics introducing the *taxon* 15 «Singing idiophones (idiophonic mirlitons): idiophones solicited by the pressure of sounding waves».

And finally, I would like to ask you to accept this sort of outline containing some of the undertakings I believe would be important to adopt as participants examining on the Hornbostel-Sachs *Versuch* one century later. I believe it would be best:

1. to compare, in the rather difficult passages, the various translations of the *Systematik*, not only to try to ratify them, but especially to learn from the interpretative reflections, both implicit and explicit, that each version may contain. Let us consider, for example, many passages from the English translation by Baines and Wachsmann, and we can see how freely the authors have introduced highly explicatory expressions that go beyond the 'literal' German original; I think that the Castilian version too, by Carlos Vega, should be taken into consideration for some interesting suggestion it contains;

2. to make an assessment of the many additions and changes proposed over the years, ranging, for example, from those by Picken to the synthesis put forth by MIMO, without, however, limiting ourselves to what has been published in English, simply because, although very relevant, these proposals are a part of a greater whole that, in the name of the universal importance of the *Systematik*, cannot be ignored;

3. to contribute to putting the pattern of the written table of the *Systematik* into a digital version, as an App based on the classes of objects organized in a xml file in the form of a browsable tree diagram. (I contributed to a first

realization of this objective, experimentally designed in 2005 by Ilario Meandri, with an application called HSNavigator, which now needs to be upgraded to newer operating systems);

4. to take into consideration several innovative blocks of *taxa*, placed at different levels of the system; among them, randomly: the subclass 12 (Plucked idiophones converted into Elastically dislocated idiophones); the expansion of the group 133 (Friction vessels) with distinctions traced upon those of the subclass 23 (Friction drums); the introduction of the subclass 15, as mentioned above; the reorganization of the dichotomous determinations of the group 211.21 (Cylindrical drums); the rethinking of subclasses 22 (Plucked drums); and 23 (Friction drums); with the introduction, amongst other things, of the cases of the membranes directly plucked by hand and of the possibility of direct or indirect friction (respectively by hand or by means of a cord or a stick); the clarification of the *taxon* 321.311 (Spike bowl lutes); the adoption of the reorganization proposed by Laurence Picken [1975, 376-380] of edge-tone instruments (but without his adoption of the number 0); a further articulation of 413 (Plosive aerophones); the deep rethinking of the entire reed group, introducing, among other things, the reeds' names 'idiokinetic' or 'idiomorphic', 'membranokinetic' or 'membranomorphic', and 'chordokinetic' or 'chordomorphic', with its consequences in the corresponding items within the reedpipes; the rethinking of flutes, reorganized according to the different ways, free or ducted, of directing the air flow towards the edge device; and the expansion for each of the four classes of common suffixes.

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Renato Meucci

Being and becoming of musical instruments: Curt Sachs and diffusionism

The most complex book by Curt Sachs – *Geist und Werden der Musikinstrumente* [1929] – and one that appears to have never been translated from German into any other language, is, from a theoretical point of view, also the most fascinating among those produced by this prominent scholar in his long and prolific career. I published a detailed paper on this [2017], and on Sachs's extensive scientific output, for the proceedings of the 2006 congress in Berlin which was dedicated to the scholar. The content of this paper extends to 1929, the year in which *Geist und Werden* was published: further information about the author can be found in my other publication.

Curt Sachs, who graduated from university in 1904 with a thesis on Andrea Verrocchio, immediately abandoned his studies on the history of art to devote himself to musicology. Between 1908 and 1910 his research focused on the history of music in Berlin, the city where he had studied and lived, and on the epistolary between two of the greatest German composers, Mozart and Beethoven. From that moment on, the understanding that one specific musicological field – organology – still lacked adequate academic recognition, pressed him to choose it as his main field of study and publication.

Following in the lines of positivist German historiography, and driven by a deep sense of systematization and of the organization of studies, Sachs turned to this discipline in what I would define a 'step-by-step approach', the most organic and grandiose imaginable, and also one that would have been impossible for anyone devoid of a multidisciplinary and multicultural education, or of an impressive breadth of linguistic skills. To these already exceptional qualities he added a skill of concentration and synthesis that only a thorough understanding of his studies can fully reveal. He had, in fact, an exceptional ability to read and memorize, as well as an unmatched ability to discern what is essential and relevant. But let us proceed one step at a time.

The first step was the fundamental lexicographical contribution: preliminary and essential for any subsequent study. In 1913 the *Real-Lexikon der Musikinstrumente* appeared, a work in which the descriptions of an innumerable number of instruments are presented in alphabetical order, and which, due to the vastness of the subjects he deals with, the historical and musical sources he

takes into consideration, the astonishing language skills he displays, still creates in us a sense of loss, as well as of deep admiration (especially if we consider that at the time the author was only thirty-two years old!). And yet after only one year, Sachs [1914], teamed with his colleague, the ethnomusicologist Erich M. von Hornbostel, published another work: an essay on the classification of musical instruments, which is still today the main reference system for the typology of these objects, both in museums and in specialist research. Apart from the terms used to define the four main categories of musical instruments (idiophones, membranophones, chordophones, aerophones), which are now used worldwide, there are numerous others devised by Sachs and Hornbostel for the sub-categories into which the main categories are further divided ('frame drum', 'whistle flutes', 'short lutes' [Sachs 1940], etc.). Not a year had passed, and the first of his studies on ethno-organology appeared, a volume on the musical instruments of India and Indonesia [Sachs 1915a], followed by an article on the instruments of Lithuania [Sachs 1915b], and in 1917 by another volume on those of Assam and Burma. In 1920 a new text would become a monumental contribution in the field, the *Handbuch der Musikinstrumentenkunde*, a 'handbook of organology' specifically dedicated to the instruments of Western tradition. Here Sachs summarizes the impressive historical and technical knowledge collected up to then, effectively ordering the instruments within the classification system created together with Hornbostel. In fact, the *Handbuch* tells the history of these objects not in single chronological order, but within the aforementioned classification under idiophones, membranophones, chordophones and aerophones, thus highlighting the possible reciprocal historical, morphological and constructive kinship. The structural characteristics are described first, then there is a detailed account of the historical transformations of the respective typologies, and, only if required, there is a third section reserved to linguistics, with the etymology and/or the terminological variants of the instrument examined. In those same years, Sachs had also engaged upon another scientific forefront, the study of antiquity, starting with an article on the instruments of ancient Egypt. An entire volume dedicated to the same topic was published in 1921, *Die Musikinstrumente des alten Ägyptens*. The music of antiquity would, nevertheless, be a subject to which Sachs would return periodically – both because it was linked to the subsequent development of western musical art and its instruments, and because it was relevant ethnically. These were, in fact, subjects with which he would deal in the years to follow.

Meanwhile, in 1919 he was appointed director of the musical instruments collection of the State Music Academy of Berlin. It is, of course, not at all surprising that he should be appointed the most technical of jobs there is for an organologist: the cataloguing of musical instruments. The volume [Sachs 1922] accurately describes the instruments then present in the collection. The work is even more precious today because a large part of the collection later went

missing as a result of the bombings that razed Berlin to the ground during WWII. In this case Sachs built on the model of the Brussels museum catalogues which had already been published by Mahillon, and to the one just released for the collection of musical instruments of the Kunsthistorisches Museum in Vienna, by Julius Schlosser [1922]. Leaving aside a series of less relevant publications, we come to his major work, published in the late 1920s, *Geist und Werden der Musikinstrumente* [Sachs 1929], a milestone, the third of its kind, in our field of study, and the main object of this paper.

Here the author delves into a new field, anthropology, relying on the most up-to-date achievements in that field. In the decades that saw the turn of the century, in fact, German scholars put forth some of the most brilliant ethno-anthropological theories. One in particular refers to 'anthropogeography' [Ratzel 1882-1891], to the so-called 'cultural circle' theory by Leo Frobenius [1898] and, above all, to the 'diffusionism' theorized by Fritz Graebner [1911] and Wilhelm Schmidt [1924]. All these theories were meant to interpret the migrations of peoples and their cultures by studying the geographical distribution of surviving testimonies, starting with the prehistory of Europe, an approach that was also the basis of his new book.

This applied the aforementioned anthropological theories – today partly outdated, but still worthy of being examined attentively – especially Graebner's 'diffusionism' (Graebner had published his fundamental *Methode der Ethnologie* in 1911). In addition, Sachs benefited from a previous study: an attentive analysis by the Swiss scholar George Montandon [1919] that was based on similar theoretical principles and concerned the same field of study. The greatest archaism is found in instruments found at the margins of the cultural circle, while those distributed in more restricted geographical and cultural areas, the bases for the aforementioned theories, appear much later.

The method is clearly summarized in a paragraph of *The History of Musical Instruments* [1940, 62], where Sachs takes up and emphasizes the value of the geographical method, explaining in a few words its fundamentals:

> The chief axioms of this method are
> 1) An object or idea found in scattered regions of a certain district is older than an object found everywhere in the same area.
> 2) Objects preserved only in remote valleys and islands are older than those used on open plains.
> 3) The more widely an object is spread over the world, the more primitive it is.
> How such a distribution originates may be illustrated by a physical phenomenon. When a stone is thrown into a pond it will cause a series of circular waves, which grow larger and larger until they fade away or are stopped by the edge. In this series of concentric circles the first (that is the oldest) is the largest one, while the more recently originated circles have a smaller diameter.

He also assigns the origin of the most archaic instruments to an instinctive motor and rhythmic impulse, attributing the origin of many of the subsequent ones to a primitive melodic instinct instead. This concept is fully reflected in the volume structure [Sachs 1929], whose chapters follow each other according to the distribution in twenty-three layers of cultural diffusion, from the more ancient ones to the more recent ones, each accompanied by a tabulated list of the areas of diffusion. Clearly highlighted are the relationships between the geographical and chronological context, from the Stone Age to the Metal Age, and to the Middle Ages, the epoch with which the discussion ends up (or rather, it ends with an appendix on 'coupled' instruments). The volume is accompanied by an impressive iconographic repertoire, consisting of 331 different illustrations collected in forty-eight tables, and an equally huge bibliography in at least eight languages. In the work, which constituted Sachs's dissertation, his youngest son, Georg Ed. Sachs, played an important role: he was the collector of excerpts and abstracts. Born in 1909, his son was, in fact, already a skilled researcher, and he would later become a renowned medievalist and philologist destined to an untimely death in 1939, shortly after the settling of his parents and sisters in New York City in 1937. The most famous book by Curt Sachs, *The History of Musical Instruments* [1940], his first volume written in English, is dedicated to his son, and provides an admirable example of the metamorphosis the German scholar underwent in America. There is no sign of the past, inflated academic style, and the refined German terminology is transformed into a plain and fully understandable narrative. This change was due both to the fact that its accessibility was the right of all American readers, and because American students were not used (nor was the English language) to abstruse and pompous prose. If this metamorphosis, which applied to hundreds of German scholars who migrated to the United States after the racial laws of 1933, were not common knowledge, one would be so shocked by the stylistic differences between *Geist und Werden* and *The History*, as to suspect it was written by two different authors.

Let us now analyse the contents of his accomplished study on the anthropological subject. The first stage of diffusion, called 'primordial endowment' (*Urbesitz*) is understandably the one to which the most remote activities belong, such as, among others, the beating of feet and the hitting on or using of one's body – especially the clapping of the hands. The latter is particularly a female activity, probably connected with the primordial representation of the reproductive role of women. Striking, moreover, is carried out, even in the most recent cultures, to defend from evil spirits and for apotropaic functions; it belongs to this same cultural layer, and throughout the planet we find 'hanging rattles', in series or in bundles, consisting of beads, snail shells, hooves, horns, tusks, etc.

A second layer of diffusion is the one 'circumscribed by the Arctic' whose respective

musical instruments belong to an archaic expression of totemism, the most primitive form of worship of a sacred object. It is in this area that we find whirling boards, also called bull-roarers, small slats of wood attached to a cord and whirled in the air. Two are the features to be investigated, that of shape and that of movement. As for the first, it must be observed that often the bull-roarer is shaped like a fish, and the fish is an ancestral symbol of fertility and rebirth (Jonah's biblical whale, for example). As for movement, it may be useful to underline that in southern Australia, when Sachs found himself writing on one of the most remote regions on the planet, he documented boomerang-shaped bull-roarers that sometimes made a hissing sound without the use of a rope, that is to say, moved solely by the hands of the player. This could mean that the twirling of this angled board represented both the origin and the effect of the instrument. Then, on this same cultural layer, we find rotating discs, which are just a few centimetres in diameter, that are passed through by a thread and then drawn to whirl in opposite directions by the fingers of each hand, thus producing a whistling sound.

A third stratum of diffusion, in which the totemic functions of musical instruments are still encountered, is the one in an area that goes from the northern regions of Australia to North America. It is, Sachs states, the result of two different cultural migrations to the East: the first left traces in the area which included, from west to east, Southeast Asia and California, with the most evident signs found especially in Hawaii. From the Californian area this cultural layer spread over the entire American continent, following the migrations of the native tribes from north to south.

Then there are the scrapers: sticks, canes and vases held sideways and rubbed with an appropriate object, these emit scratchy, crackling sounds, and are musically worthless. In some cases they assume phallic shapes and represent the male member during the initiation of adolescents in ritual dances that precede their first sexual experience. We must also not forget the ribbon reeds, against which the breath breaks, making them vibrate and allowing the emission of a very shrill sound. The best known example is the blade of grass held by the thumbs, which is a child's sound instrument in Washambala (eastern Africa) exactly as it is in Europe.

However, a translation sample can give an idea of the methodological approach and the concept of this unique and appealing volume better than any words could ever do [Sachs 1929, 14-16].

> **The strata of 'totemic groups' included between Northern Australia and North America**
>
> Among the totemic group strata, this group stretches from the uppermost Arctic regions of North America to the far South. Apparently the wealth of this culture moved eastwards in two different migrations. One – which provides the material for this section – left no traces in most of Oceania, only meagre ones in the Archipelago and in Polynesia, and many

in Hawaii, with some traces further south in the main conglomeration of the islands, but mostly north, along the line that runs west to east from Southeast Asia through Hawaii to California. From this point, the dissemination may have spread to the rest of North America and, with the migration of local tribes, north to south, into the central areas, and down to South America. The other route, the southern one, will be discussed in the next section.

Percussion sticks. Boas recounts that the Kwakiutl in North-western America sat opposite to each other in two rows to make music, each held a long cedar trunk in front of them; alternating, one row sang while the other struck the trunk with sticks. About the nearby Nootka strait, we know that there too a beam, which was hollowed out at the bottom, was beaten, according to Bancroft, with poles that were one foot long, or, according to Jewitt, «with a stick». Towards the west they tied large bamboo rods together, which in the nearby Tahiti were set on the ground. Further west these rods were suspended in the air like the rope of the 'ground zither' and beaten with wooden pitchforks, while the ground was also beaten, like in the Banks Islands. In southern Celebes they were beaten by the shaman with sticks to defend the tribe from evil spirits. Near the Samang, a solid wood beam three metres long was hung from a raffia rope and beaten by the women and girls at night. Likewise, in Madagascar, a bamboo rod was beaten by the women. In French Cameroon, the Eshira, Iveia, and Bavili used two pitchforks. In all the above mentioned cases – like the one cited by Jewitt – the sound instruments were struck using two sticks. In Suriname and in Brazil too, the black population introduced sound using sticks. Here people liked to have «fun near the log pile, engaging Negroes to accompany the music by rhythmically striking logs and empty boards».
Distribution:

Afro-America	Africa	Asia	South Seas	America
Suriname [1] Brazil [2]	Eshira [3] Bavili [3] Iveia [3] Madagascar [4]	Gilyak [5] Semang [5] Negritos - Philippines [5] South Celebes [6]	Banks Is. [7] New Zealand ? [8] Tahiti [9]	Nootka sound [10] Kwakiutl [11]

[1] Enc. Ned. W. Ind. 497. – [2] Kerst 304. – [3] Avelot 293. – [4] Grandidier III 144. – [5] Commun. of P. Schebesta. – [6] Kaudern (3) 22. – [7] Speiser (3). – [8] Best: «a *large plank*». – [9] Meinicke II 189. – [10] Boas 51. – [11] Bancroft I 201; Jewitt 98. – [12] Krämer (1) 327.

These should be linked to a pair of similar rolled objects, for example, in Delaware, North America, an animal skin wrapped and stuffed with hay and two sticks, or the corresponding rolled mat of Samoa.

Concussion sticks. A supplementary circumstance seems to have originated the need for the creation of a pair of similar sticks: it is, in fact, impossible to clap hands while dancing if holding a weapon. What could be recorded as an archaic pair of sticks struck against each other, was, in fact, a weapon: the most primitive inhabitants of the Australian continent accompanied the propitiatory dance by beating their angled throwing sticks, the *boomerangs* or *nolla-nolla* together. External interferences were most likely the reason for this, because, in fact, the sound on impact could never have been louder than that of clapping hands.

Even on the threshold of high culture we find these same angled sticks: on an Egyptian prehistoric vase, dancers can be seen striking knee-shaped boards together. Knee-shaped throwing boards were not new to Egypt: an ancient illustration, in fact, depicts a scene where hunters are first noisily clapping sticks and disturbing the waterfowl in a papyrus grove by the river, and then hitting them with the same weapon. This is a classic example of the subverting of the values of high cultures, with the finalization of how an object is used. In ancient times, Egyptian dancing abandoned the angled sticks, by then considered obsolete, for simple rounded ones. These sticks, the clappers, were used as a propitiatory device for a fruitful yield during harvest. These rounded sticks too underwent a change in use: in the Old Kingdom (III millennium), they were meant to rhythmically facilitate the work of crushing grapes. Since sticks of the same shape were also found in Australia, we suspect it is due to subsequent influences from the North. In fact, sticks from that region of the world, sometimes carved rather intricately, bore the markings of a culture that was superior to the Australia one. Relatively late, for example, from the North came a circle in which the cult of the frogs of the Aranda and Loritja tribes was presented. In that circle two actors sat one behind the other in a ditch and beat a stick to prevent the frogs from croaking. The red colour of the Australian sticks are evidence that they belonged to the totemic type mental processes. Versions could also be found in more recent uses; among the Kágaba in the Colombian Sierra Nevada, it accompanied a dance to prevent birds from endangering the harvest, and among the Nabaloi, in North Luzon, it followed the tattooing procedure.
Distribution:

Africa	Asia	South Seas	America
Ancient Egypt [1]	Buryats [6]	Tasmania [13]	Thompson Is. [24]
Warega, Centr. Afr. [2]	Indian subcont. [7]	Australia [14]	Queen Charlotte Is. [25]
Adele, Togo [3]	Annam [8]	Gazelle Penins. [15]	Choctaw Indians [26]
Cameroon [4]	Cambodia [9]	New Irland Is. [16]	Ancient Nahua [27]
Pangwe [5]	Perak [10]	Santa Cruz Is. [17]	Kágaba ? [28]
	Nabaloi [11]	Loyalty Is. [18]	Canela - Brazil [29]
	South Celebes [12]	Marshall Is. [19]	
		Nauru Is. [20]	
		Caroline Is. [21]	
		Marquesas Is. [22]	
		Hawaii Is. [23]	

[1] Sachs (11) 12. – [2] Delhaise 273. – [3] Zech 104. – [4] Malcolm 398. – [5] Avelot 288. – [6] Czaplicka 205. – [7] Sachs (4) 13. – [8] IM. Brüssel 1694. – [9] Leclère 278. – [10] Skeat (1) 121, 126, 131, 134; Skeat (2) 472. – [11] Scheerer 150. – [12] Kaudern (3) 13. – [13] Bonwick 39. – [14] Strehlow e al. 38; Eyre 228, 230; Eylmann 375, 376. – [15] Parkinson (2) 136. – [16] Krämer (3) 53. – [17] Buschan II 177. – [18] Ray 273. – [19] Kraus (2) 35. – [20] Hambruch (1) 330. – [21] Hahl 95, 99; Girschner 209; Meinicke 383; Müller 265. – [22] Melville 187. – [23] Choris 19. – [24] Teit 299. – [25] Poole 322; Bancroft I 270. – [26] Bushnell 22. – [27] Bancroft II 426. – [28] Preuss (8) 1047. – [29] Kissenberth 51.

And now to the flutes: in these instruments the sound is produced when a stream of air is blown against a sharp edge or a lateral hole. Due to its shape, in many cultures it is associated to the male member and reproduction (still today, in many countries the word flute is used as a euphemism for penis). For the same reason the flute has always had a role in rituals, for example, in Africa during the initiation of young men; it, therefore, could not be seen by uninitiated men, strangers, women or children. Procreation and rebirth belong to the same layer in which concepts relating to blood, incisions, the colour red, the midday sun and the ripening of the earth or fruit trees are found. The sacred flutes of the Sentanier, in northern New Guinea, are streaked with blood, and those of countless other peoples are painted red or decorated with the colour red. For the same reason, the sacred flutes of Northwest Brazil are sounded during harvest celebrations; and, in the myths of the same Sentanier, the first flute was born when a couple wanted to collect the fruits of the baobab. As for rebirth, this usually derives from funeral rites. In ancient Mexico the slaves who were offered as victims on the coffin of their prince were brought to death to the sound of the flute; and the children, whose heart would be extracted by the high priest and offered to the sun, also climbed the steps of the pyramid temple to the sound of the flute. In a similar celebration of rebirth, the primitive tribes of Formosa play the flute at the return of the head-hunters, a sacramental hunt that is itself the symbol of rebirth.
The flute, in the cultures of African harvesters as well as in North America, disperses the clouds and drives away the rain, or recalls the fertility of the earth. Where the phallic implications of the instrument are lacking, the translated meaning always remains the same: magic for fertility and reproduction – the enchantment of love – the expression of love (serenade) – the feeling of love – entertainment – children's play. And even in the latter case, it is significant that the flute is almost exclusively male entertainment.
Flutes made from human or animal bones resonate in a shrill voice, and the young bones are obtained from deer or jaguars, but also from slain enemies in South America. In a Uitoto story (ancient Peru) a young man must play one of his mother's bones to draw her killer, the jaguar, and lure it into the water to be eaten by alligators. The magical power of the flute is even recognized by the Motilón clan of the Suriname. These employ their single-hole flutes, made from human or animal bones and often played in by two players, for funerals (reference to rebirth) and for male dances (phallic worship).
As for the type of flute, two types are distinguished: notched flutes and whistle flutes, depending on whether the point of production of the sound is at the end or within the instrument. In the first case the player blows directly against the notch, in the second in a hole cut in the side that pushes the air-stream against an edge. The whistle flutes do not yet have fingerholes, the notched flutes often do, and this fact seems to support the idea that whistles are much more ancient. Double flutes remain to be mentioned, and it is, in fact, discussed in the aforementioned appendix. And finally we find the third layer, which is supplied by nature itself: pumpkin rattles. Vegetables containing seeds can also be considered instruments, because once the seeds have dried, when shaken they rattle against the walls. The next similar sound device is the flask-shaped pumpkin (*Lagenaria*) filled with pebbles or grains of wheat. In north-western Africa the pumpkin is empty and the rattle consists of an external network made of seeds. Spread almost throughout the entire planet, with the exception of Europe, the main function of the rattle is apotropaic, that is, to drive away evil spirits, but in some cultures it is used by the holy men to heal the sick, and in other cases in the rain dance. Naturally, the reproductive meaning cannot be lacking, especially in this case: the bulging vegetable, with seeds inside it is easily traceable to the idea of female fertility.

This brief review of the contents of the first three layers, together with the translated excerpts from *Geist und Werden*, give a rather accurate synthesis of the methodological approach of the volume.
However, to better clarify what the scientific premises of diffusionism and the cultural circles (the methodological counterpart to the rigid application of evolutionary theories) are, I thought it useful to add a translation essay in the appendix, which cites the foreword found in the volume integrally.
When returning to the same topic twenty years later in *The History of Musical Instruments* [1940], however, Sachs, by strongly reassessing the validity of the geographic method, reduced, thus simplifying, the number of cultural strata, as follows:

The early stratum comprises those instruments which, prehistorically, occur in paleolithic excavations and, geographically, are scattered all over the world. These are:

IDIOPHONES	AEROPHONES	MEMBRANOPHONES	CHORDOPHONES
rattles	bull-roarer		
rubbed shells?	ribbon reed		
scraper	flute without holes		
stamped pit			

No drums and no stringed instruments appear in this early stratum.

The middle stratum comprises those instruments which, prehistorically, occur in Neolithic excavations, and, geographically, in several continents, though they are not universal. These are:

IDIOPHONES	AEROPHONES	MEMBRANOPHONES	CHORDOPHONES
slit-drum	flute with holes	drum	ground-harp
stamping tube	trumpet		ground-zither
	shell trumpet		musical bow

The late stratum comprises those instruments which, prehistorically, occur in more recent Neolithic excavations, and, geographically, are confined to certain limited areas. These are:

IDIOPHONES	AEROPHONES	MEMBRANOPHONES	CHORDOPHONES
rubbed wood	nose flute	friction drum	
basketry rattle	cross flute	drum stick	
xylophone	transverse trumpet		
jaws' harp			

Perhaps a consideration can be made, one found in *The History*, in which, in summarizing the methodological approach adopted, Sachs [63] also adds cautiously:

> The geographic method, too, may prove fallacious. The commercial dissemination of European goods and, before that, the systematic spreading of Near Eastern instruments following the Islamic conquest, sensibly restrict its worth. Nevertheless, geographical criteria are safer than any other criteria because they are less exposed to subjective interpretation. It is best to follow them as closely as possible and to check the chronology they provide with prehistoric and historic data, and with the more interpretive answers to the questions of simplicity and cultural level.

Appendix

Curt Sachs, *Geist und Werden der Musikinstrumente. Foreword*

The study of musical instruments of all peoples and in all times has a singular charm. For the musicologist they represent – in the context of an ephemeral, fleeting art that disappears into nothingness – something imperishable, stable, and tangible. In the nebulous realms of an art whose nature and expression reject definition and verbalization, musical instruments are matter, fully accessible and describable in words scientifically. The epochs, whose songs and sounds have vanished without leaving written or oral traces, have left, in musical instrument at least, evidence of that world of sound; and even in more recent centuries, the mysteries of their musical essence are unveiled when we pass from fossilized musical notation to the actual sound that is brought to life through the instrument. But the knowledge of the nature and fate of sounding objects is not just a matter for the musician and the musicologist. In fact, these objects have much more to reveal than just their aesthetic values. Before music becomes art – art in the particular meaning of perceptual pleasure, of pleasant leisure, or of abstract construction – it is inextricably linked to spiritual behaviour as a whole; it is the most immediate religious and social act, and reflects, like the faithful mirror for an observer, the undistorted image of ancient cultures. This is intelligible, however, only by those who have clear in mind that for the natural man the world is an inseparable unit. We Europeans have reached – with respect to the portentous synthesis that Scholasticism has sought out in the High Middle Ages – an ever more individual dimension. The world and our 'I', our idea of self, have parted. Being, thinking, sensing, feeling – everything is divided, and these things 'have nothing to do with each other'. The natural man has not yet separated anything. The world is one for him, one in itself and one with him. One with him: the elements that surround him, the colours he sees, the shapes he touches, the stars that illuminate him, the cardinal directions that appear to him, the animals and plants in the multiplicity of their way of existing, and beyond that, the numbers, to which he traces a combination of phenomena, everything is, for him, part of a whole with numerous variants, but with the same meaning and the same force. He and the universe are one: the seasons and phases of the moon, the path of the sun, and the hours of the day are with him; the mysteries of sowing and reaping, of germination and growth, of birth and death, of reproduction and rebirth – earth and man, macrocosm and microcosm, are neither opposite nor equivalent, but one and the same. The deep awareness of his knowledge, of his feelings, of his growth, as well as the purpose of his actions, are none other than the preservation of the species; preservation through nutrition, heating, renewal, procreation, pregnancy, birth, inheritance, recurrence. Vital forces hereby recall and quash those that oppose them, following, therefore, a cultural cycle. The power and lifeblood of one's ancestors, the reproductive organ of man, the fruitful womb of a mother, the scorching sun, and the fruitful moon that bears fruit, the fertile earth and the rain that nourishes it – these are the objects of every ritual, and its magical medium is the sophisticated and laconic conversing of all things, shapes, colours, sounds, and movements – the expression, representation and substitution of which – live in one's soul. What is most realistic, most personal, and, in a sense, most connected to matter, is, in fact, its remotest expression: sound, and, consequently, its most powerful cult object, the musical instrument. It acts directly, responds to specific movements, and its response is the strongest: it is the infallible magical medium. Other instruments of worship must first be consecrated; the musical instrument is spirit. This is why it is at the centre of all religious life. The musical instrument as a cult object, as a magical means, excludes all other aesthetic consideration. It must not function as a producer of artistic enjoyment, but as a catalyst of the forces that sustain life, as an exorciser of destructive forces, no matter how they present themselves. Through sound, first of all. It crackles and rattles, snaps, screams, growls, roars, hisses, whistles, buzzes; 'sound', in a musical and vocal sense, is not required, and is even avoided, because the fear and the distress that men

feel in hearing it must also serve to ward off the forces of evil. But this emotional side is only a part of the action. In the inner perception of the sensorial element, acoustic expression is accompanied by a whole series of representative contents. An 'empty' sound is empty because of the incomplete series of partials, a 'more acute' sound is acute because of a certain series of high partials – in short, what is, for us, obscured today by the explanation, by the metaphor, is, for the natural man, the very essence of being. Empty and acute, however, are just as valid as the properties of sound, form and taste. In particular, a mother's womb, which encloses the fruit, is hollow and dark, like the night in which the mystery of birth takes place. Thus, the empty and acute sound is the bearer of fruit and birth. Sound cannot exist alone. The unity of perception needs it to be combined with other forms of representation and movement. The musical instrument as an object must sustain – materially, visually and tactilely – the magic of sound. The seashell is fertile not only for the deep and empty sound it produces, but for its concrete cavity and for the fecund physical construction, the bearer of water, which, even when it is not played, is necessary to the execution of the ritual. The stamping tube has a feminine connotation, because it has a dark sound, because it is empty and it strikes mother earth. The flute denotes vitality and rebirth because, as in common parlance, it is synonymous of the male organ. The beating of the drum is so representative of the act of procreation that in primitive areas the slit drum is not beaten, but rather pushed with a phallic rod. These symbolisms are so incredibly intrinsic that some sounding objects must be played exclusively by men, and others only by women. This division by gender often led to a death sentence for women who intentionally or unintentionally observed what is considered a characteristically 'male' instrument. The history of musical instruments is, therefore, not only the study of how to perfect technical skills to achieve superior musical results; it suddenly becomes a portrait of the development of social history. It must show how innate expressions of sensitivity serve religious concepts and purposes; how the growing decline in the sense of religion – or even the substitution of one rite for another – progressively secularizes the musical instrument, tending towards practical uses; how it clears the way for sensual pleasure and how this becomes artistic strength; how, therefore, on European soil, the fate of musical instruments reflects the ideal sound of peoples and times, and the sonorous ideal itself is seen as the expression of a shared sentiment. This is the content and the function of a historiography of the musical instrument. Our path, until we reach a historical plateau, is dark and barely outlined, but in fact, a large part of what once existed is still alive today: it lives among the people of low and very low culture, of course, but it also exists among us, in the integral remains of the ancient customs of our people. Lying together, however, without cohesion, that of others and our own, the more recent and the ancient. How can something dead become alive again? How can chaos become order? For the music researcher the next step should be to focus on the musicological perspective and move in that direction. This would mean making decisions based on the functioning, be it high or low, of the instrument. But even here insurmountable difficulties arise. Modern-day historical research, which no longer subordinates development to the concept of unidirectional progress, has no right to post-date a phenomenon because it is more highly developed – higher solely from the point of view of our retrospective observation. What is progress in musical activities? Is it the enrichment of sound material, the conquest of higher and lower sounds, or the reduction of pitch distance? Is it the growth of pure harmony, the increase in tonal refinement, or the increased flexibility in the dynamic and rhythmic power of sound? We would soon find ourselves at a dead end. How is it possible to establish whether a three-hole flute using partial closure or fork-fingering was able to produce more notes and smaller intervals than another flute, one that seems to us more functional because it has four holes? Can we, in any way, ascertain that sounds produced using instruments of a backward population are as noble as the sounds their musically superior ancestors produced? How can we possibly know if the sound produced by a damaged sound object from a lost world, an instrument I just happen to pick up off the shelf in a museum, gives

me even a hint of what it would have given well-trained hands and lips years ago? Does our everyday experience not teach us that the sense of rhythm of primitive peoples is far superior to that of modern Europeans, that the rudimentary tube of an Indochinese flautist has more technology than a modern Boehm flute, or that the Japanese koto player draws from the strings a complexity that Europeans can hardly imagine, let alone imitate? Plausibility is a bad advisor here: it leads us astray if we compare, and proffers nothing if we bring together distant things. No one today would dare conclude which instrument – a slit drum or a trumpet, a flute or a pumpkin rattle – 'plausibly' came before the other. Even ergological methods, analysing the distinctive features of an object, are insufficient. Certainly, we would not be wrong to assume that composite and elaborate artefacts generally belonged to cultures that were more mature than simple and primordial ones. No one would doubt that a piano comes after the musical bow, and that the organ came after the pastoral flute. But it is not that simple. One must also take into account that objects which, according to a historical-cultural experience, have moved from higher to lower cultures, have also regressed in the hands of less skilled artisans. This is confirmed by the fate of the panpipe which, created in cultured Asian tradition, was taken by waves of intermediate culture and transported to America. On the other hand, there may be cases in which refined techniques find simpler solutions. Consequently, it did not seem possible to take on a study of this kind solely by analysing the objects. Here too, our worst enemy is plausibility; a risk that consists in the introduction – from a modern point of view, and, therefore, from an external point of view – of ideas of development, which, on the contrary, must be the first to be avoided. The observer who understands that musical instruments are an indissoluble, truly pre-eminent part of the entire cultural heritage of all peoples must, as an alternative, look for the ways in which anthropological theory has developed so as to transform disordered juxtaposition into chronological sequence. The historical aspirations of anthropology are condensed today in the so-called theory of cultural circles. It is concerned with constantly comparing the diffusion of specific material goods, ideas, physical conditions and customs, and of exploiting their field of distribution in order to reveal the stratifications of human culture, and, therefore, its history. It is well known that this doctrine, applied, in particular, by Frobenius, Graebner, Foy, Ankermann and Father Schmidt, has not yet been adopted by all ethnologists, even though there continues to be growing support for it. I, author of this paper, am not authorized, from my particular observation point, to take a stand in this discussion, but must deal with what is the only historical method in ethnology. The foundation it offers is not yet strong enough today to have a permanent structure built upon it; it can inspire research and oversee the results, but it cannot determine them. Lastly, there was – after the musicological, the ergological and the ethnological systems – a fourth system: the geographical method. The main idea is that from each cultural centre spring cultural, intellectual and material wealth, through the actual migration of groups of people or through transplanting from tribe to tribe, radially; and, driven by newer and newer waves, the larger ones move towards the peripheries. In other words, the farther a wealth is from the heart of its mother culture, the older it is. Of course, this is only possible for those who, in this contrast between the pros and cons of cultural transmission, have sided with the former. The old dispute is still raging: has the essence of human culture been radiated by one or few centres, or has it occurred independently in many parts of the world as a necessary result of the human species itself? Growing proof makes it obvious to me that the entire world of instruments of low and medium cultures, including the American and the South and South-eastern Asian ones, has been fuelled by few centres, the most important and fertile of which is located in Central Asia. How could it be otherwise? Let's take the flute's sounding device, for example: a cut in a wall on whose sharp edge one's breath separates, and an internal air-stream that leads from the end where one blows to the edge itself, so that only a small amount of air flows at an appropriate angle against the sharp edge. Is this not so special, so extraordinary, that it is difficult to imagine an independent discovery in Asia,

in the European stone-age, and in both Americas? Or the bull-roarer, a small fish-shaped board tied to a string, that resounds in North and South America for the same events as it does in the South Pacific, in Africa and in the mysteries of ancient Greece? Or even the musical bow – which in several very distant parts of the planet is put to the mouth – with which, by changing the resonance of the oral cavity, one can highlight the partial sounds and connect them to the melody? If the human race, using these same procedures, could make such unique inventions in a completely independent way, how is it that neither the South Pacific nor the whole of America ever accomplished, in the construction of stringed instruments, something as simple as the musical bow? That the flute is missing from entire areas that are anything but primitive? And that trumpets of all kinds are foreign to northern Indians? For anyone who has observed, throughout his or her numerous years of study, how the most singular objects – often with constructive features that are very similar – are found in opposite parts of the world, and how they maintain their symbolic meaning and the circumstances for which they are played despite of all other external influences, underlining and explicitly defending this dependence seems rather pointless. There existed, years before, the majestic image of an earthly, cultural bond that was created – over the course of thousands of years of wanderings and voyages, across countries and over the seas despite all the obstacles presented by the land and the elements – as a result of the struggles of mankind. The contours of this image are becoming clearer: ancient migrations through Northeast Asia, over the terrestrial bridge that once connected Kamchatka and Alaska; unprecedented and audacious sea voyages at the mercy of and in disregard for the ocean currents between Asia and North America; the most ancient human wealth still preserved by the remotest Indian tribes; younger strata crossing the Pacific Ocean from island to island all the way to South America; and then new waves that were already exhausted in Oceania, or that just touched upon the outer borders of the Malay Archipelago. The range of action becomes smaller and smaller, the area of diffusion decreases. But new influxes are on their way, from other centres: Western Asia, Egypt, and the Indian continent; and the circular waves ripple creating strange figures. Of all the representations that our methods develop, this is the clearest and the most impressive; the path that the geographic method has unveiled seems to be the safest and the most verifiable. The beginning and the end were easily determined: the final phase was uncovered unequivocally in the light of historical data; and the beginning was unambiguously found where the four questions – on the musical practice, on the quality of the work, on the cultural condition of the tribes that possess them, and on their range of diffusion – found the same, most incredibly simple answers. With these questions in mind, every itinerary was examined, and the path was always correct. The individual points, one or the other, can certainly, and undeniably, be improved, being, as they are, the work of man; but the history of the musical instrument, which I have tried to put forward here for the very first time, should find confirmation in the points that matter. Not just music research, but also ethnology and human history can profit from it!

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Ignace De Keyser

Hornbostel-Sachs and Mahillon: the unanswered question

My starting point is Victor Mahillon's lack of a reaction to the classification system by Erich von Hornbostel and Curt Sachs. In the fourth and last version of his own classification system, published in 1922, Mahillon does not make any comment on the Hornbostel-Sachs classification system, even if Hornbostel and Sachs made many comments on Mahillon's system in their *Versuch*, published in 1914. In fact, Mahillon was not able to consider the *Versuch* in the fourth version of his classification system, since he wrote this version at the end of 1911 or, at the latest, at the beginning of 1912 [De Keyser 2017, 223-225]. Even more importantly, any chance of direct contact between Victor Mahillon and Erich von Hornbostel and/or Curt Sachs failed. Victor Mahillon, who was seventy three at the time of the publication of the *Versuch*, was retiring from the Musée Instrumental, leaving the daily running of the museum in the hands of his assistant, Ernest Closson. Mahillon passed the winter months in southern France, and, from 1903 onwards, had a permanent residence in Saint-Jean Cap Ferrat. In March 1914, Hornbostel was in Brussels to give two lectures – neither of these dealt with his classification system of musical instruments. During his stay in Brussels, he visited the musical instrument collections of the Brussels Conservatory, and the Tervuren Congo Museum, [currently the Royal Museum of Central Africa], but he did not meet Mahillon. On 29 May 1914, Curt Sachs also went to Brussels (figure 1, p. 49), again without meeting Mahillon.

On 4 August 1914, Germany invaded Belgium and destroyed the Central Library of the University of Louvain – one of the largest academic libraries of that time in Europe. As a reaction, many Belgian scientific institutions withdrew their subscriptions to German scientific journals and so did Closson at the Brussels Conservatoire Museum (*in casu* with the *Zeitschrift für Instrumentenbau* edited by Paul de Wit, though a friend of Mahillon). Due to wartime hostilities, German scientific journals were either suppressed or did not arrive. Closson, of course, never went back to Berlin during the war, and after the First World War, Mahillon definitively stayed in Saint-Jean Cap Ferrat in Southern France (figure 2, p. 49) until his death in 1924 [Closson 1924, 119]. Mahillon was, therefore, never able to discuss classification systems when both Hornbostel and Sachs visited the Conservatoire museum, nor to take the Hornbostel-

Sachs classification system into account.[1] In their correspondence after WWI, Hornbostel and Sachs, on the one hand, and Mahillon (and Closson) on the other, dealt mainly with overblowing fifths, harpsichords etc., avoiding any discussion about their respective classification systems.
What questions could Mahillon have discussed with Hornbostel and Sachs? Mahillon could have asked about the definition of aerophones in Hornbostel-Sachs's *Versuch*, and, more generally, about the following points regarding the function and the limits of the classification systems for musical instruments:

> Is the definition of the criteria for the main classes in the classification system of Hornbostel and Sachs an acoustical paradigm?
>
> What place do combination instruments hold in a hierarchically established classification system for musical instruments?
>
> What about the 'emic' discussion, i.e. an approach made from an inside viewpoint of a cultural system?

The definition of the criteria for the main classes
Hornbostel and Sachs claimed they used the same criterion as Mahillon did to define the four main classes of their classification system: «In Anschluss an Mahillon haben auch wir den physikalischen Vorgang der Tonerzeugung als wichtigsten Einteilungsgrund angenommen» (Following Mahillon, we accepted the physical process of sound production as a main criterion for classification) [Hornbostel and Sachs 1914, 557].

Class	Hornbostel-Sachs	Mahillon
Idiophones	Das Material des Instruments gibt dank seiner Steifigkeit und Elastizität den Ton her, ohne gespannter Membranen oder Saiten zu bedürfen.	Où le son est entretenu par l'élasticité des corps eux-mêmes.
Membranophones	Tonerreger sind straffgespannte Membranen.	Où le son est dû à la vibration de membranes devenues élastiques par tension.
Aerophones	Die Luft selbst gerät primär in Schwingung.	Où le son est produit par le mouvement vibratoire de l'air, obtenu à l'aide d'un courant agissant sur des organes spéciaux.
Chordophones	Eine oder mehrere Saiten sind zwischen festen Punkten ausgespannt.	Basée sur la vibration des corps, corps filiformes qui, de même que les membranes, ne deviennent élastiques que par tension.

1. In my article *Sachs und Mahillon: Ein verpasster Dialog* [De Keyser 2017, 224], an error is present. The text should read: «[Dies] bedeutet, dass Mahillon die Systematik von Hornbostel und Sachs nicht berücksichtigen konnte».

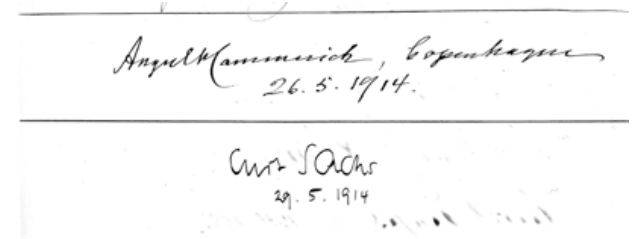

Figure 1.
Signature of Curt Sachs at p. 10, in the Visitor's Book of the Brussels Musée Instrumental, Brussels, MIM Archives COURTESY BRUSSELS MIM

Figure 2.
Victor-Charles Mahillon and his son Fernand in Saint-Jean Cap Ferrat after the First World War.
Brussels, collection of the late Pierre Mahillon COURTESY BRUSSELS MIM

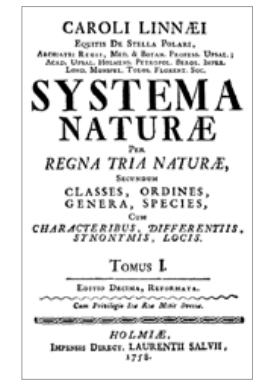
CAROLI LINNÆI
SYSTEMA NATURÆ
REGNA TRIA NATURÆ,
CLASSES, ORDINES, GENERA, SPECIES,
TOMUS I.
HOLMIÆ,

Figure 3.
Linnaeus' biological classification system
FROM WIKIPEDIA, AVAILABLE UNDER THE CREATIVE COMMONS ATTRIBUTION-SHAREALIKE LICENSE

Hermann Backhaus [1938], but more prominently Herbert Heyde [1975], and Jeremy Montagu [1998] formulated a fundamental critic on these criteria, which they considered to be inconsistent. According to Backhaus [1938, 238], aerophones should be compared with idiophones: «Schließlich werden 'Aerophone' als besondere Klasse behandelt, obgleich man sie nach den bisherigen Grundsätzen zu den Idiophonen rechnen müßte» (Finally, aerophones were treated as a special class, although, according to the current principles, they should be classified among the idiophones). Heyde [1975, 37-42, 121] considered membranes, strings and solid bodies *Wandler*, as he called them, or 'converters', which convert incoming energy into an energy format that can be perceived – directly or indirectly – by human beings. In wind instruments, these 'converters' are threefold:

> The edge of a flute on which turbulences are produced, through a steady air stream (*acialia*);[2]
>
> The mechanical vibrations of a reed on reed instruments (*lingualia*);
>
> Idem of a lip reed (*labialia* – called labrosones in the MIMO version of Hornbostel-Sachs classification).

Apparently, there is a difference between Hornbostel-Sachs and Mahillon in their definition of aerophones:

Aerophones	Hornbostel-Sachs	Mahillon
German / French original	Die Luft selbst gerät primär in Schwingung	*où le son est produit par le mouvement vibratoire de l'air, obtenu à l'aide d'un courant agissant sur des organes spéciaux*
Translation	In the first place, it's the air itself that is set into vibration	*where the sound is produced by the vibratory motion of the air, obtained by means of an air stream acting on specific components*

The definition of aerophones by Hornbostel and Sachs is too concise: the air is not a generator of sound, but the driving force, and the medium in which the 'converters' are acting, these converters being an edge, a reed and a lip reed. Mahillon [1878, 108] rightly called these 'converters', *organes spéciaux*: «Les vibrations de l'air dans les tuyaux peuvent être provoquées par trois organes de caractère bien déterminé: l'anche, la *bouche*, l'embouchure» (The air vibrations in a tube are caused by three very specific components: a reed, the lips, an edge). He thus considered an edge, a reed and a lip reed acoustically relevant for the sound generator, as he called it – more precisely, for the 'converter'

2. According to Heyde the difference between a bull roarer and a recorder is that of a 'converter with active type of action' («Wandler mit aktiver Aktionsart»), compared to a 'converter with a passive type of action' («Wandler mit passiver Aktionsart»).

of energy. However, why didn't Mahillon consider autophones/idiophones, membranophones, and chordophones main classes together with edge, reed and lip-reed instruments (which Herbert Heyde called *acialia*, *lingualia* and *labialia*)? And why did he place these three sub-classes within the aerophones together with wind instruments with an air reservoir?
The definition of the *organes spéciaux* is anterior to Mahillon's thinking of a classification system for musical instruments: it is already present in his earlier acoustic writings. In his treatise on acoustics *Eléments d'acoustique*, published three years before the first version of his classification system, Mahillon had already specified these specific components [1874, 187, 164, 267, 95]. His own acoustical experiments were mainly focused on the influence of the bore on wind instruments [De Keyser 2017, 225-231].

Figure 4. Experimental pipes used by Mahillon for his acoustical experiences, Brussels, MIM inv. M2230 COURTESY BRUSSELS MIM

In other words, Mahillon did not consider edge, reed, and lip-reed instruments as main classes at the same level as the autophones/idiophones, membranophones and chordophones, since his main concern in defining wind instruments was to measure their bore dimensions, and their importance as a major factor in the sound spectrum of different wind instruments.

Combination instruments in a hierarchically established classification system

There is a second reason why Mahillon distinguished four sub-classes within the aerophones, and that was due to the existence of polyphonic wind instruments that

have an air reservoir that include aerophones belonging to different sub-classes.[3] In the Hornbostel-Sachs classification system, it is of course possible to include combination instruments, by joining different sub-classes. The first to mention the problem was Jeremy Montagu in an article written in 1971 along with John Burton. They give the example of a highland pipe – which would require the use of 23 figures and signs: 422.112/422.211.1.-621: they rightly conclude: «the systematic is constructed, not as a classification […] but as a key» [Montagu and Burton 1971, 50]. To a certain extent, this situation is comparable to what happens in the Universal Decimal Classification (UDC) used for scientific literature and in libraries, where it is possible to put whatever subject of human knowledge from whatever point of view by using a combination of several Dewey codes, and extra suffixes and special codes for geographic, linguistic and cultural entities.
To Mahillon, a zero group for each class might have been a pragmatic solution for combination instruments; anyway, that's the sense of his approach in creating a fourth class among the aerophones.

From classification systems to…
If one were to go on to analyse all the instrument species, after having identified all the descriptive categories, he would eventually have to determine a relevant location for each instrument species in a system. The system is assumed to be pre-existing and the instrument species or types are supposed to fit in. The most fervent adept of this theory, Hans-Heinz Dräger himself recognizes the idealistic character of his reasoning:

> Das Ideal einer Systematik wäre, diese Momente [die physikalische Beschaffenheit des primär in Schwingung zu versetzenden Stoffes, dessen Formgebung und Montage, die angewendete Spieltechnik, das Material des primär in Schwingung zu versetzenden Stoffes und schließlich den zur Erzeugung der Schwingung benutzten Erreger] so in Relation zu bringen, daß bei gleicher Fragefolge jedes Instr[ument] an seinem ihm allein zukommenden Platz neben den ihm zunächst verwandten stehen würde. Da diese Verwandtschaft aber von den verschiedensten Momenten bestimmt sein kann, ist dies Ideal nicht erreichbar» [1957, 1291].

> The ideal of a systematic [classification] would be, to build a more equal relationship between these moments [i.e. the physical nature of the primary material to be put into vibration, its morphology and design, the playing technique used, the material of the primary material to be put into vibration, and finally the energy used to generate the vibration]. [That should be done] after a serial questioning, so that the result would be a rightful place for each and every instrument, standing next its first relatives. Since this relationship can be defined by a large variety of moments, such an ideal is unreachable.

3. Roger Blench calls them 'multiple instruments' and Cristina Ghirardini 'polyorganic instruments' – see their respective articles within these proceedings.

On the other hand, a system in itself is not a 'scientific' proposition. Logical empiricists consider a system as nonsensical: it cannot be verified, nor falsified. However, the arguments underpinning the choice of one or another criterion, or those which may or may not organize species in a particular [sub]-class, can of course be verified and falsified and are subject to scientific research.
The fundamental question, however, is to know whether it is at all possible to make a classification system for musical instruments, when the main classes can be found on one and the same musical instrument. Let's compare it, for example, to zoology, and imagine a fish that has the sexual reproduction system of a mammal, and that can metamorphose as an insect. Mahillon applied Linnaeus' biological classification system (figure 3, p. 49). In his first version of his classification system, Mahillon called the different levels *Classe / Famille / Espèce / Variété*, which are indeed very much inspired by the Linnaeus classification system.
From the second version of his classification system – apparently, under François Auguste Gevaert's influence [Mahillon 1893[2], 3-4, footnote 1] – this subdivision was replaced by *Classe / Branche / Section / Sous-section.*
It is interesting to note that biologists today also share this critical opinion of the classification systems. In natural sciences today, there is a more or less general consensus that any classification is artificial, and implemented, according to criteria defined by observers who are in mutual agreement. With the scientific community's widespread acceptance of Linnaeus' names for bi-nominal species, bodies were created to govern the scientific name, such as the *International Code of Zoological Nomenclature* or the *International Code of Nomenclature for algae, fungi, and plants,* which experts follow when they describe new species or re-describe existing species in so-called taxonomic revisions. In nature it is more transitional, or random: it is essentially the human who wants to establish categories, be it for purposes of study, understanding, or even to domination. Hence the large number of borderline cases, where one hesitates to decide whether a species is X, or Y, or a hybrid. Even in mathematics, and in algorithms used to rank genetics, there is an element of subjectivity, since, at some point in the process, one has to decide, according to well-established, accepted criteria, how the categories / groups will be distinguished. When it comes to man-made objects, the debate on the types of classifications becomes more complex. From the moment of creation of the object, there is always an artificial dimension: the designer may have an original idea or he may be influenced by existing classification systems.[4]

4. This paragraph is the result of an exchange of ideas on the matter from the present author with Dr. Patricia Mergen, Secretary of the Consortium of European Taxonomic Facilities, RMCA, Tervuren (BE). For further reading, see Baker and Hubert [1975], Milligan and Cooper [1985].

…taxonomies

According to Alexandra Mushegian, in many cases, scientists may disagree on what taxonomic group an organism belongs to.[5] The question usually comes down to how well a certain character reflects the relatedness of organisms. For example, if the presence or absence of wings was used as a characteristic to define a group, then butterflies, bats, and birds would be considered one group and all other wing-less organisms would be considered a separate group. However, based on an overwhelming number of additional characteristics, biologists can see that each of these groups — butterflies, bats, and birds — is more closely related to certain organisms without wings than they are to each other: butterflies are insects, many of which lack wings; bats are mammals; birds evolved as a subgroup of the dinosaurs and are now more closely related to crocodilians. For Mushegian, creating accurate classification schemes requires a combination of modern methods (DNA sequencing and computer-assisted evolutionary reconstruction) and old-fashioned ones — discovering and closely observing as many species as possible to gain a broader picture of the tree of life.

In order to classify musical instruments too, the use of bottom up systems, or taxonomies, is more relevant than the use of a hierarchical classification system. According to Margaret Kartomi, a taxonomy «consists of a set of *taxa*, or groupings of entities that are determined by the culture or group creating the taxonomy» [1990, 17]. Several other authors have established a typology or even a taxonomy for certain subclasses, and so did Hans Hickmann, for example, for ancient Egyptian harps; Bernard Ankermann, Percival Kirby, Bertie Söderberg, Olga Boone and Jean-Sébastien Laurenty for African musical instruments; Heinrich Seifers for Western wind instruments; Barbara Le Godinec for flutes; Hermann Moeck and Dragoslav Devic for European duct flutes; Ernst Emsheimer for Swedish wooden trumpets; and Tobias Norlind for zithers, etc. In order to avoid conflicting criteria, other authors started from the plurality of criteria, and they have tried to reorganize them in a rational way. André Schaeffner, Kurt Reinhard, Hans-Heinz Dräger, Herbert Heyde, Michael Ramey, William Malm, Tetsuo Sakurai, Sumi Gunji, and Peter Simon, among others[6] – and recently Stéphanie Weisser and Maarten Quanten have concentrated their efforts on what may be the relevant criteria to establish a classification system. Some, among these authors, have, quite naturally evolved towards a faceted classification, in which the same species can be classified according to different sets of criteria into different matrixes.

5. See the article by Alexandra Mushegian (n.d.).

6. For additional classification systems see Kartomi [1990 and 2001].

Ethnic musical instruments: the emic discussion?

When Hornbostel and Sachs [1914, 556] discuss where to place the aerophones with an air reservoir, they question Mahillon's Eurocentric attitude:

> Eine Anzahl Teilungsgründe, die im europäischen Instrumentarium eine Rolle spielen – [z.B.] Instrumente mit Klaviatur oder mit automatischen Antrieb [oder polyphone Instrumente mit Luftreservoir] – [nehmen] einen unberechtigt hohen Rang ein.
>
> A number of criteria, which in European musical instruments play an important role – [e.g.] keyboard instruments or automatically driven ones [or polyphonic instruments with an air reservoir] – [occupy] an unjustified high rank.

It is true that Hornbostel and Sachs had a strong interest in ethnic musical instruments. However, Mahillon and Closson shared a much greater respect for the skills of non-European musical instrument makers as well. Mahillon's vision is explained in a letter to his correspondent de Rennenkampf in Saint Petersburg: «Je me permettrai de vous faire remarquer que, le Musée ne contenant pas seulement des instruments *artistiques*, mais aussi des instruments rustiques, le caractère primitif des instruments populaires ne diminue en rien l'intérêt que j'y attache». (Allow me to point out that the [Brussels] Musée [Instrumental] does not contain only *artistic* instruments, but also rustic instruments; the primitive character of popular instruments does not diminish the interest that I have for them).[7]

Mahillon's interest in traditional instruments is clear in a letter to Mrs. Crosby Brown, whose collection of musical instruments is the basis of the one in the Metropolitan Museum in New York: «Vous avez mille fois raison de tenir aux instruments des peuplades primitives; c'est parmi eux que l'on rencontre souvent les spécimens les plus intéressants et les plus surprenants pour nous». (You are absolutely right to care about instruments of primitive peoples; it is among them that we often encounter the most interesting specimens and the most surprising for us).[8]

Nevertheless, in their efforts to create a 'universal' classification, an effort common to both Hornbostel-Sachs and Mahillon, both were miles away from the emic discussion led by ethnomusicologists after the Second World War – see the remark of Margaret Kartomi:

> The assumption that it was correct to use Western categories for the study of non-Western instrumentarium was so deeply ingrained that it remained virtually unquestioned among

7. Letter from Victor Mahillon to R. de Rennenkampf (Saint Petersburg) dated 21 March 1898, Archives of the Brussels MIM: Dossier Conservatoire 1897-1900 (120-121).

8. Letter from Victor Mahillon to Mrs. M. E. Brown (New York) dated 13 November 1901, Archives of the Brussels MIM: Dossier Conservatoire 1900-1902 (188-189).

ethnomusicologists until the late 1960's; and vestiges of it are still dominant in the minds of many, perhaps most, western-trained musicians and musicologists to this day. [Kartomi 1990, 9].

By the way, the 'emic' discussion in musicology is not a unique phenomenon in science. Ethnobotanists[9] and ethno-zoologists[10] share the same concerns as ethnomusicologists, in trying to understand a phenomenon from within the system.
In biology, different portals are available for a structured and long lasting way to communicate, and they continue to make up the list of species names (scientific and vernacular) in *Catalogue of Life*.[11] Groups like the Taxonomic Databases Working Group[12] (now renamed Biodiversity Information Standards) have lively discussions on how to share species information, and regularly ratify standards for the exchange of data and associated tools.

Conclusions

From the very beginning of modern organology with Mahillon and Hornbostel-Sachs, a series of problems existed with regard to the objective of making a logical and exhaustive classification system for musical instruments. They concern (a) a unique (acoustical?) paradigm in the definition of the criteria for the main classes, (b) the place of combination instruments in a hierarchically established classification system, and (c) the inclusion of ethnic musical instruments.
Several generations of organologists concentrated on a fundamental discussion on the criteria to establish musical instrument categories. Some of them established taxonomies for specific categories of musical instruments, and/or faceted classification systems, trying to find a compromise between a large number of criteria and different viewpoints on how to use them. The problems with which organologists are faced are not restricted to their discipline alone: (ethno) zoologists, (ethno) botanists and, in general, the sciences of life, all face analogous problems. It would, therefore, be a good idea to set up a permanent portal, a discussion group and/or a centre for reflection on the problems of taxonomy and the classification of musical instruments, comparable to *The Catalogue of Life*.

9. See http://botanicaldimensions.org/what-is-ethnobotany/ (accessed 31 October 2019).

10. See https://en.wikipedia.org/wiki/Ethnobiology (accessed 31 October 2019).

11. See http://www.catalogueoflife.org/content/about (accessed 31 October 2019).

12. See https://www.tdwg.org/ (accessed 31 October 2019).

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Lars Christian Koch

The Hornbostel-Sachs classification system. Its origin and relevance for contemporary research

Most cultures or ethnic groups have classification systems for sound producing devices. The Hornbostel-Sachs classification is based on such a system from South Asia. The modifications and extensions within the system introduced by Hornbostel and Sachs show a distinctive view reflecting the *Zeitgeist* at the beginning of the twentieth century, as this peculiar classification was aiming for a cross-cultural perspective which allows for classification without deeper knowledge of the respective cultural setting. I will discuss the structure and origin of the system, its application by the authors during their research and in their publications, as well as its relevance for contemporary research and exhibition practice.

In the Berlin academic milieu of the nineteenth century, the main topic was the increased significance of natural sciences, the heart of the new materialistic approach. From then on, the main concern was to establish a science of life, which included human beings and their societies, based on the strict rules of natural sciences. With regards to the rise of research in comparative musicology – and in certain ways the focus on 'comparative organology', although it was never labelled as such – in Berlin, three scientists must be mentioned. Carl Friedrich Stumpf was born in Berlin in 1848. He grew up in a musical family and learned to play several instruments in his school years, and he also studied harmony and counterpoint. He studied philosophy and natural sciences and completed his studies with a doctorate in philosophy. Later on, he got his qualification in the same discipline. He was Professor of Philosophy in Würzburg, Prague, Halle and Munich before founding the Psychologisches Institut at the Friedrich Wilhelms Universität in Berlin (now the Humboldt Universität Berlin) in 1893. He directed this institute until 1928. Within the institute, he founded the Berliner Phonogram Archive in 1900 with a first recording of a Siamese court orchestra on wax cylinder. Together with his assistant Erich Moritz von Hornbostel, Stumpf is considered a prominent founder of the discipline called 'comparative musicology' (*vergleichende Musikwissenschaft*), the forerunner of the contemporary discipline 'ethnomusicology'. Aside from tone psychology, which according to him was oriented towards individual and experimental work, Stumpf [1997, 145] was engaged in comparative psychology, where tone

psychology played an important role. This let him distance himself from the contrasting views of many scholars of aesthetics. Stumpf advocates the study of music unfamiliar to the ear:

> The greater the initial wonder, the stronger the drive to research, the greater the expansion of the perspectives and the depth of insight into the essence of this and all art, when gradually the explanations are found, and when we learn to comprehend our own level of art as one of the flowers of a widely branched tree. This does not diminish the immediate pleasure of the magnificent creations of our classicists by any means, instead our perception is increased, and to a certain degree we make the artworks of the whole world our own, in that the initially repelling of exotic works of art is moderated through the theoretical comprehension and the inner law of structure is perceived as a source of a positive aesthetic satisfaction [Stumpf 1908, 234; English translation by Emily Schalk].

Stumpf specifies three aims in comparative musicology:

1. The analysis of sound according to musical criteria
2. The psychological musical capacity of human beings
3. The study of musical instruments [Stumpf and Hornbostel 1911, 105][1]

These were the first steps in comparative musicology at the Berlin University. In this regard Stumpf's assistant Erich Moritz von Hornbostel played a decisive role. Erich Moritz von Hornbostel was born in Vienna in 1877, and his family was also very much involved in the musical life of his hometown. In his early years he studied harmony and counterpoint and by his late teens he was an excellent pianist and composer. However, he did not pursue a musical career, instead he studied natural sciences and philosophy in Heidelberg and Vienna and finished his studies with a doctorate in chemistry in Vienna in 1900. In that same year he moved to Berlin, where he worked at the Physical-Chemical Institute. Hornbostel was already interested in experimental psychology and musicology, and – under the influence of Stumpf – tone psychology was added to it. In 1917 he was appointed professor at the Friedrich Wilhelm's University in Berlin, where he taught systematic and comparative musicology. After the rise to power of the Nazis in Germany, Hornbostel and his family decided to stay in Switzerland. He got a scholarship from the Academic Assistance Council for research at the University of Cambridge. There he died in November 1935. During these early years, Curt Sachs also worked extensively with Hornbostel. Curt Sachs studied music history at Berlin University, but took his doctorate in the history of art. In 1920 he was appointed director of the Staatliche

1. Elsewhere Stumpf [1922, 89] mentions questions concerning the history of music and culture. He proclaimed comparison of different music, which should enable conclusions about the development of music through time.

Instrumentensammlung, which was then attached to the Staatliche Akademie - Hochschule für Musik, Berlin. At the same time he was an external lecturer at the university, becoming reader in 1921 and professor in 1928. Being Jewish, Sachs was deprived of all his academic positions in 1933; he went to Paris, where he worked at the ethnological museum, the Musée de l'Homme and taught at the Sorbonne. In 1937 he immigrated to the USA; from 1937 to 1953 he was professor of music at New York University.

In 1914, together with Curt Sachs, Hornbostel published the classification of musical instruments. This classification is still in use in most museums – though Hornbostel and Sachs called it an attempt, knowing that their version could not be the last; even though further attempts would not change this classification significantly. For Hornbostel it was essential that researchers in the field could easily distinguish and classify musical instruments. The basis of this classification system is the physical production of sound. So they determined four classes (Idiophones, Membranophones, Chordophones and Aerophones) and divided them into several subclasses. Members of a music-culture usually classify their instruments following cultural immanent perspectives. They differentiate between materials, playing style or ways of cultural determined application, or a combination of these criteria. In scientific context-systems and classifications, it is crucial to describe musical instruments in an intercultural perspective. In this regard, only a transcultural classification system is useful. A scientifically based classification of musical instruments began in Europe only at the end of the century, when Victor-Charles Mahillon (1841-1924) started to write the catalogue of the Musée Instrumental du Conservatoire Royal de Musique in Brussels. He established four categories: Autophones, Membranophones, Chordophones and Aerophones. This was not, however, his own invention. Hornbostel and Sachs's new creation, this classification system – based primarily on the sound producing material – was already used 2000 years ago, as is mentioned in the *Natyasastra* (ca. 100 BC), one of the oldest and most influential books on drama and music. In connection with the playing technique and cultural context and musical practice (voice accompaniment, dance-music, and solo-performance) in which the instruments were used, the following classification can be found:

tata (tan = to pull)	Chordophone
avanaddha (= covered)	Membranophone
ghana (= solid)	Idiophone
susira (= hollowed)	Aerophone

This system has been used in India until today thanks to the work of Raja Sir Sourindo Mohan Tagore, a central figure in nineteenth century Kolkata.

1.

2.

4.

Figure 1.
Alabu Sarangi,
Ethnologisches Museum Berlin,
Preußischer Kulturbesitz

Figure 2.
Sitar,
Ethnologisches Museum Berlin,
Preußischer Kulturbesitz

PHOTOGRAPH BY VERENA HÖHN,
ANDREAS RICHTER

Figure 4.
Sitar-like instrument
from the S. M. Tagore collection,
Ethnologisches Museum Berlin,
Preußischer Kulturbesitz

PHOTOGRAPH BY VERENA HÖHN,
ANDREAS RICHTER

Figure 3.
Gopal Bandyopadhyay
in playing position

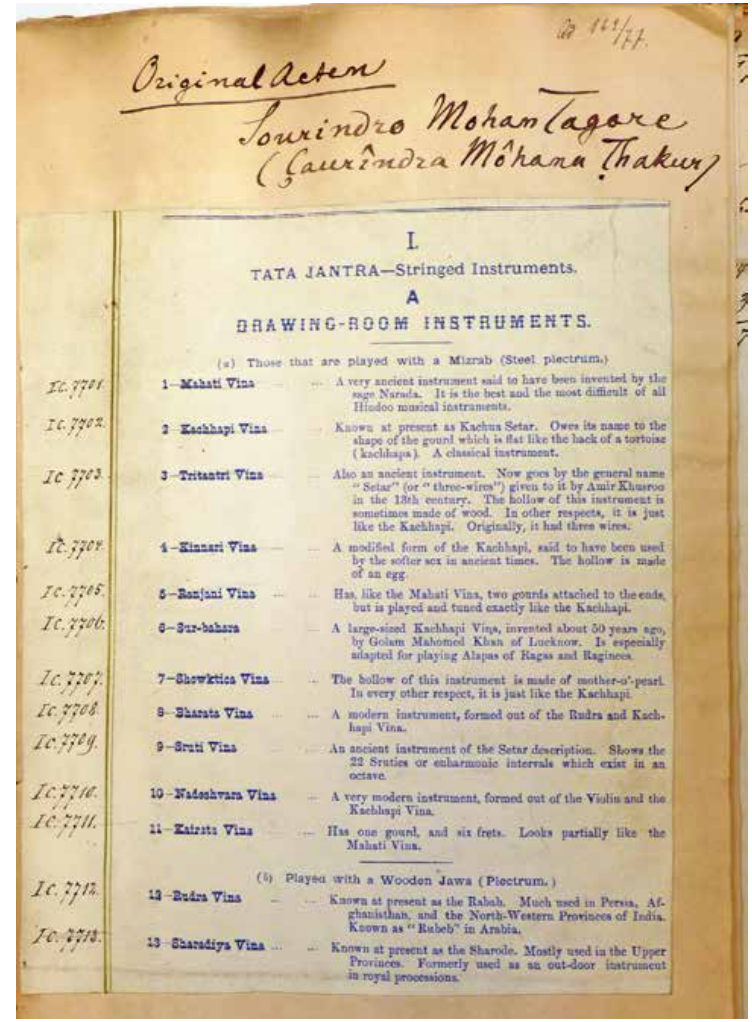
FROM THE PRIVATE COLLECTION
OF MURARI MOHAN ADHIKARI

Raja Sir Sourindo Mohan Tagore worked as a musicologist in Indian Music and its history from the second half of the nineteenth century on. His aim was to place Indian music on the same level as Western Music. He transcribed Indian Music in western staff notation, collected all writings of western scholars on Indian Music, researched different aspects of Indian Music and published all this in more than thirty books. To show the value of Indian Music, Raja Tagore ordered full collections of musical instruments – some of them standard instruments, others pure decoration or replicas of old instruments, and still others pure instruments – for his musicological research. These collections were donated to several Museums in the West including the Berlin Ethnological Museum. A considerable part of the instruments in these collections have never been played and have never been constructed again in this form, but they survived and dominated the scientific perception of Indian Music in the West during the twentieth century. Raja Tagore encouraged the interest in Indian Music in the well-educated middle class of nineteenth century Kolkata, and at the same time promoted Indian Music in the West and made it a symbol of the 'classical' heritage of Indian culture. He established a worldwide correspondence with academic societies and scholars of different nations. He ordered all relevant literature on music and published his own books on music accordingly. He presented complete musical instrument collections to all the major museums in Europe and the USA (Brüssel, Dresden, Copenhagen, Stockholm, Rome, London, Wien, Berlin as well as New York and Melbourne). These collections contain more or less standardized objects as well as pure test-instruments and self-designed varieties of ancient musical items based on his philological studies. Most of these instruments have never been played, and in many cases they were literally unplayable. Nevertheless, these items provided the basic structure of the Hornbostel-Sachs classification system.

The following examples from the collection of the Ethnologisches Museum Berlin with commentaries from Tagore and Sachs explain how they were conceptualized and later classified.

The Alabu Sarangi is a bowed short neck lute from North India, and Tagore himself describes it as «a very soft tuned, old instrument, made to accompany the female voice» (commentary on the shipping documents). The body is made out of a single piece of dried pumpkin, the top has *f*-holes like a violin with a violin like peg head. The tuning pegs of the sympathetic strings are arranged in such a way that the playability is seriously limited (figure 1, p. 64). A second example would be Tagore's conception of long necked lutes, like sitars, which already had a certain standard in the nineteenth century (figures 2-3, p. 64-65). Tagore's version again shows elements taken from the western violin family (figure 4, p. 64).

Raja Sourindo Mohan Tagore not only influenced but determined the research


Original Acten
Sourindro Mohan Tagore
(Gaurîndra Môhana Thakur)

I.

TATA JANTRA—Stringed Instruments.

A

DRAWING-ROOM INSTRUMENTS.

(a) Those that are played with a Mizrab (Steel plectrum.)

Ic. 7701. 1—Mahati Vina — A very ancient instrument said to have been invented by the sage Narada. It is the best and the most difficult of all Hindoo musical instruments.

Ic. 7702. 2—Kachhapi Vina — Known at present as Kachua Setar. Owes its name to the shape of the gourd which is flat like the back of a tortoise (kachhapa). A classical instrument.

Ic. 7703. 3—Tritantri Vina — Also an ancient instrument. Now goes by the general name "Setar" (or "three-wires") given to it by Amir Khusroo in the 13th century. The hollow of this instrument is sometimes made of wood. In other respects, it is just like the Kachhapi. Originally, it had three wires.

Ic. 7704. 4—Kinnari Vina — A modified form of the Kachhapi, said to have been used by the softer sex in ancient times. The hollow is made of an egg.

Ic. 7705. 5—Ranjani Vina — Has, like the Mahati Vina, two gourds attached to the ends, but is played and tuned exactly like the Kachhapi.

Ic. 7706. 6—Sur-bahara — A large-sized Kachhapi Vina, invented about 50 years ago, by Golam Mahomed Khan of Lucknow. Is especially adapted for playing Alapas of Ragas and Raginees.

Ic. 7707. 7—Shewktica Vina — The hollow of this instrument is made of mother-o'-pearl. In every other respect, it is just like the Kachhapi.

Ic. 7708. 8—Bharata Vina — A modern instrument, formed out of the Rudra and Kachhapi Vina.

Ic. 7709. 9—Sruti Vina — An ancient instrument of the Setar description. Shows the 22 Sruties or enharmonic intervals which exist in an octave.

Ic. 7710. 10—Nadeshvara Vina — A very modern instrument, formed out of the Violin and the Kachhapi Vina.

Ic. 7711. 11—Kairata Vina — Has one gourd, and six frets. Looks partially like the Mahati Vina.

(b) Played with a Wooden Jawa (Plectrum.)

Ic. 7712. 12—Rudra Vina — Known at present as the Rabab. Much used in Persia, Afghanisthan, and the North-Western Provinces of India. Known as "Rabeb" in Arabia.

Ic. 7713. 13—Sharadiya Vina — Known at present as the Sharode. Mostly used in the Upper Provinces. Formerly used as an out-door instrument in royal processions.

Figure 5.
List of musical instruments sent to Berlin with the S. M. Tagore collection, Ethnologisches Museum Berlin, Preußischer Kulturbesitz
PHOTOGRAPH BY LARS-CHRISTIAN KOCH

in Indian instruments and music to such an extent that there are usually no comparable instruments from India in museum collections from the nineteenth century, only during the second half of the twentieth century were these items collected in a significant number. Only in the twentieth century did research on organology, in a more or less global perspective, increase and intensify. In 1990 Nazir Jairazbhoy proved that Mahillon most probably used the classification system of the *Natyasastra* as a model of his own classification system. He thought that Mahillion had consulted the complete literature included with the instrument collections – generally written in Bengali or Sanskrit – which indeed was not necessary since the collections in Brussels surely had inventory lists with names and descriptions of the instruments like the ones of the Berlin collection. These are inventory lists based on the classification system of the *Natyasastra* (figure 5, p. 67).

Tagore further distinguishes between «outdoor» and «drawing room» instruments – not «indoor» – a classification which clearly represents the 'chamber-music' aspect of Indian music during the time of Tagore. If reduced to its main structure, Tagore's list resembles a clear classification system in itself:

I. ***Tata Jantra*** – Stringed instruments
A. 'Drawing room' instruments
   a. played with a steel plectrum (*mizrab*)
   b. played with a wooden plectrum (*jawa*)
   c. played with a bow
   d. played with the tips of the fingers
B. Pastoral instruments
   a. played with a wooden plectrum (*jawa*)
   b. played with the tips of the fingers
   c. played with a bow

II. ***Shushira Jantra*** – Wind instruments
A. 'Drawing room' Instruments
   a. 'Flute' species
B. Outdoor instruments
   a. 'Reed' species
   b. 'Horn' species
C. Used in religious service
   a. 'Shell' species
D. Pastoral instruments
   a. With double tubes

III. ***Ghana Jantra*** – Percussion instruments made of metal
A. 'Drawing room' instruments
B. Used in religious services
C. Outdoor instruments

IV. ***Anaddha Jantra*** – Pulsatile instruments covered with skin
A. 'Drawing room' instruments
   a. played with the hands
B. Outdoor instruments
   a. Suspended on the neck of the player
   I. played with a stick
   II. played with two sticks
C. Used in the *Nahabat*
D. Used in religious services
E. Pastoral instruments

V. ***Nyastaranga*** (A special mirliton in the shape of two wind instruments, pressed against the larynx; it should amplify the larynx-resonance)

This classification was neither in use by Mahillon nor by Hornbostel and Sachs, especially the latter who aimed at a classification system applicable to all sound devices with the possibility of an extension if necessary. Their classification should follow severe criteria concerning the primarily sounding material. Considering these basic ideas, one could hardly talk of cultural appropriation but of the utilisation of an ancient Indian concept, as all further subgroups were established by Hornbostel and Sachs. In his *Reallexikon der Musikinstrumente*, Curt Sachs [1913] thanks Erich Moritz von Hornbostel for his suggestions concerning the joint work on this publication. The bibliography of this book reveals that Sachs relied mostly on *Hindu Music from Various Authors* [Tagore 1875a] for what concerned Indian musical instruments. He cites articles written by Campbell, French and Davy, as well as Tagore himself. On p. 90 of the 1994 reprint of Tagore [1875a], the classifications system from the *Natyasastra* can be found, a source which Hornbostel and Sachs most probably knew. Sachs most certainly consulted the catalogue of the French collection, which classified instruments by following the categories as found in the *Natyasastra*, although this is not specifically mentioned. The order in French is Idiophone, Aerophone, Chordophone and Membranophone; the *shank* (conch shell horn), however, is classified as an instrument from the religious cultural area, as found in the classification system by Tagore. Furthermore, Sachs mentions Tagore's publication *Yantra Kosha*, which is only available in Bengali and an article with the title *Short notices of Hindu musical instruments* [Tagore 1877].

Mahillon's catalogue of the Brussels collection was nevertheless the main initial influence on the Hornbostel-Sachs classification. Considering the strong influence of the Hornbostel-Sachs classification worldwide, it is striking that Hornbostel and Sachs themselves hardly used it. In his encyclopaedia, Sachs [1913, 255], only occasionally uses terminologies like «plucked idiophone» for a jaw's harp, and he describes the mirliton as a membranophone [*ibidem*, 260]; he does not use this terminology in the case of the tabla [372] or *Mridangam* [262]. His publication *Musikinstrumente Indiens und Indonesiens* [1915] is based on the Hornbostel-Sachs classification system, although Sachs did not use it with all its sub-classification groups. The same can be said about *Handbuch der Musikinstrumentenkunde* [1920], apart from not using sub-groups, he establishes new categories based on the fact that this book deals basically with European musical instruments [1920, v]:

> In ihm sind zunächst die Musikinstrumente Europas in Mittelalter und Neuzeit nach Wesen, Bedeutung, Entwicklung und Nennung behandelt. Die Grundlagen der Anordnung bot die Systematik, die ich gemeinsam mit Erich M. v. Hornbostel aufgestellt und 1914 veröffentlicht habe.
>
> First European musical instruments from the Middle Ages and Modernity are taken into account, investigating their nature, significance, evolution and name. The basic order follows the *Systematik*, which I elaborated and published with Erich M. von Hornbostel in 1914.

In his short introduction to *Die modernen Musikinstrumente*, Sachs [1923] uses his already established classification system in a modified form, mainly to make it more acceptable for western musicians. His order is based on: Holzblasinstrumente, Blechblasinstrumente, Orgel, Harmonium, Harmoniken, Saiteninstrumente, Fellinstrumente, Selbstklinger (woodwind instruments, brass instruments, organs, harmoniums, accordions, string instruments, membranophones, and idiophones).
Erich Moritz von Hornbostel did not publish – apart from his article with Sachs – any major works on musical instruments, although his research topics correlated strongly with the role of musical instruments in cultural contexts, for example *Blasquintentheorie*, in which he explains different tuning systems in non-western music-cultures. He measured panpipes and xylophones as well as other instruments to prove his theory, which today is considered as only partially valid [Kaden 1998, 91-94].
In his 'Black Box' (preserved at the Indiana University Archives of Traditional Music in Bloomington, figure 6, p. 72) with all his sketches, measurements and correspondence, none of the typical terminology from the Hornbostel-Sachs classification system can be found. The file cards are ordered and classified

using the names of the instruments as well as their geographical origins. The classification system is, in fact, never mentioned. In 1910 Hornbostel wrote the article on comparative acoustical and music-psychological studies *(Über vergleichende akustische und musikpsychologische Untersuchungen)* where he clearly says that this work uses three methods:

1. Experiments with non-European test-subjects (*Versuchspersonen* as Hornbostel calls them)
2. Pitch-measurements on musical instruments
3. Studies on phonograms

Little is known about Hornbostel's ideas on the first and second method. There is an unpublished article, or rather a guideline, *Tonsinn und Musik* [1913], which deals in detail with this method. Concerning the studies on phonograms, a lot of his publications show his detailed transcriptions and analyses. They need not be discussed in detail here, nevertheless, his description of the technique of field-recording shows some of the intentions at basis of his analyses. Pitch, scale and measurements were obviously important for Hornbostel, as well as data concerning the cultural setting of the recorded music; he understood the value of this data, but it was not his primary research field, while musical instruments indeed were. Apart from his already mentioned classification, he had many more ideas about research on musical instruments. He knew about the difficulties concerning measurements and therefore connected them to phonogram recordings. Some quotations from Hornbostel's writings:

> Since ancient times, music theory has tended to be concerned with the determination of the size of the interval, and this is also one of the most important tasks of comparative musicology. Modern methods of acoustical measurement permit a very exact determination of pitches, not only on instruments with constant pitch but also in music recorded with a phonograph […].
> Measurement on musical instruments […] harbours sources of error of all kinds and should therefore never be used by itself for determining a musical system leaving aside that it only yields instrumental scales which definitely are not always identical with the *Gebrauchsleiter* […].
> Flutes and pipes have largely proven to be useless in acoustical study; primitive instrument makers are generally guided by non-musical principles; the finger holes are spaced equidistantly, or in symmetrical groupings, or approximately halfway between the natural modes of a bamboo tube […]. The irregular scales of such wind instruments are corrected by the player's skill in blowing […].
> The most reliable instruments are, after all, the tuned percussion instruments like xylophones, chimes, etc., although even these instruments must be measured with some caution [Hornbostel 1986, 257-258].

Nevertheless, Hornbostel collected musical instruments and measured them whenever possible. He did not, however, publish extensively on this, although he must have had plans to do so. I heard that his collection was taken over by George Herzog, one of his close students, who later on took them to Bloomington where he taught for several years at Indiana University and founded the Indiana University Archives of Traditional Music. Some research proved that these instruments – approximately 200 in number – are now in the Mathers Museum in Bloomington, but I had also heard rumours about a 'Hornbostel Black Box' with his original notes. During a short visit to Indiana University Archives of Traditional Music in Bloomington in 2005, I visited the Mathers Museum and talked to Ellen Sieber who showed me the instruments but had no idea about the 'Hornbostel Black Box'. Luckily the next morning I got a mail from Ellen Sieber with the short notice 'Black Box found'. So I went immediately to the Museum where Ellen was already waiting. It turned out that the Black Box was a medium sized black file-card box full of notes on musical instruments written by Hornbostel, as well as photos and correspondence concerning musical instruments.[2]

Figure 6. Hornbostel's Black Box
PHOTOGRAPH BY LARS-CHRISTIAN KOCH

Hornbostel had a certain order that did not strictly follow his classification system; he used geographical regions as well as instrument classification. His measurements were precise, paying attention to all details (figure 7).
It is not possible to be more precise about the content of this file-card box at the moment, further research is needed. In addition we found – in an unpublished article with the title *Tonsinn und Music* (Sense of tone and music) written by Erich M. von Hornbostel around 1913 – detailed instructions for the examination

2. Thanks to Ellen Sieber at the moment all the cards are being scanned and preserved. After digitization, a research project is planned.

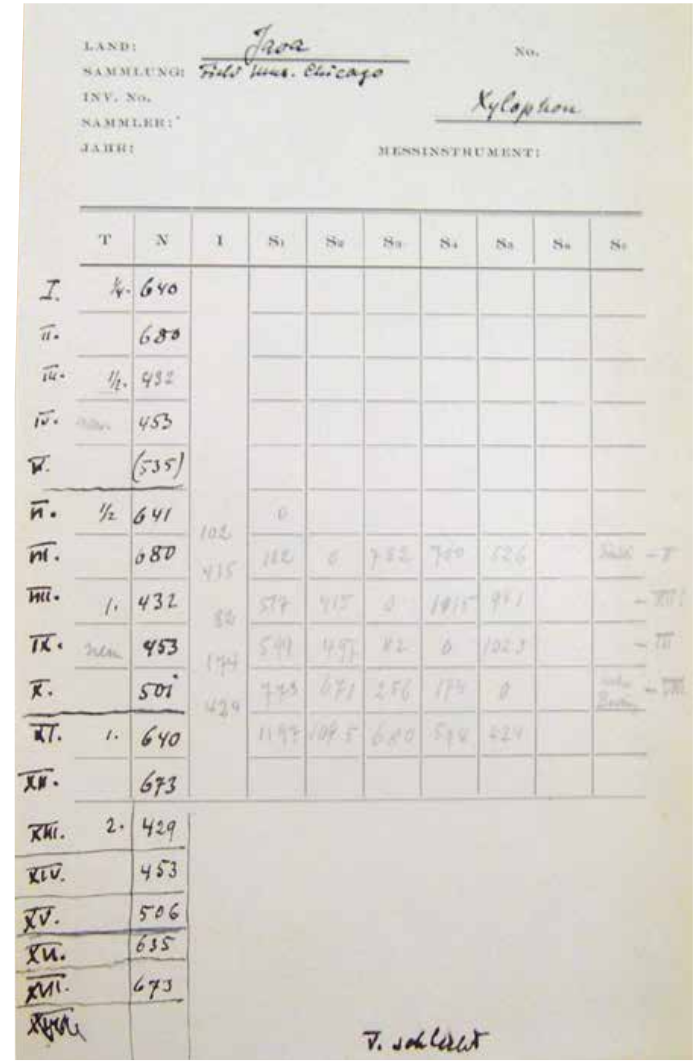
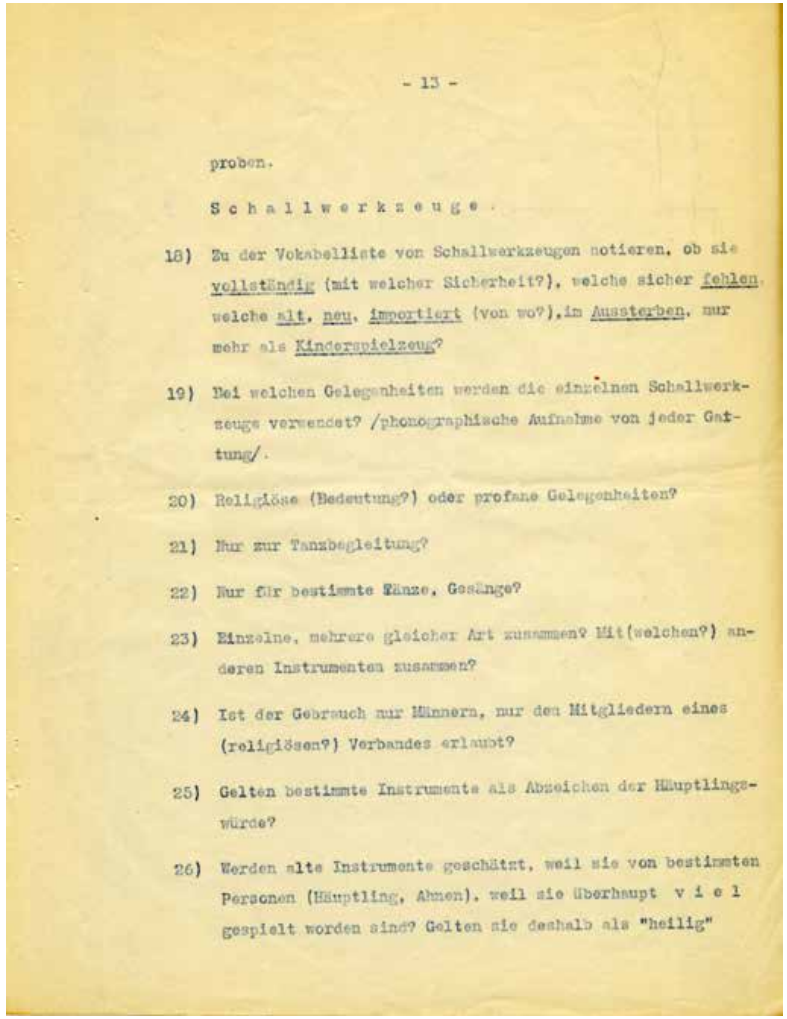


Figure 7.
Measurements from a xylophone from Burma
by Erich M. von Hornbostel
PHOTOGRAPH BY LARS-CHRISTIAN KOCH



- 13 -

proben.

S c h a l l w e r k z e u g e .

18) Zu der Vokabelliste von Schallwerkzeugen notieren, ob sie vollständig (mit welcher Sicherheit?), welche sicher fehlen, welche alt, neu, importiert (von wo?), im Aussterben, nur mehr als Kinderspielzeug?

19) Bei welchen Gelegenheiten werden die einzelnen Schallwerkzeuge verwendet? /phonographische Aufnahme von jeder Gattung/.

20) Religiöse (Bedeutung?) oder profane Gelegenheiten?

21) Nur zur Tanzbegleitung?

22) Nur für bestimmte Tänze, Gesänge?

23) Einzelne, mehrere gleicher Art zusammen? Mit(welchen?) anderen Instrumenten zusammen?

24) Ist der Gebrauch nur Männern, nur den Mitgliedern eines (religiösen?) Verbandes erlaubt?

25) Gelten bestimmte Instrumente als Abzeichen der Häuptlingswürde?

26) Werden alte Instrumente geschätzt, weil sie von bestimmten Personen (Häuptling, Ahnen), weil sie überhaupt v i e l gespielt worden sind? Gelten sie deshalb als "heilig"

Figure 8.
From the Typescript *Tonsinn und Musik*
by Erich M. von Hornbostel, cap. 5,
Experiments in native musical instruments
PHOTOGRAPH BY LARS-CHRISTIAN KOCH

of tone psychological phenomena in the form of elaborated questionnaires. Here we get an insight into the methods and techniques of early comparative musicology (figure 8).

Pages 20 and onward deal with the cultural contexts of musical instruments; and pages 114-125 deal with native musical instruments and their relation to sound-perception. Hornbostel for example suggests [114] to give the test-subject a native instrument and ask him to make a copy. The researcher should measure the differences between these instruments; if this is not possible he should at least record both instruments. He also suggests playing native instruments using different techniques – beating a drum in the middle or on the rim – asking the test-subjects how the sound was made. Hornbostel then asks the researcher to play intervals on different instruments, asking the test-subjects if both notes are the same, different or very different. Nevertheless, you do not find a single mention of the Hornbostel-Sachs classification system, which was to be published a year later, and which is still an important reference in the documentation work of any museum. The advantage of the system lies in its clear layout of the characteristics that are important when organising musical instruments inside storage rooms and in databases. In its basic structure no evaluation of the objects is made. In this way one could consider it a balance between objectivity and subjectivity in the basic classification of musical instruments.

On the other hand, it is questionable whether the Hornbostel-Sachs classification is at all relevant in the process of displaying musical instruments in a museum, especially where ethnomusicological contexts are concerned. Thus, exhibitions should pay attention to the origins of musical instruments; this means that criteria regarding religious, ritual, regional and mechanical considerations should be highly relevant. The local criteria of classification should be part of the exhibition if one takes this seriously. The fact that musical instruments are culturally classified in generally all music cultures is definitely one of the most important messages an exhibition must put forth. The Hornbostel-Sachs system is, nevertheless, still valid for its ability to incorporate all musical instruments and sound devices in a more or less egalitarian perspective; it is also important for its role in the history of science, specifically of ethnomusicology. Writing its history or carefully evaluating the Hornbostel-Sachs classification in connection with the knowledge about the classification systems of other music cultures – and incorporating them into our databases – will be the challenge for future research.

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Gian Nicola Spanu

The early reception of Mahillon's taxonomy and of the Hornbostel-Sachs classification system in Italy

In September, 1880, Domenico Bertini announced the publication of the *Catalogue descriptif et analytique du Musée instrumental du Conservatoire royal de musique de Bruxelles* by Victor- Charles Mahillon [1880] in the pages of «Boccherini», the official organ of the *Società del Quartetto* of Florence. Apart from stressing the merits and complexities of the new book, and the prestige of the well-known author, the reviewer [Bertini 1880] seized the opportunity to lament the absence, in Italy, of a museum like the one in the Belgian capital city: «Quali sono gli istituti musicali d'Italia che abbiano il corredo di un museo musicale di una certa importanza e formato da circa 600 strumenti? Nessuno!» (Which Italian music institution possesses an important Music Museum worthy of that name, and which one has a collection of over 600 instruments? Not one!). He concluded ironically that, having nothing better to offer «dovremo contentarci del catalogo […] del museo di Bruxelles, e ringraziare Dio se il Mahillon pensò di pubblicarlo» (we will have to make do with the catalogue […] of the Brussels Museum, and to thank God that Mahillon decided to publish it). In the article, no importance whatsoever was given to the attempt to systematically classify all the ancient and modern instruments that, as stated in the preface, preceded the book. Bertini's sarcasm, however, underlined a well-known truth: over the years, the Brussels Museum acquired so many Italian instruments that these alone would have easily created a furnished 'National' museum. The statement, in fact, underlines certain aspects of our organological tradition in the second half of the nineteenth century. Not unlike what happened in the rest of Europe and the United States, there was a growing and generalized interest in musical instruments in this period in Italy, an interest that can be outlined in three main trends: 1. the study and promotion of 'historical' instruments; 2. curiosity about twenty-first century technological innovations that led to the improvement and/or increase of instruments of art music (except bowed string instruments) and the invention of automatic devices for the production of music; 3. new attention, for scientific purposes and mere collecting, to extra-European instruments and, to a smaller extent, to the so-called folklore of our continent.

The interest in historical instruments pivoted, at least initially, around the nationalistic enhancement of the art of the Italian luthier, represented at its

highest point in the prestigious schools of Cremona and, more generally, in Northern Italy. The interpreters, surely not the only ones, of this trend were Luigi Francesco Valdrighi, collector and renowned bowed string instrument historian [Meucci 1999, 108-109] and Leto Puliti [1884] who, in the attempt to demonstrate the Italian origin of the piano, conducted an accurate biographical research on Bartolomeo Cristofori. Historical instruments were also collected by several music schools starting in the second half of the nineteenth century. Among the first we find the Regio Istituto Musicale in Florence and the annexed Accademia, which, following the unification of Italy, managed and promoted the precious collection of the Granduca, with the purpose of increasing the endowment and offering the most exhaustive overview possible of organological typologies. In 1897, in order to increase the wind instrument section, which was limited compared to the bowed string or keyboard sections, the director of the Istituto e Accademia, Luigi Ferdinando Casamorata, received a certain number of aerophones from Mahillon. Casamorata [1880] himself recounts this event in the *Relazione di antichi e speciosi strumenti donati al R. Istituto dal cav. Vittorio Mahillon* […] read before the fellows of the Accademia on 7 December 1879. Among the acquired instruments we find – besides piston valve trumpets, modern clarinets and Roman instrument reconstructions (i.e. a *tibia* and a *tuba* discovered in Pompeii) – a selection of Baroque instruments: two recorders, soprano and bass, one cornett, one dulcian and a wooden trumpet – manufactured by the Belgian scholar to demonstrate how metal does not affect timbre in acoustic tubes [see also Bargagna 1911, 79, 83, 84, 93, 109, 126, 127, 130, 131, 144].

During the last three decades of the nineteenth century, in addition to the Florentine institute, a number of museums were established in Conservatories in cities like Milan, Parma, Palermo and Naples. The declared aim of these collections was *in primis* to provide suitable training, granting students in the history of music the chance to observe and study musical instruments, manuscripts etc. 'live'; but also to promote, as we have already mentioned, the establishment of the best luthier shops. In addition to these reasons, especially in Southern Italy, we find economic-productive ones. This is the case regarding the collection found in the Conservatorio in Naples where, as declared by Michele Ruta in his *Storia delle condizioni della musica in Italia* [1877], the instruments displayed could have encouraged a renaissance of the skilled crafting of instruments: a craft which was facing difficult times in the second half of the nineteenth century because of the growing number of extremely economic semi-industrial foreign products found on the market. A large number of workshops had already closed and a relevant, long-standing craftsmanship was at risk: museums – according to Ruta – would have prevented this risk by assembling and preserving 'models' that would have helped to breathe new life into the traditional art of making

musical instruments in the former Kingdom of the Two Sicilies, now part of the Kingdom of Italy [*ibidem*, 64; Cardone 2005, 14].

New production methods and a now 'global' market restored the widespread interest, of which we have already spoken, for newly invented instruments and for structural and constructive innovations applied to traditional instruments. In regards to this, we should not overlook how Mahillon himself combined a scholarly acoustic and organological activity with the co-direction of the family company: leader in Europe in the construction and trade of musical instruments. Also, we should not forget that his systematic classification had been explicitly conceived for all ancient and modern instruments – «tous les instruments anciens et modernes» – [Mahillon 1880, title page]. His fascination for innovation in the production of instruments manifested itself in the collecting, both private and official, of instruments (including that of conservatory museums) and also in his participation in national and international exhibitions, which were rather frequent between the nineteenth and twentieth centuries.

The first national exhibition, held in Florence in the year of the unification of Italy (1861), was a somewhat bizarre commingling of scientific interests (thus declared) and trade promotion. The report, signed by Luigi Ferdinando Casamorata [1862] that was drafted by the commission appointed to award the exhibitors still remains. Before deciding on constructors and exhibitors – listed in the report in a rigorous systematic-organological outline,[1] the awards committee members, among which we find Alessandro Kraus senior, underlined the criteria used for the evaluation which, as we can see, complied to typically 'commodity-related' parameters: 1. the quality of the exhibited object, of more than average class; 2. useful innovations in the construction method; 3. the commercial importance of the company; 4. and the comparative affordability of the price of the instrument [*ibidem*, 8].

Overall, however, the Florentine exhibition was somewhat chaotic and disorganized: paintings, sculptures, agricultural and industrial machines, musical instruments and much more were all placed under the same roof – see the semi-serious guide to the exhibition drafted by Yorik, pseudonym of Pietro Coccoluto Ferrigni [1861, 29-30]. Nonetheless, in the following events there would be room for improvement: the exhibitions in Milan, held in 1881, which saw the collaboration of competent exhibitors-collectors like Alessandro Kraus junior, was better organized and, unlike the one in Florence, offered its visitors a considerable number and variety of extra-European instruments [Guizzi 1991; Zecca Laterza and Meucci 1991; Guizzi 1994, 9; Leydi 1994, 27].

The International Music Exhibition that was held in Bologna in 1888, however,

1. 1. Keyboard instruments; 2. stringed instruments, bowed instruments; 3. plucked instruments; 4. woodwind instruments; 5. brass instruments; 6. percussion instruments; 7. melographic machines [Casamorata 1862, 9-51].

was mono-thematic and, an unusual fact in Italy, in addition to the display of manuscripts, books and ancient, modern and exotic instruments, it hosted a series of themed concerts and conferences. The organizers and the 'artistic director' Arrigo Boito (the honorary president was Giuseppe Verdi) wished to broaden the musical culture of the times, making it less 'provincial' by summoning international scholars (like Victor Charles Mahillon and Raja Sourindro Mohul Tagore), and by opening its doors to extra-European music cultural traditions through various exhibitions and concerts. Unfortunately this objective was only partially reached [Fiori 2004, 189-197]. Tagore did not attend the event in person, but he sent many books on Indian music and a *Surbahr* – a sort of large modern Indian guitar, so defined in the *Catalogo ufficiale dell'Esposizione*, displayed next to the «Dictionary of Hindu musical instruments at the entry *Sur-bahr*» [*Esposizione* 1888, 38-39].[2] Mahillon participated in the event: he acted as the representative of the Conservatory of Brussels which, with its approximately ninety pieces, was among the major exhibitors [*ibidem*, 18-20, 27-28], and was the organizer of a Baroque music concert in which original instruments were played [Fiori 2005, 368-373]. The Museum of the Conservatory of Milan sent only extra-European instruments [*Esposizione* 1888, 150] to Bologna, instruments that we imagine were 'inherited' from the 1881 Exposition, proving once again the 'universalizing' vocation of the institution.

Several scholars, like Roberto Leydi and Febo Guizzi, have outlined the development of Italian organological tradition from the nineteenth to the twentieth centuries, highlighting the interest of musicologists, travellers, scientists and collectors in the instruments of the world, and reprinting a series of essential studies cited here for further study [Leydi and Guizzi 1994]. It is best to note that in the early years of the nineteenth century an important Italian music dictionary, although not entirely original, put forth the idea that all musical cultures were equal. It was the *Dizionario e bibliografia della musica*, a work in four volumes published by Pietro Lichtenthal in Milan in 1826. In the *Dizionario* we find a series of entries on extra-European musical instruments and a rather exhaustive, for those times, dissertation on 'other' musical systems and 'cultures'. For instance, the entry on Arabic-Persian music occupies the same number of pages as the entry on 'Italy' (by comparison, in the DEUMM those same entries occupy six and thirty-three pages, respectively), and the entries on India and China are particularly comprehensive. The above mentioned book was published years before the *Histoire générale de la musique* by Fétis [1869-1876], which was never translated into Italian. Another book by Fétis, *La musique mise à la portée de tout le monde* – translated by Eriberto Predari in 1858 – was, however, known in Italy: in its second volume, the author discusses

2. Regarding Tagore's role in the development of modern organology see Jairazbhoy [1990].

the music and musical instruments of the 'savages' – the Chinese, Persians, Turks and Indians – in addition to those of several ancient populations. For this same reason, the four volumes of the *Dizionario e bibliografia* by Lichtenthal remained a point of reference for Italian musicology until the early years of the twentieth century.

Hence, returning to our main theme, we can see how research on historical, modern and extra-European instruments sparked a rather keen interest, appreciation and diffusion in late nineteenth century Italy, as did public and private music collecting. It is, therefore, somewhat strange that the systematics adopted by Mahillon in 1880 registered almost no reaction in our country. It is stranger still if we consider that the Belgian scholar was 'at home' in Italy, and a key player, as is often stated, in the development of Italian organology. We know he was in contact with the Accademia del Regio Istituto Fiorentino and an honorary member – as stated in the frontispiece of the *Catalogue descriptive* [Mahillon 1880] – and the *conservateur* at the musical instruments Museum in Brussels. We have also mentioned his participation in several events in Italy: he was a correspondent and consultant, exhibitor, contributor, concert organizer, and perhaps even the representative of his family's business. The origin of many objects in his Museum are proof of the fact that he maintained a close relationship with many Italian scholars and collectors, for example, Alessandro Kraus junior.

His books were promptly reviewed in Italy, including the *Catalogue descriptif* with the *Essai de classification*. As we have already mentioned at the beginning of this paper, the first newly published edition was reviewed in 1880 by Bertini, while the first volume of the second edition of the *Catalogue* (published in Gand in 1893) was disclosed in 1894 in the first issue of the «Rivista musicale italiana». Once again the reviewer, signed G. B. (Giuseppe Bocca), lingers on the history and size of the collection in the Brussels Museum, highlighting the importance of such a collection for the development of organology and the history of musical instruments (an observation directly taken from Mahillon's introduction). Once again, although he mentions to his readers the existence of an attempt to create a methodical classification, the reviewer totally disregards it [Bocca 1894].

This circumstance appears even more surprising when we consider how the «Rivista musicale italiana» was not an 'old fashioned' music chronicle like the «Boccherini» in Florence. It was, instead, a periodical with extensive views that would highly contribute to the development of Italian musicology; and it was also highly influential in comparative musicology and in the study of musical folklore, hosting in its pages a large number of contributions by Italian and foreign scholars alike, as we can see from the detailed list drafted by Leydi [1991a, 96-102, 287-291].

There may be various reasons for this lack of interest, on the part of Italian organologists and musicologists, in Mahillon's systematics: one of these regards the long-standing problem of the absence of a 'national' museum – like those in London, Paris, Brussels, and Vienna – which, somehow, represented a point of reference for organology in their respective countries. There were numerous requests made for the establishment of similar institutions in Italy, for example by the reviewer of Mahillon's first *Catalogue* in 1880, and then again in 1934 by Giulio Fara [374-375], who never subscribed to the Fascist party and dryly invited the Regime to take action: «Come, ancora non abbiamo un museo strumentale degno di tal nome? Ciò non è da noi. Ciò è un anacronismo nell'Italia di Benito Mussolini» (How is it that we still do not have a musical museum worthy of this name? This is not like us. This is an anachronism in Benito Mussolini's Italy).

Through the years, therefore, historians and musical instrument collectors, as well as positivistic scholars more or less in line with the principles of comparative musicology, have moved 'in sparse order' but, above all, using different research models and objectives. This circumstance, evidently, has driven each scholar to choose or to elaborate his own classification criterion or, in some cases, not to address the problem at all. Many, in fact the majority, continue to use the classical three-partition system: string (plucked/bowed), wind (wooden/brass) and percussion instruments. The most celebrated Italian organologist of that time, Alessandro Kraus junior, when organizing his *Museo etnografico-psicologico-musicale*, opted for a criterion based on parameters of function and use [Guizzi 1994, 14]. Nello Puccioni [1906], when arranging the collection of musical instruments in the Anthropological Museum in Florence, elaborated a system which combines three elements: the use of musical instruments, the vibrating material, and the playing technique. His classification represents an interesting and pioneering attempt: however, it cannot be considered equal to the subsequent organological classification systems [Guizzi 1994, 16-17]. Others, like Giulio Fara, without, however, declaring it, organized instruments following an 'evolutionary' framework, that is, from the simplest to the more complex instruments.

Among the more or less complete Italian collection and exhibition catalogues to rigorously adopt Mahillon's taxonomy we find that of the Museum of the Conservatory in Milan, published in 1908. It was compiled by count Eugenio de' Guarinoni, librarian and conservator at the Museum, who in the *Note illustrative sull'ordinamento del Museo*, which precedes the catalogue entries, translated [1908, 13-43], the entire *Essai de classification méthodique* from the second edition of Mahillon's *Catalogue* [1893, 2-86]. However, he did so without referencing the source: he merely thanks the Belgian scholar and «friend» in the preface for his precious advice and precepts [Guarinoni 1908, IV; Rossi Rognoni 2008, 168]. This leads us to believe that if Guarinoni, a renowned scholar in

the field, was able to copy 84 pages (the initial pages) of the most important organological treaty of that time without declaring the source, he certainly did not fear being unmasked, and had reason to believe no one would recognise the original text.

There are, in truth, a few minor differences between the original and the translated version, for example: in the autophones with undetermined sound he inverted the *raganella* and the *tràccola* with mallet [Guarinoni 1908, 15], while Mahillon [1893, 9] first describes the big *crécelle*, the one with hammers, and then a *plus petite*, our *raganella*. Also interesting to note is his translation of the *bouche biseautée* in «bocca zeppata». Mahillon, when referring to the flutes that in the Hornbostel-Sachs classification are qualified as «flutes with internal duct», explains that the air flux beats onto the corner framed by one of the partitions *taillée en biseau*, cut *a bisello* which means 'at an inclined plane' [*ibidem*, 43], while for Guarinoni [1908, 27] «si frange contro l'angolo formato da una delle pareti tagliata a zeppa» ([it] beats against the corner of the wall cut at an inclined plane). Employing a typically arboricultural term, Guarinoni refers to the oblique cut obtained on the wall of the acoustic tube; however, by labelling the organological typology as «a bocca zeppata» he generates confusion, because the current meaning of *zeppa* in the Italian language is cap, a piece of wood used to seal an opening, similar to the one that almost entirely closes the upper end of internal duct flutes and leaves only the insufflation duct open. Some years later Giulio Fara [1916, 509], in an article on the flageolet in Sardinia, which appeared in the «Rivista musicale italiana», underlines the incongruence (apparently the name «strumento a bocca zeppata» 'wedge mouthpiece instrument' was by then widespread), stressing how it is one thing to say «wedge-cut, or cut in shape of a wedge (tagliato a, o in forma di zeppa); and quite another to say: wedged (zeppato)».

The catalogue of the Museum of Milan also presented, we must admit, an important novelty: as we know, Mahillon began, with the *Catalogue* [1893], to subdivide each of the four fundamental 'classes' into several 'branches' (*familles* in the 1880 edition), a term that corresponds to the Italian *rami*. In Guarinoni, this becomes *sottoclassi*, thus anticipating by some years Hornbostel and Sachs who, in the *Versuch* of 1914 [558] use the same term (*Unterklassen*, or 'sub-classes') to indicate the ramification, in two digits, of the first level of classification.

As we have previously stated, the support offered to the birth and development of ethnomusicology in Italy by the «Rivista musicale italiana» (1894-1933) is widely acknowledged, even though we find a very limited number of contributions on ethno-organology. In addition, in the numerous articles on music culture from places both near and far, the instrument plays a secondary role with respect to repertoires and performative practices.

The only exceptions to this rule are Giulio Fara's writings which, since his first contribution in the «Rivista» [1909], not only illustrate Sardinian music products, but also illustrate instruments that produce music and sounds. In the above mentioned paper, Fara describes the Sardinian *launeddas* and their repertories in a detailed and exhaustive manner for the very first time, without however, showing any particular interest in their taxonomies. His information will be used by Mahillon [1912, 175-177] to compile the entry of the *cunzertu* of *launeddas* conserved in his Museum. The subject of taxonomies will, however, be taken up again and expanded upon in a long essay on *launeddas,* which covered two consecutive yearly issues in the «Rivista musicale italiana» [Fara 1913 and 1914]. Under the significant title *On a Sardinian musical instrument* we find: «Launeddas […]: strumento a fiato, polifono, ad ancia semplice battente e a tubi cilindrici» (wind instrument, polyphone, simple percussion reed and cylindrical tube). The commas, obviously, mark a taxonomic branching, the same as the one we find in the fourth volume of Mahillon's *Catalogue* [1912, 172] published the previous year: «[Instruments a vent], anche simple, battante, et tuyau cylindrique».

Giulio Fara would publish other essays on Sardinian instruments, including the so called 'musical toys' and the 'acoustic objects', almost entirely classified on the basis of Mahillon's systematics. When describing and cataloguing the *serraggia,* a stick zither with resonator, he reveals a discrete knowledge of contemporary organological literature [1918, 75], while the classification of a shell horn, the *corru marinu*, goes beyond Mahillon's systematics which, for similar instruments, envisaged only three *taxa*: 1. wind instrument, 2. with mouthpiece, 3. natural [trumpets] – see, for example, the classification of the Japanese *rappakai* [Mahillon 1896, 87]). Fara [1918, 179], starting from the sub-section of the reed aerophones, implements the taxonomic string specifying the conic shape of the tube in the shell horn and the absence of lateral holes, classifying it as: «strumento a fiato, a imboccatura, a tubo conico, senza fori laterali» (wind instrument with mouthpiece, with conical tube, without lateral holes). In a contribution on Sardinian musical toys [1915a, 156-157] he contests Mahillon's *taxon* of 'friction drums', questioning, for those that use a whirling stick, the function of the cord that rubs against the stick; and he goes as far as to propose its relocation among the string instruments. It is an obvious mistake, and yet the Sardinian scholar thus revealed an uncommon interest in the construction and function of instruments, and a correct attitude when using the classification system, which should not be applied rigidly and mechanically but interpreted, while trying to resolve (at the risk of failing) eventual critical issues.

When Fara published these essays, Hornbostel and Sachs, inspired by Mahillon's systematics, had already elaborated and published their *Attempt* some years

prior; once again, as with the systematics of the Belgian scholar, there is no evidence of a review of the text in Italy. Although a positive critique is written in 1913 about the forthcoming publication, *Reallexicon,* by Sachs [Torrefranca 1914] in the «Rivista musicale italiana», nothing more would be said in its pages about his publications, even though they would continue to host reviews about publications on ethnomusicology.

The fact is that the Hornbostel-Sachs systematics was being elaborated in the first two decades of the twentieth century, precisely when the positivist and comparatist trend in early Italian musicology was waning. The Italian music culture, seduced by Croce's idealist views, was becoming more and more intolerant of rigorous, coherent and universal systems, like the ones put forth by Mahillon and Hornbostel-Sachs, and of any kind of laboratory tests or experiments. Fara [1915b, 172, 174] defines such scholars «Feticisti del diapason, del corista, del tonometro» (diapason, chorister, tonometer fetishists) while also referring, although not directly mentioning him, to Silvestro Baglioni who analysed and measured the acoustic qualities of musical instruments «senza il concorso dei suonatori indigeni» (without the involvement of indigenous players). The material-technological and functional components of the instruments, on which the Mahillon and Hornbostel-Sachs taxonomies were based, were, therefore, considered less and less relevant and productive in the reconstruction, intuitionist and spiritualist, of the concept and art of music. This was especially true in Italy where music, both classical and folk, became central to intellectuals, musicologists and ethnomusicologists – whom Diego Carpitella [1961, 54] called the *generazione di mezzo* – during the fascist reign. Fara [1914b, 249-250] himself, who came from a comparatist experience and who, more than any other person, showed an interest in systematic organology, started to consider classifications mechanical and tedious, suited to Germans but not to Italians. So, years later, while presenting the collection of musical instruments from the Liceo Musicale in Pesaro, where he worked as a librarian, he stated [1932, 426]: «È già abbastanza che mi sia limitato a catalogare strumenti musicali come un qualunque oscuro tarlo da museo» (The fact that I have limited myself to cataloguing musical instruments like any anonymous woodworm will more than suffice).

In short, it was a common belief that systematics, by describing and placing single objects into a taxonomic grid, would somehow isolate them from history and context, because it was unable to produce narratives and give explanations. A similar notion was sustained by Cesare Caravaglios in the *Folklore musicale in Italia* [1936, 241-248], one of the most substantial essays on Italian ethnomusicology written between the two world wars. In the text, he quotes an extensive contribution by Albert Marinus who heavily criticizes Mahillon's systematics and museum because, he states, it brings together

instruments from all over the world, but gives no explanations (the article was previously published in the Belgian journal «Le Folklore Brabançon», 13, 1934). A similar criticism was directed at systematic organology by supporters of cultural studies [Guizzi 2014, 10-11].
Nationalism, and anti-German sentiment during and following the Great War, together with the certainty that systematics represented a technicist approach to music and was, therefore, too 'German', partially explains the non-acceptance of the classification system in Italy, a classification system that we are celebrating today, one hundred years from its introduction.

[Translated from Italian by Matilda Colarossi]

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Florence Gétreau

Hornbostel-Sachs universal classification and André Schaeffner: a discordant or an original voice?

During summer 1932, André Schaeffner (1895-1980) submitted to Curt Sachs a new classification of musical instruments that he had already announced in the first issue of the «Bulletin du Musée d'Ethnographie du Trocadéro» in January 1931. Schaeffner's proposal was then published in «La Revue Musicale» [1932] and later developed as *Appendix* to his seminal monograph *Origine des instruments de musique* [1936]. This article will present the genetic and characteristics of this classification, evaluate its international reception, its influence on French ethnomusicologists working on organology, its heritage in academic training and publications, and finally its impact in the storage and indexing system of the collections preserved in the Musée de l'Homme and later in the Musée du Quai Branly.

André Schaeffner's classification system 1931-1936

George Henri Rivière (1897-1985), the French museologist who served as co-director of the Musée d'Ethnographie since June 1928 (future Musée de l'Homme) to organize temporary exhibitions [Gorgus 2003, 28-39], asked André Schaeffner to create a Department of Organology and to prepare a comparative exhibition room of musical instruments in 1929. Two years later, he asked him to participate, under Marcel Griaule, in the famous field research Mission Dakar-Djibouti. In 1931 Schaeffner published his monograph on Stravinsky and an expanded French version of Hugo Riemann's *Dictionnaire de musique* [Rouget 1973; Paulme-Schaeffner 1982a, 1982b]. André Schaeffner had already prepared in 1930 a *Projet d'une classification nouvelle des instruments de musique*, announced in January 1931 in the first «Bulletin du Musée d'Ethnographie du Trocadéro». He then submitted it to Curt Sachs (letters are preserved in the former Archives of the Musée de l'Homme in Paris[1]) at the beginning of the summer 1932. Sachs answered on 9 July 1932 and endorsed his judgment, wishing to submit Schaeffner's work to Professor Hornbostel:

1. Médiathèque du Musée du Quai Branly. Archives, Dossier «Curt Sachs». Schaeffner's first letter bears no date (July 1932?), Sachs's first answer is dated 9th July 1932.

Professor Dr. Curt Sachs, Berlin W 10, Lichtensteinallee 2, to André Schaeffner, 9 July 1932

Sehr verehrter Herr Kollege!
Für die freundliche Übersendung Ihres Bulletins danke ich Ihnen herzlichst. Sobald die Ferien anfangen, werde ich mich mit Hornbostel zusammen über Ihre interessante Arbeit setzen und sie gründlich studieren.
Ihr hochachtungsvoll ergebener
Curt Sachs

Schaeffner first sketch was then expanded in his article on the same subject published in October 1932 in the «Revue Musicale». In this article, he pointed out that Mahillon's, and Hornbostel-Sachs's definition of *autophones* or *idiophones* was ill defined («mal délimitée»), covering all that is unclassifiable:

> Mais revenons à l'idée d'instruments *autophones* ou *idiophones* introduite par Mahillon. Si juste soit la distinction établie entre le membranophone et l'autophone – de sorte qu'un tambour à membrane ne se confond point avec une cloche de bronze ou de bois –, si claire soit la notion même de membranophone, la classe des autophones n'en apparaît pas moins assez mal délimitée. Et en elle figure le rebut de l'ancienne classe des instruments à percussion: là se range tout ce qui est inclassable par ailleurs [Schaeffner 1932, 219].

Considering that the use of the word 'percussion' should be rejected to describe how man proceeds to put an instrument in vibration, and a classification based on the procedure to put an instrument in vibration should be avoided, he underlined that one specific instrument can be used with different playing techniques. He then proposed that the subdivisions should be based on «factors of an immediately appreciable character», on elements we find in physical matter of the sounding body exited by the musician:

> Malgré les avantages certains qu'elle présente, la classification de Mahillon et de ses continuateurs prête à équivoque par l'emploi du terme d'*idiophone*, par la pente aussi qui y conduit sans cesse à une division par modes d'excitation sonore malaisés à définir ou que le manque de témoignages laisse ignorer. Nous croyons qu'une meilleure base de classification serait assurée par des éléments de caractère évident, indiscutable, tels qu'on les appréciât immédiatement et sans qu'ils exigeassent une expérience musicale rendant cette étude peu accessible aux ethnologues ou aux préhistoriens [*ibidem*, 223].

He finally proposed, quoting Al-Farabi, the Arab theorist (d. 950), according to whom «the striking organ is either the human hand or the respiratory apparatus» to base his classification on a uniform principle: the nature and structure of the vibrating material. Schaeffner defines two principal categories: instruments with solid vibrating bodies (subdivided into those «not susceptible

of tension», and those that are «flexible»), and instruments in which the air itself is the primary vibrator:

> Il nous apparaît d'abord que tous les instruments de musique sans exception se peuvent ranger selon deux grandes catégories: les instruments où le premier corps qui vibre est un solide et ceux dont le premier corps vibrant est un gaz – en l'espèce, l'air. D'un côté, les instruments à cordes et à percussion (soit cordophones, membranophones et idiophones); d'un autre côté, les instruments à vent (soit aérophones). Une pareille division ne répond-elle point à deux gestes essentiels et distincts de l'homme: celui de toucher ou de battre un corps quelconque, celui de souffler à l'intérieur d'une cavité quelconque ? Deux gestes naturels, dont les prototypes mêmes se trouvent dans le chant et dans le frappement des mains ou de toute autre partie du corps – cuisse, épaule, pied sur le sol… Tant le théoricien arabe Al Farabi que Victor Mahillon avaient noté cette division fondamentale dont ils eussent pu tirer le principe de la présente classification des instruments de musique [*ibidem*, 225].

Before its publication André Schaeffner submitted to Curt Sachs the proofs of his article, to be published in the same issue of the «Revue Musicale» than Sachs's article *A travers un musée d'instruments* [1932] devoted to the Berliner museum of Musical instruments. Schaeffner was «honored» that his article had such a «flattering neighborhood»:

André Schaeffner to Prof. Curt Sachs, Berlin W 10, Lichtensteinallee 2 [July 1932?]

Monsieur le Professeur,
Je vous remercie vivement de la carte que vous m'avez envoyée le 9 juillet dernier et par laquelle vous m'annoncez si aimablement que vous voulez bien durant ces vacances examiner mon projet de nouvelle classification des instruments.
Mon désir eût été de vous envoyer au préalable une étude beaucoup plus approfondie et plus exacte de la question qui m'occupe. Cette étude fut rédigée au cours de l'été 1931 et devait paraître en octobre de la même année dans la «Revue musicale» (de Paris). J'avais même prié mon ami Georges Henri Rivière de vous en adresser un tirage à part. Lorsque je revins d'Afrique, où j'avais été envoyé en mission, j'eux la tristesse de constater que mon étude n'avait pas encore paru. Ce qui, maintenant, me console, c'est qu'elle paraîtra en octobre prochain, en même temps qu'un travail de vous: je ne puis qu'être honoré d'un voisinage aussi flatteur […].

He then underlined that this article is not giving the detail of his subdivisions, not yet ready. He planned to work on these subdivisions by classifying all the instruments preserved in the Musée du Trocadéro and after examining the collections in Berlin, Bruxelles and Oxford:

> Je vous prie de ne tenir aucun compte de l'ébauche imparfaite de ma classification que contient le «Bulletin du musée d'Ethnographie du Trocadéro»; elle avait pour but unique

de prendre date. Dans le cas où vous voudriez malgré tout connaître ma classification, je me permets de vous envoyer dès maintenant un jeu d'épreuves de l'étude qui paraîtra en octobre. Je m'excuse de l'horrible présentation de ces pages corrigées.
Cette dernière étude ne renferme pas le détail de mes subdivisions que je n'ai pas encore mis au point; du reste ce n'est qu'en classant tous les instruments du Musée du Trocadéro et qu'après avoir examiné les riches collections de Berlin, de Bruxelles et d'Oxford, que je compte saisir plus nettement ces subdivisions.
Vous trouverez cependant le principe dans les lignes encadrées au crayon de la page 7 des épreuves ci-jointes.
En m'excusant de la liberté que je prends de vous envoyer mon article en épreuves, je vous prie, Monsieur le Professeur, d'agréer, l'expression de mes très respectueux sentiments et de toute la reconnaissance que je dois à vos travaux.
[André Schaeffner]

Curt Sachs answered at the beginning of September 1932 but he suspended his opinion to the return of Horbonstel, still on holiday, commenting that the subject and the 'weight' of the author need a detail examination:

Curt Sachs to M. André Schaeffner, Musée d'Ethnographie, 4 september 1932

Monsieur et cher Collègue,
J'ai étudié avec soin les épreuves que vous avez bien voulu m'envoyer, mais je voudrais suspendre la communication de mon point de vue jusqu'au retour de M. von Hornbostel, qui devra avoir lieu dans les semaines prochaines. Le sujet même et le poids de son auteur nous demandent un examen minutieux.
Je vous prie, Monsieur, d'agréer, l'expression de ma plus haute considération.
Curt Sachs

Georges Henri Rivière, the young joint director of the Musée d'Ethnographie du Trocadéro, took the opportunity of this enquiry to visit Curt Sachs in Berlin in September 1932, arranging some weeks later an official invitation to his museum. Sachs was then welcomed in Paris in June 1933 to give a lecture on comparative musicology at the Institut d'Ethnologie (June 20) and another one on the History of Dance – related to his recent publication *Eine Weltgeschichte des Tanzes* [Sachs 1933] at the Musée Guimet (June 30). Back in Berlin, Sachs expressed his gratitude to Rivière at the end of July, saying that he was happy in Paris and moved by his hospitality. These preliminary contacts played certainly a role when, on 30 September 1933, Sachs was deprived of all his academic positions by the National Socialist Regime. Paul Rivet, the Director of the Musée d'Ethnographie, invited then Sachs officially on 24 October «to collaborate in the classification of the musical instruments of our collections in collaboration with M. Schaeffner». Having the benefit of a financial support from the Universal Jewish Alliance and from the Rockfeller Foundation, Sachs

took indeed the opportunity of this stay of four years in the Musée du Trocadéro with more ambition than the official invitation planned. But we can be sure that Curt Sachs had, due to these circumstances, plenty of occasions to share, during these years of collaboration, his point of views on Schaeffner's classification. It was indeed published in a much more developed version in his seminal book *Origine des instruments de musique* [1936, 371-377]. As clearly exposed half a century later by Geneviève Dournon [1992, 253-254]:

It is based on a uniform principle: the nature and structure of the vibrating material. Schaeffner defines two principal categories: instruments with solid vibrating bodies and instruments in which the air itself is the primary vibrator.
The subdivisions are based on the material (wood, metal, stone, etc), the form or structure of the sound-producing component (stick, lamella, plaque, tube, husk, block) in the case of those «not susceptible of tension» and those that are «susceptible of tension» (string, stalk, thong); the membranes are classed by the body of the instrument (vase, tube, frame) on which they are stretched. In the category of instruments with vibrating air, Schaeffner distinguishes those for which the vibrating air is not confined – or 'air ambient' – as for example the bull-roarer, from wind instruments proper, which are subdivided into single pipe, pipe with natural reeds and reed pipe.

As pointed out by Geneviève Dournon [1992, 253]

Schaeffner does not introduce the means of setting an instrument in vibration as a criterion of subdivision, but simply as a complementary indication for certain types (concussion sticks, struck boards, scraped bones, plucked lamella, skin set vibrating by direct of indirect percussion etc.). He thus makes optional something that was a useful classificatory sub-criterium in Hornbostel-Sachs and Mahillon, at least in three of their four categories.

The reception of *Origine des instruments de musique* and its new classification among international ethnomusicologists

The reception of that book was quite enthusiastic, even if the reviewers pointed out his new but disconcerting classification and the inconsistency on a number of points.
Klaus Philipp Wachsmann (1907-1984) signed the first review of the book [1937] only with initials. But it is interesting to know that he had been trained in Musicology and Comparative Musicology by Erich Moritz von Hornbostel and Curt Sachs before 1933, that he earned his PhD on pre-Gregorian chant at the University of Fribourg (1935) and proceeded to London for post-graduate studies in Bantu languages and phonetics. As a very young Africanist, later curator of the Uganda Museum in Kampala, he found the book in the tradition of Hornbostel-Sachs thought but took little attention to what he considered an attempt for «a modified classification» [*ibidem*]:

> Sachs set out to write a history of musical instruments which was based mainly upon their structural elements and their diffusion. His standard work on this subject is *Geist und Werden der Musikinstrumente* [1929]. André Schaeffner has been inspired to this work by Sachs's line of research.
> It is worth while to look at the index of Schaeffner's book as it shows the method of his approach to the subject. The earlier chapters dealing with the invention and application of musical instruments, treat to the following subjects: the corporeal origins […]; the organology of the theatre; work and play; religion and magic. But then Schaeffner changes his course and confines himself to an exclusively organological survey of the main types of instruments. He goes on by giving a genealogical account of string instruments, of wind instruments, and an essay on the position of musical instruments in general in the evolution of music and in cultural history. Finally, a modified classification of musical instruments is attempted.
> Schaeffner's treatment of the problem is instructive and full of suggestions owing to observations partly of his own made during two expeditions to Africa partly based on specimens of ethnological collections, partly cited from traveling records and essays of other scientists. Well-chosen quotations from philosophers, poets, and composers make his book pleasant reading.

Few months later, Francis William Galpin (1858-1945), the famous organologist and specialist of Triangular harps and Sumerian Music, wrote a review [1937a] – also only signed by initials – of Schaeffner's book in the same issue of «Music & Letters» where his own major *A textbook of European Musical Instruments. Their Origin, History and Character* [1937b] was reviewed. He was quite impressed by Schaeffner's «remarkable survey», but considered that the new classification was more «ethnographical rather than musical» because based on materials, and found disconcerting that «In the first division the 'material' arrangement is followed; in the second it is discarded» [Galpin 1937a]:

> With one of the great ethnographical collections of Europe at his command and a personal acquaintance with primitive people both in Africa and America, M. Schaeffner has been able to present to us in this treatise a remarkable survey of man's earliest efforts in music-making; though it may not always win our assent in its conclusions, it cannot fail to arrest our attention and stimulate further enquiry […].
> Following on the text, a new scheme for the classification of musical instruments is set out. Without wishing to detract from its intrinsic interest, we may gather from its construction the real purpose and principle of the whole work. It is ethnographical rather than musical. For, as a true ethnologist, the author classes his subject on the lines of the materials used (wood, metal, stone, bone, shell, etc.) and for the history of human development such a view is important. In this way too he follows the age-long practice of the Chinese, who group their instruments by their substances, though their object in so doing is cosmological. But for the musician the material employed is of quite minor account […]. The main point for the musician is of course, the acoustical and sound-producing principles involved. It is, therefore, momentarily disconcerting to find in his classification but two divisions. […] In the first division the 'material' arrangement is followed; in the second it is discarded.

Douglas Harold Varley (1911-2000), the author of an extensive and annotated bibliography published in 1936 under the title *African Native Music*, gave a review in the journal «Man» in which he considered that Schaeffner «without attempting to define 'a musical instrument', goes a stage further than M. Closson, and emphasizes not the rhythmic origin, but the space in which the sounds reverberate, and the quality of the objects which produce them». He quoted without comments «a suggested classification for instruments based on the four categories» and gave some addenda to Schaeffner's «imposing systematic bibliography» [Varley 1937].
Percival Robson Kirby (1887-1970), one of the earliest musicologists specialized on African Music and author of *The Musical Instruments of the Native Races of Southern Africa* [1934], stressed the «absorbing interest» of the book, its promising posterity, its universalism but once again the «inconsistency» of the two basis for his classification (materials and in the second part methods of sound production) [Kirby 1939]:

> His work, although it deals with a musical subject, is, of course, ethnological in outlook, and this is undoubtedly right […]. Schaeffner […] is historian, geographer, ethnologist, musician, and philologist; he has had practical experience in the field […], he is in charge of one of the most important collections of primitive and exotic musical instruments in Europe; and he has read widely in the literature of this subject. As a result he has succeeded in producing a volume of absorbing interest. Even where we disagree with some of his conclusions, we must confess to admiration for his ideas, and willingly admit that his work will be of the greatest value to future investigators […]. Schaeffner concludes with a new classification of musical instruments, dividing them into two main groups. In the first the classification is based upon the materials from which they are made; in the second according to the method of sound production. Surely there is an inconsistency here […]. The book is a prodigious attempt on the part of one man to gather together and to unify knowledge, which is scattered all over the globe, and throughout the ages. Every student will welcome its appearance, and will, on becoming more acquainted with it, feel increasingly indebted to the author.

George Herzog (1901-1984), native of Budapest, who completed his training in music in Berlin where he was impressed by Hornbostel circle and understood the importance of cultural context in studying 'exotic' musics, established the first course in ethnomusicology in Columbia University. He was the first reviewer to point out that Schaeffner drew the consequences of a critical attitude to the previous classifications, but he criticized the too prominent position given to materials, the «confusion between the aims of a technological as against a genetic classification» and the inconsistency of his system on several points [Herzog 1941]:

> This is among the most important general treatments of musical instruments. […] In large measure the work is a critique, implicitly or explicitly, of the classificatory schemes of Mahillon, Montandon, and especially of Sachs and von Hornbostel.
> Schaeffner goes into considerable detail about subtle technical and acoustical features of sound production on musical instruments. Previous schemes were based on grouping and subdivision according to the method of excitation or sound production. He submits, among other considerations, that 1) many instruments consist of an enclosed cavity; the nature of the cavity and its walls may be more important for the understanding of the development of the instrument that the methods of making it vibrate; 2) there are numerous technological 'contagions' that connect forms whose method of sound production may appear technologically different; 3) transitional and substitutive forms often cross the divisions; 4) the same material and object has often been used for making different kinds of instruments […]; 5) the same gesture of type of bodily movement may result in technologically different musical instruments; the gesture must be kept in mind for technological as well as historical considerations.
> After these observations, supported by considerable detail, one looks with interest – and some disappointment – at the scheme Schaeffner himself offers. The system contains two mains subdivisions […]. Within the main groups further divisions are made according to material, form, and occasionally the method of sound production. These special principles are not always given the same place or order in the scheme. The material of which the instrument is made has been given rather too prominent a position. Consequently Schaeffner's system also could be shown to be inconsistent, on a number of points. […] Schaeffner's scheme has got further away than others from the sometimes unconscious confusion between the aims of a technological as against a genetic classification.

To summarize, none of the five reviewers paid a detailed attention to Schaeffner's proposal and quite all of them considered it 'inconsistent' in several aspects.
Half a century later, Margaret Kartomi as the first scholar to concentrate with the closest attention and universal interest on all classification systems, gave the first detailed account on Schaeffner's attempt, with a considerably deeper comparative emphasize [1990, 174-176]:

> Schaeffner rejected Mahillon's and Hornbostel and Sachs's category of autophones/idiophones [because it] is not sufficiently differentiated and therefore cannot avoid the faulty classification of instruments such as the African *sanza*, whose plucked tongues – not the body or soundboard – vibrate, thus making them linguaphones rather than idiophones, or East Asian and African xylophones, whose keys, not the boy or box, vibrate. More importantly, the presence of the idiophone category destroyed the only basis for the Hornbostel and Sachs classifications's claim to logical structure, namely, single-character division at the highest step. […] However, Schaeffner could not accept the differentiation of the category, nor its logical inadequacy. Schaeffner also argued that the physical structure of an instrument, not its playing method, should be the main criterion for its classification. He constructed a key, making a basic distinction between wind instruments and all others and dividing the latter into those that are operated by tension and those that are not […].

> Schaeffner's system meets the demands of logic in vitally all respects. Not only is it logically exhaustive, potentially covering all real and conceivable instruments, but its two major categories are mutually exclusive, and it applies single-character division at all its five steps (although its lowest step is a little more hazy than the others). It is not a symmetrically developed scheme, as its second category has only two steps in the case of instruments containing free cavities, three steps in the case of instruments with ambient air, and four steps in the case of instruments with air columns), as opposed to five in the first category. Unlike the Hornbostel and Sachs Classification, Schaeffner's scheme has not been translated into English, and has had little impact outside France. Its comparative novelty or, in other words, its lack of continuity with past classifications, the greater prestige and greater exposure of Hornsbostel and Sachs's classification mediated against the widespread acceptance of Schaeffner's scheme, despite its elegantly logical quality.

Geneviève Dournon as a follower of André Schaeffner

We would like now to come to André Schaeffner's main follower, Geneviève Dournon, who was in charge of the collection of musical instruments in the Musée de l'Homme between 1967 and 2004. In 1982, in the special issue of the «Revue de Musicologie», devoted entirely to the late Schaeffner (with massive French contribution), Dournon wrote:

> Even if very original, the scheme proposed by Schaeffner completes and illuminates, rather than replace the *Systematik der Musikinstrumente*. […] Like all classification, it has questionable aspects, for example when separating in distinctive categories, because of their different material, instruments pertaining to the same organological type, or when subdividing too briefly important categories. But it is however a first rank tool […] for ethnologists and anthropologists as Schaeffner already pointed out.

A decade later, reviewing Margaret Kartomi's monograph in her article *Instrumentariums et classifications* for the «Revue de musicologie», an occasion of a developed overview on classification systems, Dournon [1993] criticized her for not highlighting sufficiently how Schaeffner's proposal could bring much to Hornbostel-Sachs's classification. For Dournon, both systems are complementary. The four instrumental classes can easily be redistributed (at the higher level of the hierarchy) inside Schaeffner's two perfectly exclusives categories. For her also, idiophones can enter without difficulty in the category of solid vibrating bodies, constituted with material 'non-susceptible of tension', while chordophones and membranophones take place in this same large category as 'solid bodies susceptible of tension'. Concerning aerophones, they can be inserted logically among the 'air vibrating instruments'. Schaeffner's dichotomy used upstream the quadripartite division, and has so the indisputable advantage of increasing the definition of Hornbostel-Sachs categories. No wonder that Dournon developed these same arguments when she was in charge to write the chapter *Organology* in Elen Myers' *Ethnomusicology*. In her

chapter *Systematics* she gives an introduction defending once again the value of Schaeffner's proposal [Dournon 1992, 252-253]:

> André Schaeffner did not entirely adhere to the system of the two German theoreticians […], although he freely expressed his esteems for and indebtedness to the work of Hornbostel and Sachs […]. The interest of the Schaeffner system, which Wachsmann describes [1984, 408], as «logically perfect and coherent» […]. Schaeffner has not been widely used, despite its undoubted interest, perhaps because the user must revise and complete the subdivisions himself. Moreover, Schaeffner's work on the origin of musical instruments, which is fundamental to ethnomusicology and organology and includes his classification, has never been translated from its original French into any other language (except a recent Italian version [Schaeffner 1978]).

Dournon inserted in her article *Organology* for Helen Myers' manual her own *Classification* were she merged the two systems, giving also for each subdivision several vernacular names of real instruments and their geographical provenance, making this tool easier to use.
In 2007, in her contribution to Jean-Jacques Nattiez's encyclopedia, Geneviève Dournon re-used, in a French translation, the same classification in her chapter *Instruments de musique du monde. Foisonnement et systématiques* [Dournon 2007]. But she added some questionable changes in the hierarchies which are not always coherent. We should not forget also that when promoting her *Guide pour la collecte sur le terrain* [1981] in her article on Schaeffner's museographic heritage, Dournon mentioned the fact that she used, for her chapter dealing with the identification of instruments, the main principles of Schaeffner's classification, because its effectiveness was verified both for the training of African museographers and for students in Ethnomusicology at the University of Nanterre, a direct extension of Schaeffner's teaching initiated at the Institut d'Ethnologie [*ibidem*, 219]. In the same way one can find evidence of the spread of Schaeffner's principles in the handout distributed by Dournon to her students during the same years when she published her 'merged' classification with Helen Myers (see Appendix).

Schaeffner's classification and its impact for the storage and indexing systems at the Musée de l'Homme and the Musée du Quai Branly

When Geneviève Dournon became in charge of the musical instruments collections at the Musée de l'Homme, in 1967, she was impressed by the storage, «where Schaeffner had gathered and classified thousands of instruments whose observation and study had inspired his Master book» [1982, 216]. She kept this system as long as she served in this institution.
Finally, the most 'living and visible' heritage of Schaeffner's concepts, if I can risk this provocative metaphor, is the famous and controversial 'glass tower' or

'glass cylinder' devoted to the storage of all the instruments, in the Musée du Quai Branly that was opened in 2006 [Leclair 2007]. Here the entire collection, despite the arduous architectural gesture of Jean Nouvel, is 'visible' even if quite 'invisible'. It is classified, thanks the work of Madeleine Leclair, by continent, then after Hornbostel-Sachs four categories, and then applying material criteria inherited from Schaeffner's seminal book and classification.

Appendix

Handout distributed by Geneviève Dournon
when teaching Organology at the University of Nanterre (1991)

LES FAMILLES D'INSTRUMENTS DE MUSIQUE
Tous les instruments de musique relevant de l'acoustique (et non de l'électronique) peuvent être rassemblés selon quatre groupes

Qu'est-ce qui vibre ?	**Comment**
Deux sortes de matières vibrantes :	Principaux procédés de mise en vibration
Les corps solides	**Frappement**
- rigides (bois, pierre, métal, etc.)	**Secouement**
- élastiques (membranes, cordes)	**Raclement**
L'Air	**Pincement**
- contenu dans une cavité	**Frottement**
- ambiant	**Soufflement**

On définit ainsi quatre categories instrumentales:
Idiophones – membranophones – chordophones – aérophones
Qui constituent la CLASSIFICATION généralement utilisée en ORGANOLOGIE, science des instruments de musique.

MATIÈRES RIGIDES

Le son est produit en mettant en vibration des matières rigides par:
Entrechoc
- de deux objets semblables (pleins ou creux): cymbales, castagnettes
- d'une série de plaques de pierre (lithophone), de bois (xylopone), de métal (métallophone)

Secouement
- d'un ensemble d'éléments mobiles: sonnailles
- d'un objet creux rempli ou entouré de petits corps mobiles (hochet et hochet-sonnailles)
- d'une série de disques enfilés sur une tige: sistre
- de tubes disposés dans un cadre: tubes oscillants ou angklung

Raclement
- des côtés cannelés d'un objet (plein ou creux): racleur

Frottement
- de la face lisse d'un objet (plein ou creux): bloc frotté

Pincement
- de l'extrémité d'une languette flexible insérée dans un cadre: guimbarde
- des extrémités d'une série de languettes flexibles disposées sur une caisse: sanza

CES INSTRUMENTS DE MUSIQUE, TRÈS NOMBREUX ET DIVERSIFIÉS, CONSTITUENT LA CATÉGORIE DES **IDIOPHONES**

MATIÈRES ÉLASTIQUES: LES MEMBRANES

La mise en vibration d'une membre tendue sur un corps de résonance s'obtient par:
Percussion ou Friction.
On distingue les différents types d'instruments en fonction des caractéristiques suivantes :

Nombre de membranes: une ou deux

Forme du corps de résonance:
- **Caisse** (cylindrique, hémisphérique, tronconique, en sablier, en tonnelet, en gobelet, etc.)
- **Cadre** (circulaire, quadrangulaire, polygonal).

Système d'attache de la membrane: lacée, collée, clouée, chevillée, cerclée, etc.

CES INSTRUMENTS, APPELÉS TAMBOURS, CONSTITUENT LA CATÉGORIE DES **MEMBRANOPHONES**

MATIÈRES ÉLASTIQUES: LES CORDES

La mise en vibration d'une corde tendue sur un corps de résonance s'obtient par:

PINCEMENT – FRAPPEMENT – FROTTEMENT
▲ ● ■

Le plan des cordes – perpendiculaire ou parallèle au plan du corps de résonance – permet de déterminer les différents types d'instruments:

▲ ● **Arc Musical**: corde tendue entre les deux extrémité d'une branche arquée.

▲ **Pluriarc**: plusieurs arcs musicaux réunis dans une caisse.

▲ **Harpe**: corde(s) tendue(s) entre une caisse et un manche (arqué ou droit) formant entre eux un angle

▲ ● ■ **Cithare**: cordes parallèles entre elles et au corps de résonance ne comportant pas de manche.

▲ ■ **Luth et Vièle**: corde(s) tendue(s) entre une caisse et un manche situés dans un même plan; cordes parallèles entre elles.

CES DIFFÉRENTS TYPES D'INSTRUMENTS, DITS À CORDES, CONSTITUENT LA CATÉGORIE DES **CORDOPHONES**

L'AIR

Le son peut être produit de deux manières bien distinctes

Par la mise en vibration de l'air contenu dans une cavité au moyen du souffle:

- heurtant l'arête d'un orifice (embouchure) situé à une extrémité ou sur le côté de l'instrument: flutes
- ébranlant une languette simple ou double: instruments à anches
- faisant vibrer les lèvres contre l'embouchure de l'instrument: trompes

Par la mise en vibration de l'air ambiant au moyen du tournoiement:

- d'une plaque: rhombe
- d'un disque: diable

CES DIFFÉRENTS TYPES D'INSTRUMENTS, APPELÉS À AIR OU À VENT, ENTRENT DANS LA CATÉGORIE DES **AÉROPHONES**.

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Marie-Barbara Le Gonidec

Enhancing and developing the Hornbostel-Sachs System: the case of flutes and bagpipes

The work I have been carrying out in the past years in the field of the Hornbostel-Sachs system concerns two wind instruments, the flute and bagpipe. I would like to explain how I was able to extend the category they belong to in the Hornbostel-Sachs system.[1] I first became interested in flutes during the first part of my academic studies, and later in bagpipes, also pastoral instruments, which was the subject of my PhD research in the Balkan area. In 1985 I had my first opportunity to work with Geneviève Dournon,[2] director of the department of ethnomusicology at the Musée de l'Homme in Paris. At that time, the department held roughly 1,200 flutes, and I based my Master's thesis on particular types of flutes which are often known in French as *flûtes obliques* (rim-blown) because they are held obliquely. This is a descriptive term that makes sense in Western culture if we consider the traverse flute or the flute played vertically (like the recorder), but which is not pertinent in the context of transculturally based classifications. These 'oblique' flutes are widespread in Balkan states. They are the Bulgarian *kaval* (figure 1, p. 108), and also the *nây*, or *ney*, played in classical oriental music (figure 2, p. 108). The name, 'oblique' flute, is not pertinent in all cases, as we can observe in the example of the Persian *ney* (figure 3, p. 108).

If we compare Turkish and Persian flutes, we see that the Persian flute is played in line with the body's vertical axis. I decided then to provide another name, basing my choice on the English 'end rim-blown flute', which is more logical (even if in French it is translated with the lengthy term: *flûte à insufflation sur le biseau terminal*). That first study [1988] was monographical and concerned this type of flute only. From an organological standpoint, I studied the body of twenty or so flutes from the collection held in the Musée de l'Homme, choosing examples that presented a different mouthpiece or a different playing technique.

1. Many thanks, for the illustrations found herein, to the Kunitachi college of Music, the Musée des Civilisations de l'Europe et de la Méditerranée, the Société des Océanistes, Hyptique; to Alice Barrat, Bertrand Bilger, Cyrus, Jean-Pierre Dalbéra, Kudsi Erguner, Dobri Giaurov, Paoun Kušlev, Constance Le Gonidec, Jean-Sébastien Martin, Benoît Mager, Valérie Pasturel, Todor Trifonov, Jean-Michel Vandercamère, Anton Varela, Hugo Zemp; to the *zampognari* seen in Saint Chartier in 2007 and to the Slovak player of *koncovka* I met thanks to Igor Mačak. I would like to thank Laurence Fayet for helping with the English terms in the classification of flutes.

2. This paper is dedicated to her in gratitude for what she awarded me during my studies.

1.

3.

Figure 1.
Dobri Giaurov playing the *kaval*, a traditional end-rim blown flute from Thrace, Bulgaria
PHOTOGRAPH BY MARIE-BARBARA LE GONIDEC, 1993

Figure 2.
The traditional musician Kudsi Erguner playing the Turkish *ney* PHOTOGRAPH BY JEAN-MICHEL VANDERCAMÈRE, 1988

Figure 3.
A Persian musician playing the *ney*
PHOTOGRAPH BY JEAN-MICHEL VANDERCAMÈRE, 1988

2.

4.

Figures 4-5.
The furniture manufactured to store the flute collection in the Musée de l'Homme in Paris

Details of the furniture when open
PHOTOGRAPH BY MARIE-BARBARA LE GONIDEC, 1989

5.

Some years later, in 1989, Geneviève Dournon engaged me to reorganize the entire flute collection due to the imminent reorganization of the hall in which the flutes were kept. They were aligned in a row, in the open, on a sort of rack that hung from the wall. We moved them to a wooden structure (figure 4, p. 109), made of vertical shelves inside various cabinets and of horizontal shelves inside drawers (figure 5, p. 109).

At that time, the Musée de l'Homme was under the direction of the National Museum of Natural History in Paris, and the collections were, first and foremost, for study. So, since the time of André Schaeffner (the founding father of ethnomusicology in France, hired in 1929 by the Trocadéro museum of ethnography, progenitor of the Musée de l'Homme), the arrangement of the collections was in function of the scientific prospective. It was the Hornbostel-Sachs system that prevailed, that is to say the technological prospective that was adopted by the two researchers: the function of an instrument is that of producing sound. How does it do that?

During the time in which Geneviève Douron was the director (after André Schaeffner) of the collection of musical instruments in the Musée de l'Homme – even though the cultural and musical knowledge connected to those instruments had allowed them to be classified in their social and cultural contexts – the Hornbostel-Sachs was still the prevailing system for the categorization of the collections. We were, therefore, convinced, Geneviève Dournon and I, that the new structure should be a sort of 'analytical catalogue', making the organization of physical space correspond to the theoretical one, as shown in figure 5, where, at the top, we would find the flutes that are either 'side-blown' or 'end rim blown', and lower down 'vertical' flutes (generally the duct flutes).

I mention this work carried out in 1989, which was not part of my university degree course, to underline the fact that between my master's research and this reorganization, together with my own bibliographical studies, my knowledge of flutes has grown considerably. I was astonished by the morphological difference of flutes, when apparently, on a visual plane, we were dealing with a 'simple' pipe. However, if we look closely, we realize that the embouchure system, which is to say the arrangement of the elements that allow the sound to be emitted, is sometimes surprising, and we find instruments like the one in figure 6[3]. It is similar to a block flute whose block has been lost, but that's not really the case, and we wonder how it is able to function at all. I later learned that it is the player's tongue which, introduced into the flute, re-creates the air duct. There are even more surprising flutes like the *gasuo* (figure 7, Kunitachi College of Music, inv. 995) belonging to the Hmong people who live in the province of

3. These illustrations, which are not technical drawings, were taken from bibliographical sources and from observed specimens in order to help understand the characteristics of the embouchure. Unless otherwise stated, all technical drawings are by Jean-Michel Vandercamère (1990).

Guizhou in China. Therefore, I began to notice that, in the Hornbostel-Sachs classification system many types of flutes are set in the same subdivision, when other subdivisions could have been created. So how could we go about making the classification more detailed? This is the problem I intended to face when I presented the work I published in French in 1997.

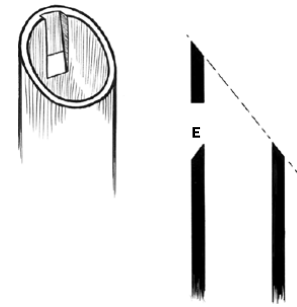

Figure 6.
A block flute with a missing block or a flute without duct?

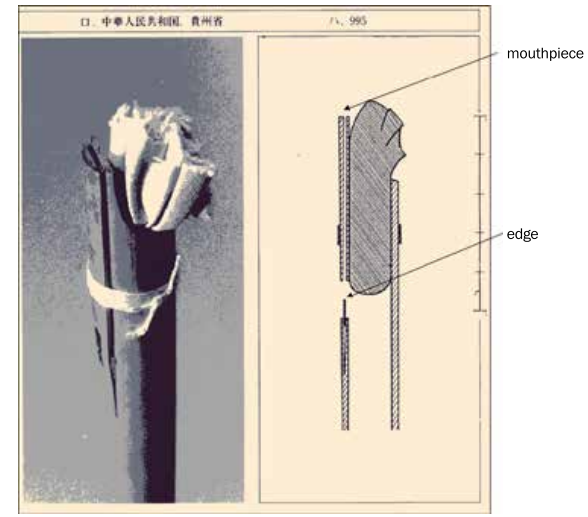

Figure 7.
Flute *gasuo* played by Hmong people, Guizhou, China, 1984.
Tokyo. Collection of Organology, Kunitachi College of Music (inv. 995)

Flute without a duct or with buccal air-duct?
New terminology for flutes

Under aerophones, category 4 in the Hornbostel-Sachs classification (see below), the flute is in position 421; it works thanks to the air stream that blows across a sharp edge. The jet of air must reach the edge through a conductor that is set in the flute (421.2 with duct), for example in the block flute, or which is produced by the player's mouth (421.1 without duct) when playing (in the case of the side-blown flute), or also by the player's nose. In my view, since conducting the air is a necessity, it is preferable (figure 8) to use positive terms, and, therefore, instead of saying 'without duct', it is preferable to speak about 'buccal air-duct' flutes for those in which the duct is not a part of the body of the flute itself (figure 8, on the right).

Hornbostel and Sachs state that the flutes (421) without duct (421.1) can be end-blown (421.11) or side-blown (421.12). Before explaining my proposal, let's have a look at the Hornbostel-Sachs system:

421	edge instruments or flutes
421.1	flutes without duct (the player himself creates a ribbon-shaped stream of air with his lips)
421.11	end-blown flutes (the player blows against the sharp rim at the upper open end of a tube)
421.111	(single) end-blown flutes
421.111.1	open single end-blown flutes (the lower end of the flute is open)
421.111.11	without fingerholes (e.g. *tilinca* from Romania)
421.111.11	with fingerholes (e.g. *ney*)
[…]	
421.12	side-blown flutes (the player blows against the sharp rim of a hole in the side of the tube)
[…]	
421.2	flutes with duct or duct flutes (a narrow duct directs the air stream against the sharp edge of a lateral orifice)
421.21	flutes with external duct (the duct is outside the wall of the flute; this group includes flutes with the duct chamfered in the wall under a ring-like sleeve and other similar arrangements)
[…]	
421.22	flutes with internal duct (the duct is inside the tube. This group includes flutes with the duct formed by an internal baffle – natural node, block of resin) – and an exterior tied-on cover – cane, wood, hide –).

Fine... but then, where should notched flutes or oblique flutes (figure 9) be placed? They have been categorized under end-blown flutes. I sustain that the classification of the end-blown flutes should diverge from the Hornbostel-Sachs arrangement. In fact, the review of certain taxonomic criteria would allow us to progress much further.

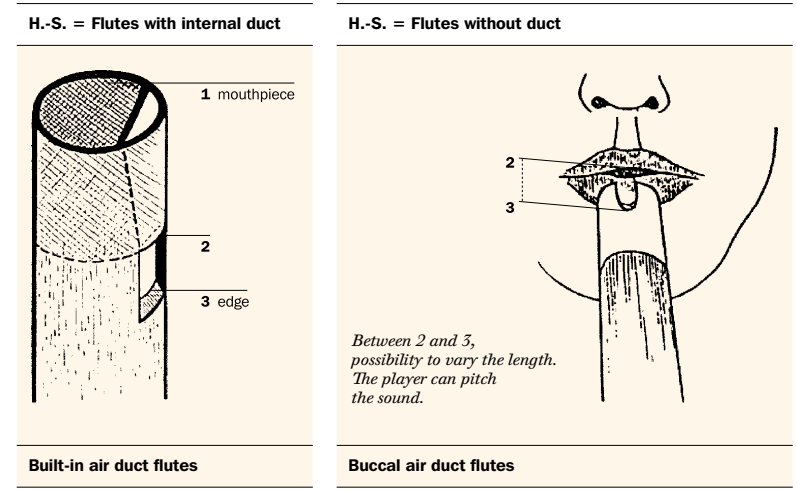

Figure 8.
Diagram showing the difference between
the Hornbostel-Sachs typology
and the one I propose for the two main categories of flutes,
type 421.1 and 421.2

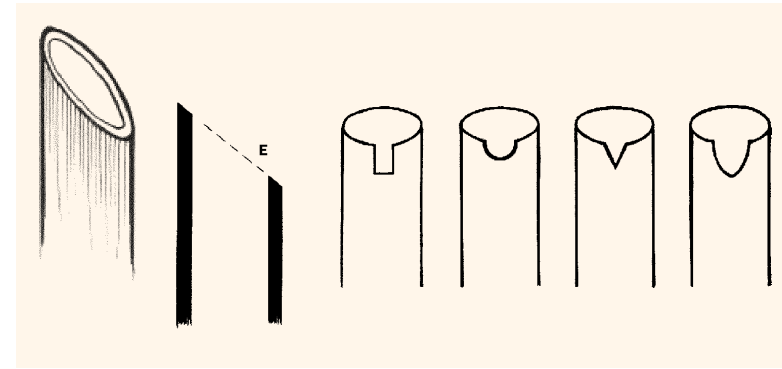

Figure 9.
Mouthpiece cut obliquely and different types of notched flutes.
Cutting the tube obliquely or making a notch have the same result:
separate the mouthpiece from the edge. But they are
two different processes we can distinguish in the typology

Acoustics teach us that the sharp edge, and not the mouthpiece, is the fundamental element in the flute, and that is why I propose to base the classification of flutes on the position of the edge in connection with the mouthpiece. I will start from the number 1 to avoid having to state long numbers. The classification is based on real flutes, already well known to scholars (which are mentioned with their vernacular name), or stored in the Musée de l'Homme in 1996. In Appendix 1 it is possible to find the inventory numbers of the flutes now preserved in the Musée des Civilisations de l'Europe et de la Méditerranée of Marseille (MUCEM) and at the Musée du quai Branly (MQB) in Paris.

In the case of figure 10:

1	buccal air-duct flutes, we find
11	(on the left) end mouthpiece and edge;
12	(in the middle) end mouthpiece and shifted edge;
13	(on the right) side mouthpiece and edge.

1 buccal air-duct flutes
11 end mouthpiece (letter M) and edge (letter E)
12 end mouthpiece and shifted edge
13 side mouthpiece and edge

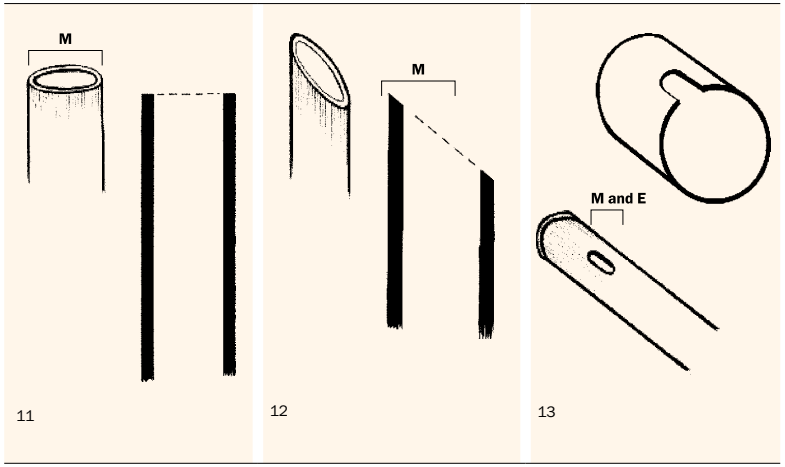

Figure 10.
Three different types of buccal air-duct flutes

In the case of figure 11:

11	end mouthpiece and edge, the following criterion is
111	open mouthpiece, as opposed to
112	half-open mouthpiece.

11 end mouthpiece and edge

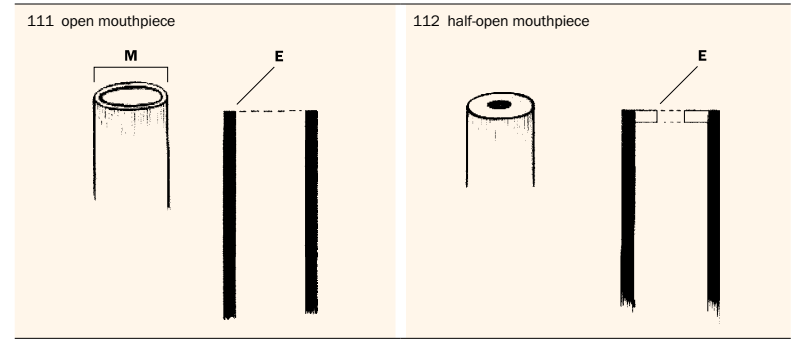

Figure 11.

An open mouthpiece can be divided into (figure 12):

111.1	simple
111.11	capped embouchure (which means the mouthpiece is inserted in the end, like, for example, in Persian *ney*, where the mouthpiece is positioned between the teeth)
111.2	bevel-edged
111.21	capped embouchure (Turkish *ney*).

11 end mouthpiece and edge
111 open mouthpiece

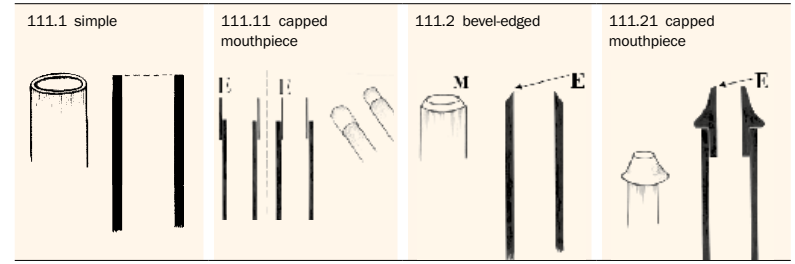

Figure 12.

To follow, for flutes of type 12, end mouthpiece and shifted edge, we have (figure 13):

121 end mouthpiece, slanted;
122 notched or with partial window [Schaeffner 1936];
123 windowed.

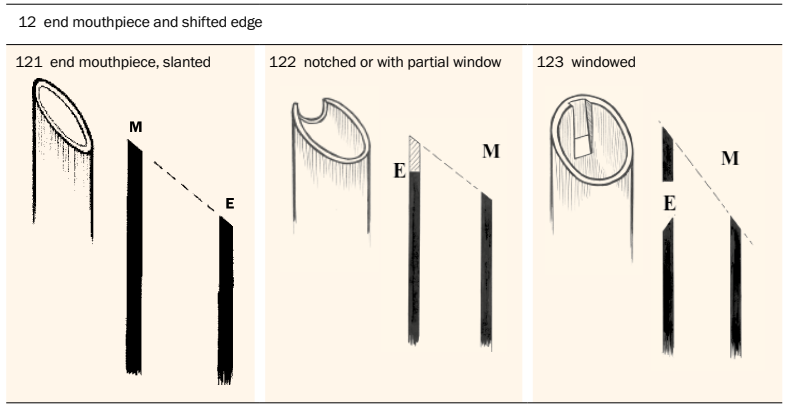

Figure 13.

And then in flutes of type 13 side mouthpiece and edge (of which the transverse flute is an example) we have (figure 14):

131 simple
132 with inserted embouchure, which corresponds to the head-joint of the transverse flute, the only example I know of.

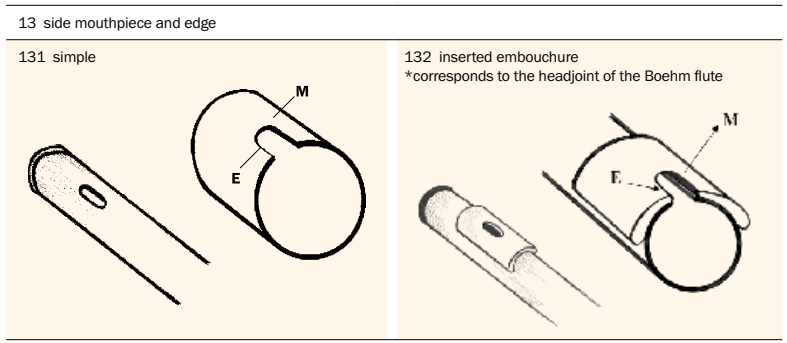

Figure 14.

In built-in air duct flutes (category 2) the duct can be (figure 15):

21 inserted
or
22 built-in, or integrated into the body of the flute

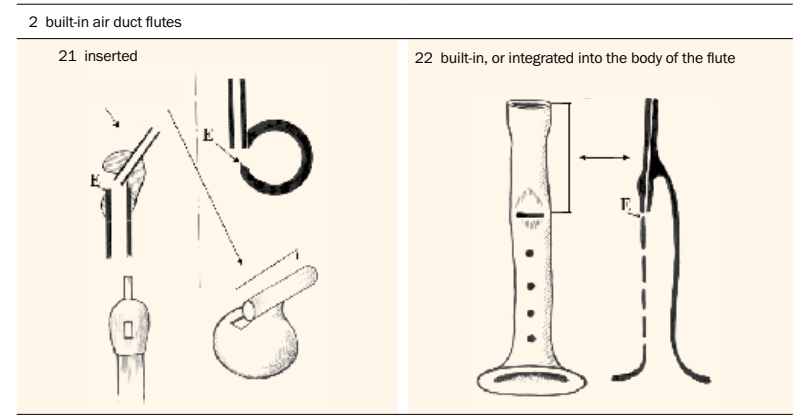

Figure 15.

Let us observe category 22, where the integrated duct can be (figure 16):

221 internal (Hornbostel and Sachs start with external)
222 external
223 semi-external (Hornbostel and Sachs do not mention it)

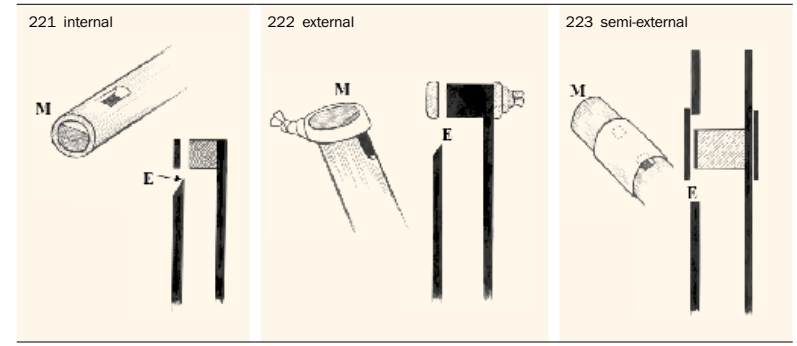

Figure 16.

In case of 221, the duct may be (figure 17):

221.1 with initial conductor
221.11 made with a plate, or
221.12 made with a block.

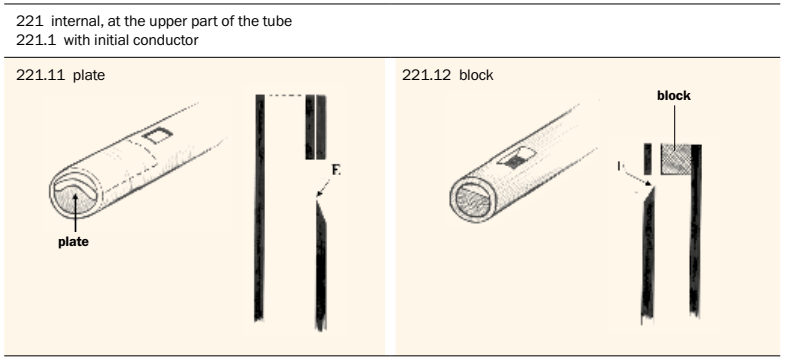

Figure 17.

The type 221.1, with an upper block (or plate having the same function) is in contrast with the 221.2 halfway block. Figure 18 shows, on the right, two flutes from Mexico and Argentine (now at the Musée du Quai Branly). On the top, the flute is made of bone, and a small wax block was added. The flute below is made of cane, and part of the natural partition (the inside node) has been conserved.

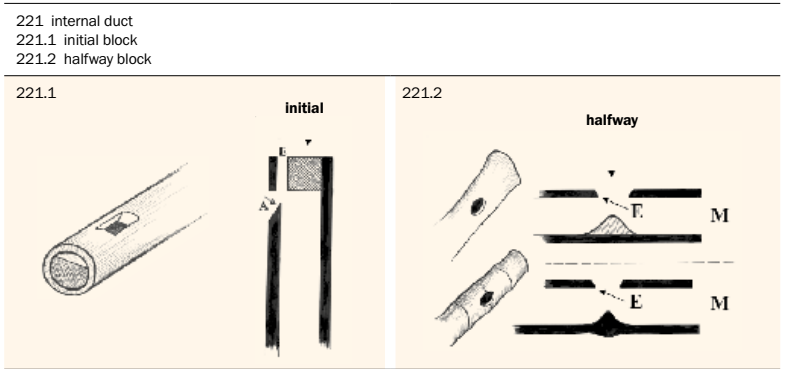

Figure 18.

Let's now return to type 221, having an initial block (221.12). In figure 19, the block is at the same level with the end of the pipe (221.121), forming a right angle (221.121.1) or cut in a beak shape (221.121.2). The first type is illustrated by a widespread flute in Eastern Europe, like the Bulgarian *duduk* seen in figure 19. The window is at the opposite side of the fingerholes. This allows one to partially cover the window with his lower lip to change the timbre of the flute. The beak-shape type is also widespread. This is the common French *flûte à bec*, in English, *recorder*.

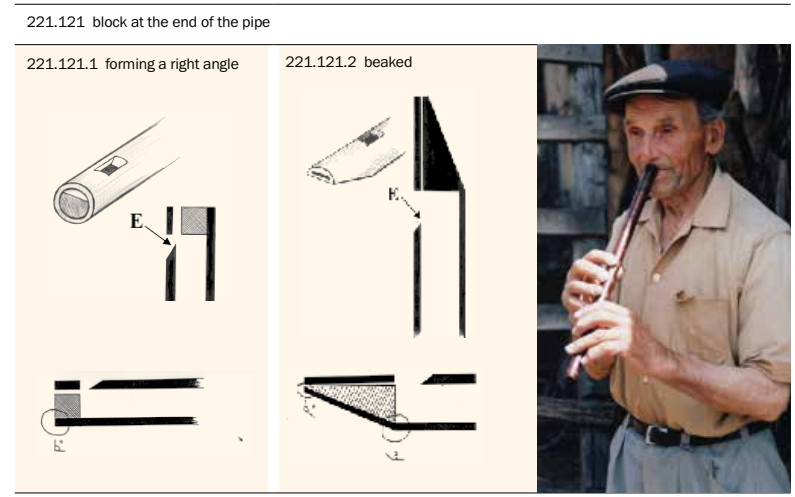

Figure 19.
On the right, the Bulgarian *duduk* played by Todor Ivanov Trifonov, Dolna Riska, Bulgaria PHOTOGRAPH BY MARIE-BARBARA LE GONIDEC, 1992

In the case of flute 221.121.1, a 1 needs to be added, without being followed by a 2, that is without opposition. It is the case of the flute from Slovakia, called *fujara*, which become famous in 2008 for having been inscribed in the Representative List of the Intangible Cultural Heritage of Humanity UNESCO (figure 20, p. 120). The mouthpiece is deflected, as in the case of the bass and the great-bass recorder from the Renaissance and Baroque periods, and of the *mohoceño* from Bolivia. A lateral embouchure is fixed in the block, opening into the air-duct.

221.121.11 with inserted side mouthpiece

The instrument can also be made to include an insufflation tube:

221.121.111	with insufflation tube (simple)
221.121.111.1	side-placed. In the case of very long flutes, it can prolong the air-duct a long way from the main tube. Its main purpose is to bring the mouthpiece down half-way along the length of the flute, at level with the musician's mouth.
221.121.111.2	end-placed, for the flageolet seen in figure 20, even if the function is different from the previous example.

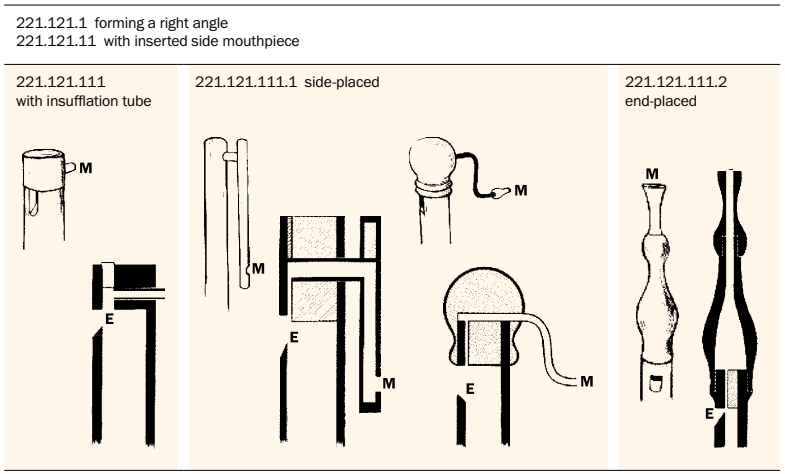

Figure 20.

Figure 21 shows an interesting side-blown flute with air-duct, well known in Sweden and in Slovakia, without fingerholes. This is a clear indication that having an end or side mouthpiece is not irrelevant, but represents a secondary criterion. Its type is 221.122, with protruding block.
Let's return to the non-initial block (type 221.2) which we called 'halfway block'. It works as a deflector, deviating the air. The flute that uses this kind of deflector can also have an adjustment device (figure 22) that is used to deviate the air in order to reach the edge.

221.21	with deflector. The deflector may be:
221.211	simple, or
221.212	double, by plates (as in figure 22) or by rings [Rivière 1994, 54].

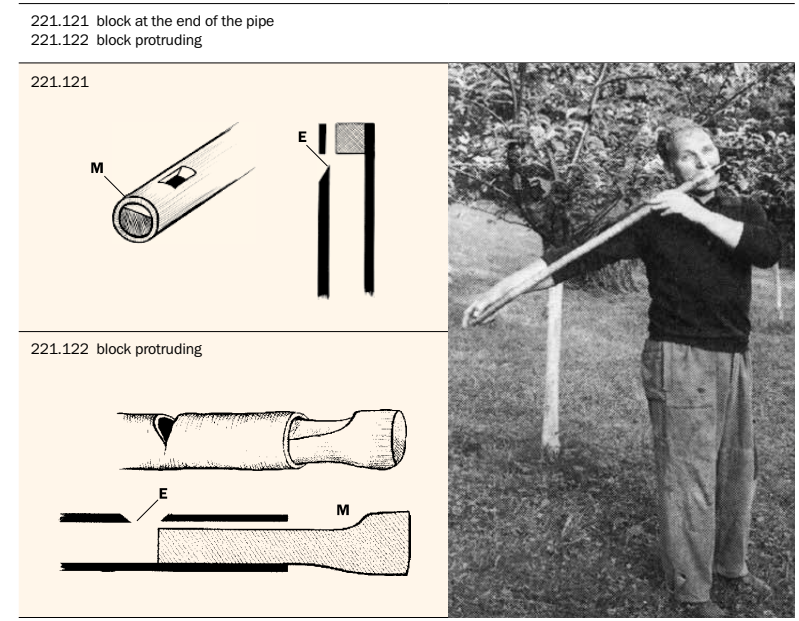

Figure 21. On the right, the Slovakian *koncovka*, a side-blown air duct flute without fingerhole
PHOTOGRAPH BY MARIE-BARBARA LE GONIDEC, 1991

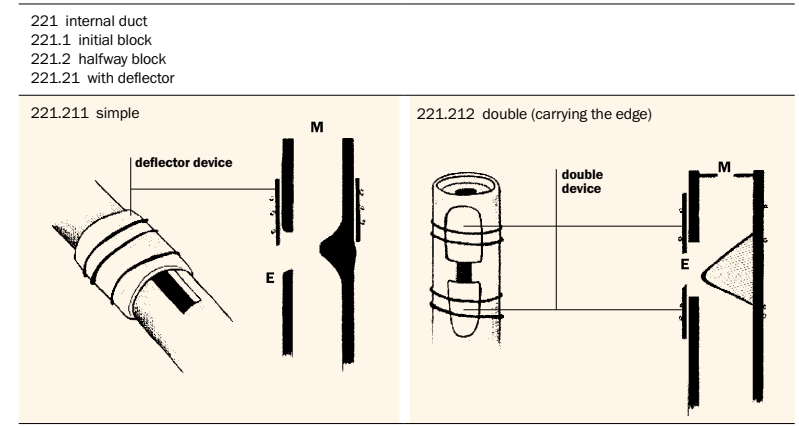

Figure 22.

The upper device helps the air stream to go just to the edge, but the second is the edge itself, which can be adjusted. In a way, it is similar to the embouchure on a Boehm transverse flute: the edge (which needs to be very accurate to generate a pure sound) is not on the pipe but on the added piece.
This is the case with flutes from the Amazon area, made from vegetable matter. The half-way block is a natural node of the tube and it is not possible to change its position, however, the flute can be tuned by moving the devices.

Let's now look at figure 23, which shows the external block (type 222). In effect, the integrated air duct is not in the pipe but outside the pipe, and the air circulates outside the wall of the pipe and not inside it. The duct is obtained by a ring, or by a plate:

222.1 ring (Indonesian suling)
222.2 plate (which forms the upper wall of the air duct).

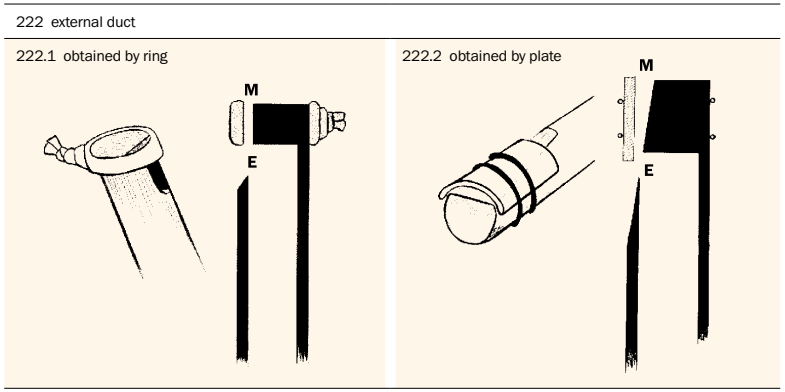

Figure 23.

In the side view we can see the pipe in black, and the added device – ring or plate – in grey, which is not part of the pipe. Flutes of this type are always made of vegetable matter, and the node of the reed or the bamboo used to make the instrument is part of the device.

In the case in which the duct is obtained by a plate (figure 24), it may be:

222.21 level with the end of the pipe, or
222.22 beak-shaped.

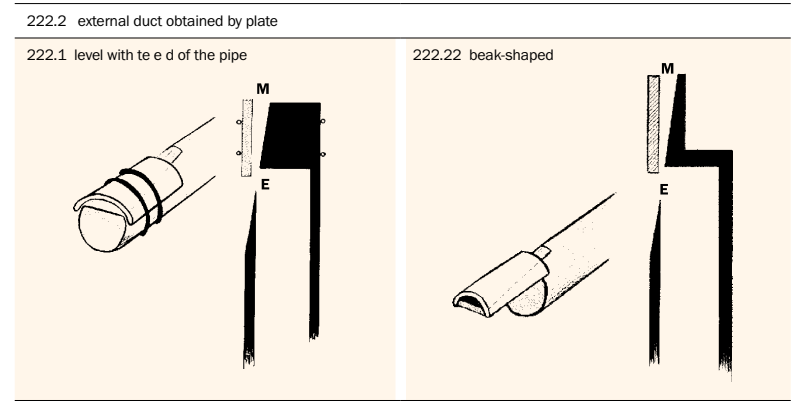

Figure 24.

When the device is beak-shaped (figure 25), the sharp edge may be obtained in two ways:

222.221 the plate itself bears the window
222.222 a second plate corrects the edge.

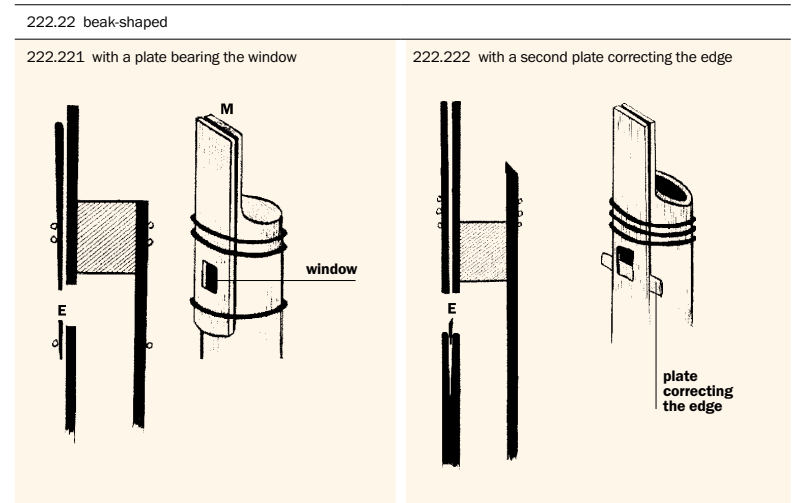

Figure 25.

The latter is the most extraordinary type of flute, and is the case of the flute mentioned above (figure 7, p. 111). Therefore, we know that the duct can be:

21	internal (recorder)
22	external (suling)
23	semi-external, a type that exists in two forms (figure 26):
231	with mobile ring (generally found in Southeast Asia: Sumatra, Timor, Flores [Kunst 1942], and among a minority of Vietnam)
232	with mobile block. This is the courting flute of Native American (found in North America). The system is very complex. The block inside the pipe deviates the air upwards where an outside block (with a plate to realize a channel to let the stream pass) forces it to enter it again, just where the edge is. This system is adjustable.

23 semi-external duct

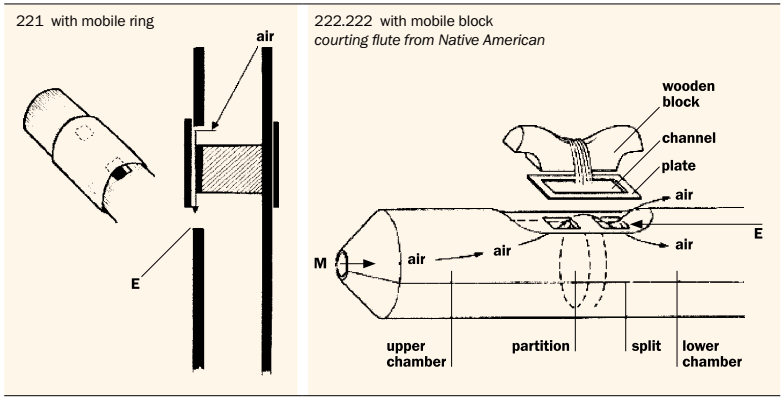

Figure 26.

This classification concerns one-pipe flutes. What happens in this classification when considering panpipes or vessel flutes? Panpipes (figure 27) are generally flutes where the duct is not part of the body: they belong instead to the type that I consider with buccal air duct (type 1), with end mouthpiece and edge at the end of the pipe (type 11), which is open (111). Then we must add the distinction between 'pluritubular' and 'unitubular', therefore, the Panpipe is a pluritubular flute from type 111, and the Romanian *tilinca* is an unitubular flute from type 111.
The Panpipes from the Solomon Islands [Zemp 1972] in figure 27 belong to the typology described above as half-open mouthpiece (type 112).

1 buccal air duct
11 end mouthpiece and edge
111 open (unitubular: *tilinca*, Romania; pluritubular: *nai*, Romania)
112 half-open (unitubular: Jivaro's nose flute; pluritubular: Solomon Islands flute)

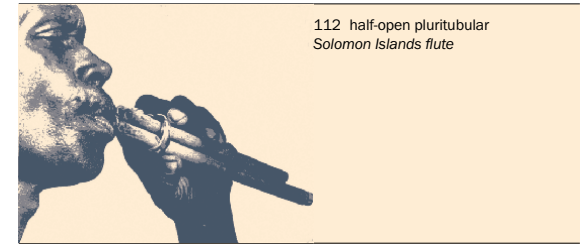

Figure 27. PHOTOGRAPH BY HUGO ZEMP, PUBLISHED IN 1972

As far as vessel flutes are concerned, three are the types we already know of (see figure 28 for a comparison between tubular and vessel flutes): a buccal air duct vessel flute, one with external duct and the ocarina. Being that the vessel flute is round, there is no question whether the mouthpiece and edge will be at the side or at the end. The vessel flutes on the right, in figure 28, have already been considered in figure 15, together with the ocarina (type 21 in figure 15, p. 117).

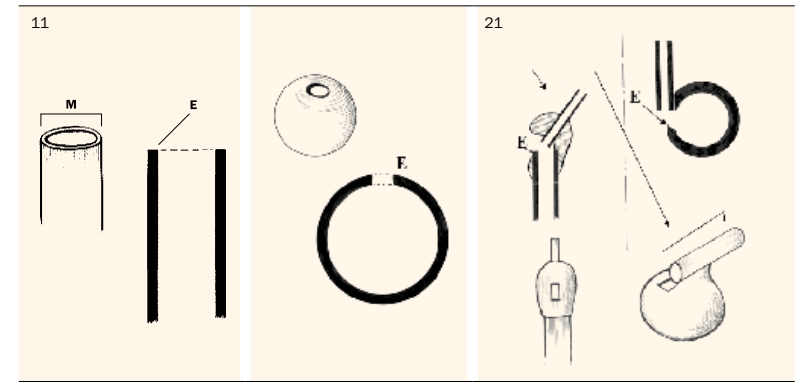

Figure 28. Mouthpiece system of vessel flutes compared to tubular flutes

The Hornbostel-Sachs classification was, therefore, absolutely pertinent in relation to flutes with or without air ducts. The mouthpiece was privileged, but without further investigation: the breadth of their knowledge of flutes was not sufficient. My proposal, in relation to the Hornbostel-Sachs classification, is

to substitute the word 'without' with 'with' because this changes our way of thinking and we may observe more closely what is 'built-in' and what 'must be arranged' for the instrument to function. And thus the term mouthpiece-system, which indicates a relation between the different elements in the system, in which the edge is the central point. How the rest is set up is also important, how the duct is integrated with the instrument or arranged by the player. I think, and hope, I have been exhaustive in regards to this group.

What about bagpipes?

Let's look at the Hornbostel-Sachs classification once more to see what is put forth for those instruments:

4	aerophones
421	edge instruments or flutes
422	reedpipes
422 1	oboes
422 2	clarinets

The suffixes to be used for any division of this class (aerophones) are:

6	with air reservoir
61	with rigid air reservoir
62	with flexible air reservoir

The Hornbostel-Sachs classification is based on the notion of polyorganic instruments:

> Thus, for a bagpipe in which chanter and drone are both of the clarinet type, the code-number would read i.e. a set of clarinets with flexible air reservoir. But if, for instance in a monograph on bagpipes, one wished to especially distinguish these [chanter and drone] features, one could write 422-62:22, i.e. reed instrument with flexible air reservoir whose pipes are exclusively clarinets [Hornbostel and Sachs 1961, 11].

All the bagpipes belong to type 422-62. And, furthermore, we need to know what kind of reed is used in this 'reedpipes aerophone with flexible air reservoir' to be able to classify them.

The problem is that very often in museum collections, the reeds are missing... So, what to do?

Leonardo da Vinci was known to say: «Il vento passato per le pelli delli animali farà saltare li omini. Cioè la piva che fa ballare» (The wind that passes through the skins of animals, makes men jump. That is to say, the *piva* makes men dance). What is a *piva*? As da Vinci explained, it is a wind instrument with a flexible air reservoir, a bagpipe. I will explain my position, which is closer to Leonardo

da Vinci's than to Hornbostel and Sachs. First of all, I must thank Jean-Pierre Van Hees for this quote: bagpipe player and the author of the recently published *Cornemuses, un infini sonore* [Van Hees 2014], he has given me the opportunity to discuss matters regarding bagpipes since I first met him in 1994. At that time, I was working at the Montluçon museum (in France, Allier department), and I took part in an exhibition on the bagpipe maker Jean Sautivet (1796-1867), the first maker known in popular tradition, a contemporary of the Romantic writer George Sand (1853). He used to build the kind of *musettes* (according to the generic term used at the time) that are now called *musette du Centre* (figure 29, p. 128). They are made of a chanter, a small drone and a bass drone. For the catalogue of the exposition, I proposed a classification of which I will underline the principles. This classification was also partially used by Jean-Pierre Van Hees in his publication.

As I mentioned before, during the second half of the nineties I was working on my thesis on Bulgarian pastoral instruments, and a catalogue of Yugoslavian instruments [Marković 1996], written in Serbian, inspired me. In fact, in Slavic languages, or at least in Serbian, Croatian and Bulgarian, it is not the instrument that produces a sound (*zvouk*), but a voice (*glas*), like with human beings. I decided to translate the word *glas* literally with 'voice' and not 'sound'.

Before the war in 1992, Yugoslavia was a confederation of different peoples. You could find different kinds of bagpipes (*gajde*, generic term in Serbian), like the *mišnice* from Dalmatia, a double chanter bagpipe, or the Albanese *gajde* from Kosovo and Macedonia, with one chanter and one drone (like the Bulgarian bagpipe, figure 30, p. 128), or the *gajde* from the Banat region (figure 31, p. 128) which seems to have two pipes, like the previous model.

To describe them, the Belgrade museum catalogue speaks of bagpipes with two voices (*dvuglasna gajde*), like the *mišnice* and the Albanian *gajde*, three-voices (*triglasna gajde*), like the *gajde* from Banat, and four voices (*četiriglasna*). This term could also be used, for instance, for the Italian *zampogne* (figure 32, p. 128) and for the Scottish bagpipe as well.

Let's now look at the *gajde* from the Banat region in figure 30. Since I had only some pictures in front of me and as I saw two pipes, I could not understand why the catalogue considered it was a 'three-voiced' bagpipe. The description was not very clear, or perhaps my translation skills were limited. But hearing the sound on a record, I could hear that there were more than two voices. I thought that the idea of 'voices' instead of the characteristics of the pipes (chanter, drone...) would be an interesting way to start because it better respects the principles of the instrument, which is a reed instrument: every voice is the product of a reed. In fact, in the *gajde* from Banat, the melodic pipe (or chanter) is made of a double-bore tube. We can only see two tubes (a chanter and a shoulder drone) but this instrument has three reeds, and so three voices.

29.

30.

31.

32.

Figure 29.
Musette du Centre from Berry and Bourbonnais regions, played by Benoît Mager
PHOTOGRAPH BY BERTRAND BILGER, 2006

Figure 30.
Paoun Stojanov Kušlev with his *kaba gajda*. Devin, Bulgaria
PHOTOGRAPH BY MARIE-BARBARA LE GONIDEC, 1992

Figure 31.
A Serbian musician playing the *gajde* from Banat. Banja Luka, Serbia PHOTOGRAPH EXTRACTED FROM A VIDEO MADE BY MARIE-BARBARA LE GONIDEC, 1991

Figure 32.
Two *zampogna* players at the Saint Chartier festival, France
PHOTOGRAPH BY JEAN-PIERRE DALBÉRA, 2007

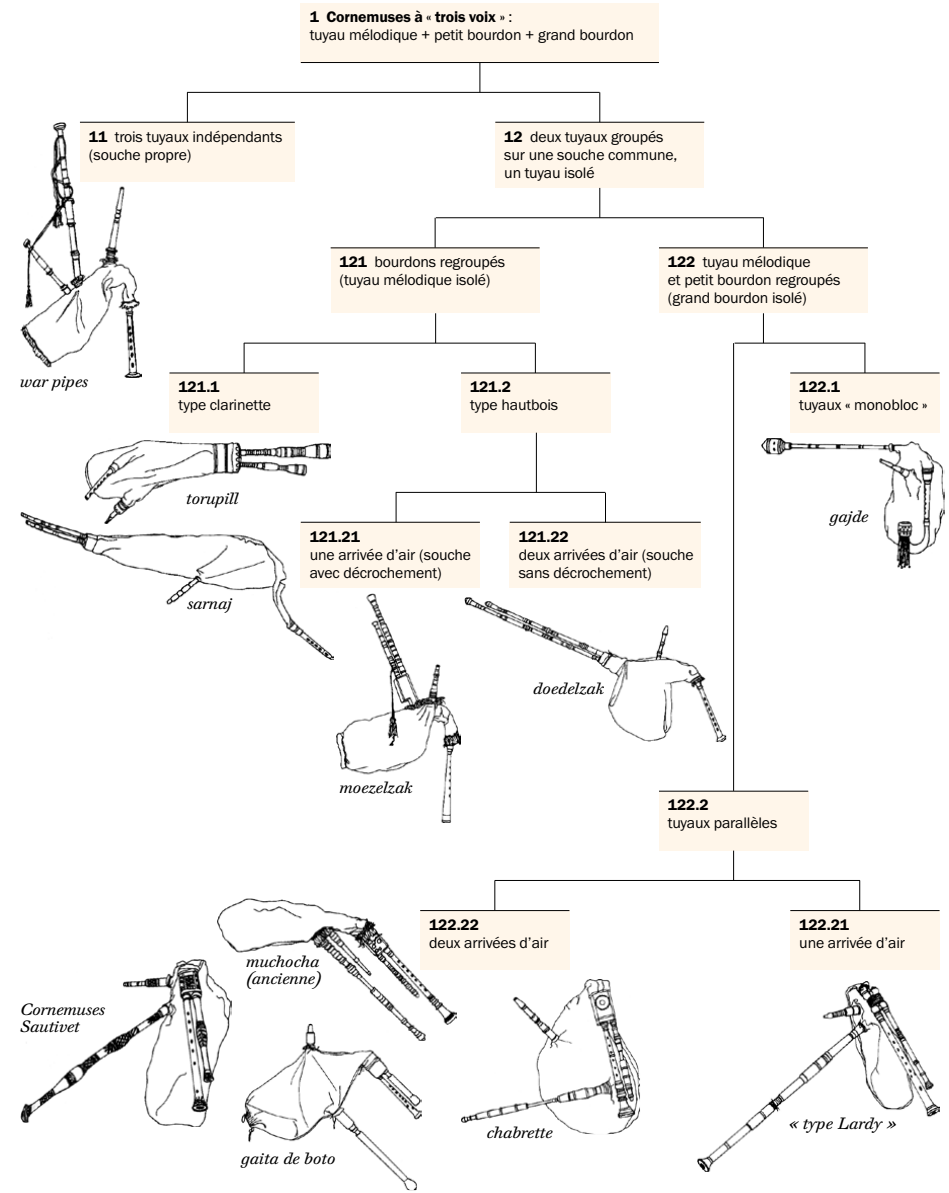

Figure 33.
The three-voice bagpipe tree
DRAWINGS BY JEAN-SÉBASTIEN MARTIN, 1996

The exhibition was dedicated, as mentioned above, to a three-voice type bagpipe, the *musette du Centre France* seen on figure 29, p. 128. To explain how this kind of bagpipe sounds, and to place it in the three-voice family of bagpipes, I put forth a typology that I presented as a tree (figure 33, p. 129). Originally published in French [Le Gonidec 1996, 36-38], I will give the English translation of all the *taxa* in appendix 2.

To be classified as a bagpipe, a wind instrument must have, at least, those three elements: bag + blowpipe + chanter. This basic model corresponds to a one-voice bagpipe. This is the case with the *askavlos*, a Greek bagpipe which reminds us of primitive medieval bagpipes made with a bladder.

In general, there is a bag to allow more than one pipe to make sounds simultaneously. A second voice could be that of the drone, like in the *biniou* from Brittany (figure 34) and many other bagpipes from Europe. But this is not the only two-voice family conformation: bagpipes with two chanters, too, like the Tunisian *mezwed* (figure 35) are two-voiced.

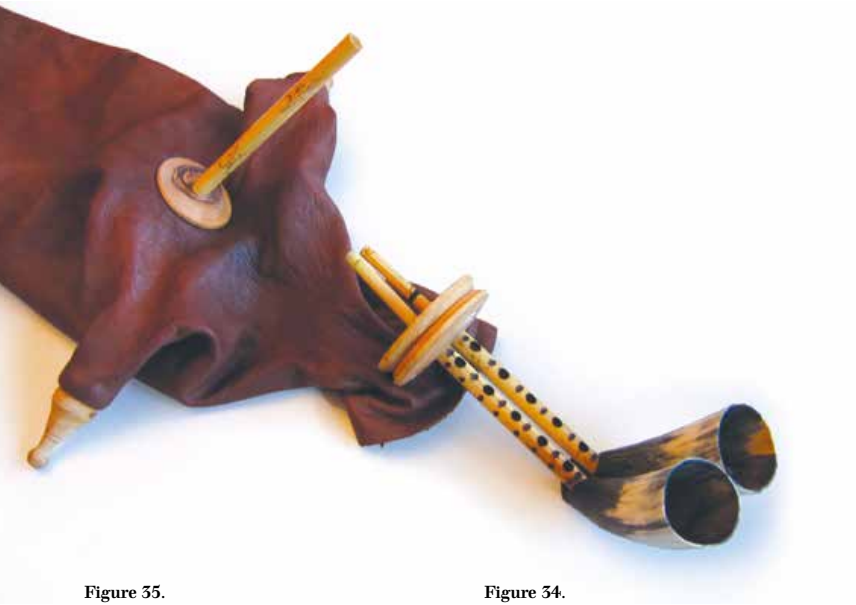

Figure 35.
Tunisian *mezwed* whose pipe was disassembled to show the reeds
PHOTOGRAPH BY MARIE-BARBARA LE GONIDEC, 2006

Figure 34.
Brittany regiment musicians playing the *biniou* (left) and the *bombarde* near to the Front of Yser (Belgium) during in the First World War
PICTURE PUBLISHED ON THE COVER OF THE FRENCH MAGAZINE L'ILLUSTRATION ON 3 JULY 1915 (PERSONAL COLLECTION). PHOTOGRAPH BY GEORGES SCOTT, 1915

I thought that the disposition of the pipes on the bag might be a relevant criteria, because it allows us to distinguish, in the same voicing group, one bagpipe from another. Then I focused my attention on the stock, because this is how the pipes are applied to the bag. So, for the three-voice bagpipes, that is to say type 1, we have a first branch (type 11) represented by the Scottish war-pipe (figure 36). Each chanter has its own stock (like in figure 37 showing Galician *gaitas* with one, two or three drones, each on its own stock). This is a 'dead' branch from which others do not stem, while, in type 12, two pipes grouped on a common stock + one isolated pipe, allows for many more possibilities (figure 38).

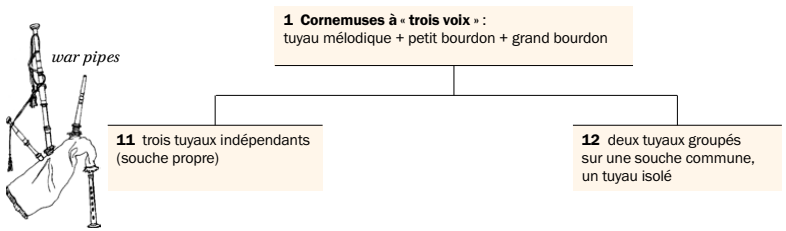

Figure 36.
Top of the embranchement showing the first distinction of the three voice bagpipes

Figure 37.
The galician group Os Raparigos at a bagpipe festival in Autun (Bourgogne). The traditional *gaita* is a two-voice bagpipe (on the right) but nowadays, we find three-voice bagpipe (on the left) and also some with four voices (in the middle, made and played by Anton Varela) PHOTOGRAPH BY VALÉRIE PASTUREL, 2005

This branching gives, first of all, type 121 with a single reed and two drones on a common stock, like the Estonian *torupill* (type 121.1). Type 121.2 instead has a double reed chanter. This is the case of the bagpipes seen in the paintings of Flemish painters of the sixteenth century like Bruegel, which show a different sort of stock, with (121.21) or without (121.22) recess. In type 122.1, seen in figure 38, there are only two visible pipes, the drone and the chanter, but, of course, three voices: this is the *gajde* from Banat in figure 31, p. 128. The chanter is not a single pipe but a cylindrical block with a double bore. I have called it 'monoblock' pipe. At the time, I did not notice the small drone set parallel to the chanter; I would, today, define it as a semi-melodic pipe. This pipe, called *kontra* in neighboring Hungary (figure 39, p. 134), has a hole which is played with the little finger of the lower hand. It can produce two notes: the fundamental in unison with the chanter (open hole) and the lower fourth (closed hole). It has a melodic-rhythmical role.

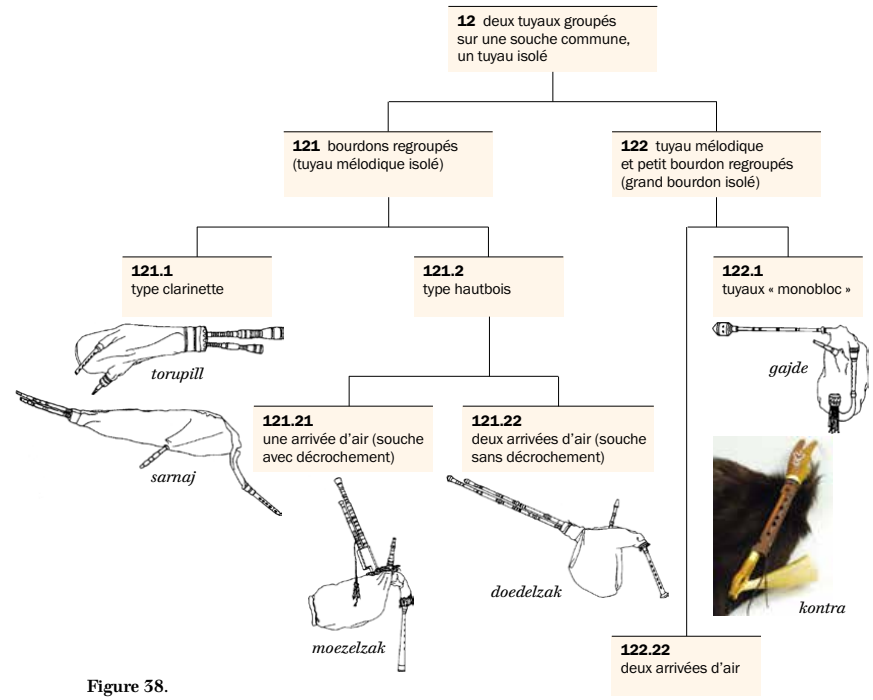

Figure 38.
Part of the tree showing the embranchement of the bagpipes from the type 12

Figure 39.
The double bore chanter of the Hungarian *duda*, named *kontra* with its two channels: one with finger holes to play the melody and the other with one single finger hole which has a melodic-rhythmical role
MARSEILLE. MUSÉE DES CIVILISATIONS DE L'EUROPE ET DE LA MÉDITERRANÉE (INV. 2005.127.1). PHOTOGRAPH BY ALICE BARRAT, 2005

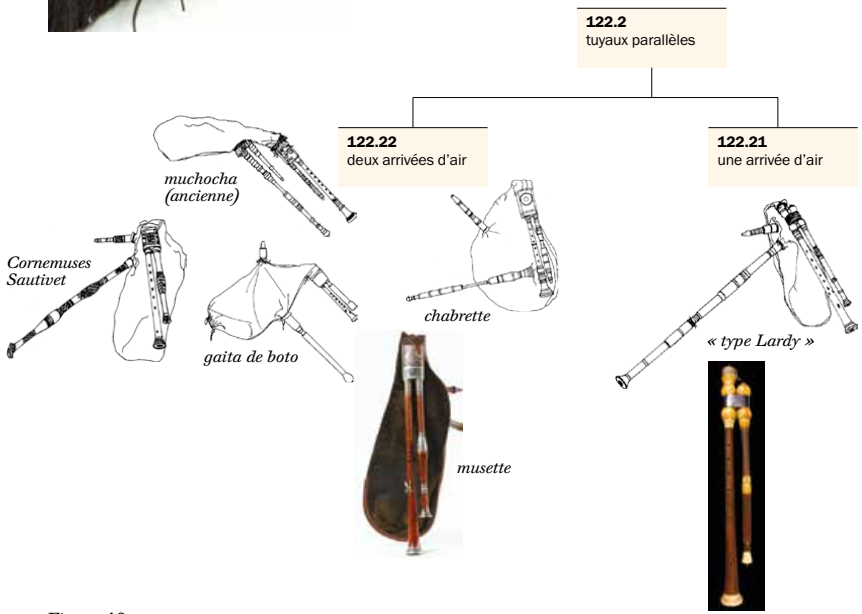

Figure 40.
The last branch of the tree showing the embranchement of the bagpipes from the type 122.2.
Details: on the right, the 'foot' of the *cabrette* from Auvergne which is inserted into the stock and easily removable, and on the left the *musette du Centre*, also with two parallel pipes (chanter and small drone) inserted into a double bore stock
CABRETTE: MARSEILLE. MUSÉE DES CIVILISATIONS DE L'EUROPE ET DE LA MÉDITERRANÉE (INV. 2001.8.7), TECHNICAL PICTURE OF THE DATA BASE
MUSETTE: PHOTOGRAPHS BY BERTRAND BILGER, 2006

Type 122.2 (figure 40) has two distinct and parallel reedpipes and a small drone set at the side of the chanter. There are two possibilities:

122.21 the stock for the parallel pipes has one hole only. Both pipes can be removed at the same time. This is the case of the Lardy type of *cabrette* from Auvergne (right). The detail shows the *pied* (the 'foot'), a device that can be replaced to play in another key (the *cabrette* was often played with accordion for the dance).

122.22 the stock for the parallel pipes, called *boîtier* (the box), has two holes: one for the chanter and another one for the drone. The pipes are removed one after the other to tune the reed. This is the case of the *musette* from Central France (on the left), like the instruments manufactured by Jean Sautivet. Making this tree, I wanted to find a place, among its 'cousins', for this local bagpipe, once again played in the Montluçon region and in Berry.

Finally, in 2014, Jean-Pierre Van Hees's book was published. There, we can find a very advanced study, based on all the bagpipes played in the world, in which he, a bagpipe player himself, integrates, in the classification he proposes, different notions on music. This classification, in which he maintained the notion of voices, is a chart where data overlaps in a complex system of abscissa and ordinates.
To conclude, let us remember that when I prepared the exhibition (1996) this extraordinary tool called Internet, which today provides all kinds of information and keeps people in touch, did not exist. Eleven years later we were able to create a website thanks to the contribution of numerous international musicians. (http://www.cornemuses.culture.fr/ figure 41).

Figure 41.
First page of the web site Cornemuse d'Europe et de Méditerranée www.cornemuses.culture.fr. REALISED BY HYPTIQUE, 2007

The method I employed for this classification, by using the notion of 'voice' and therefore of 'sounding pipe', is different from the principle employed by Hornbostel and Sachs. It allowed me to avoid distinctions between single or double reed bagpipe when it was not relevant, like in case 121, where it is useless to separate the Estonian *torupill* from Flemish bagpipes. However, my classification holds within it the same question that can be applied to the Hornbostel-Sachs classification: what produces sound in a bagpipe? Reeds, certainly, but what is typical of bagpipes is not the fact that they are clarinets or oboes, but that they can maintain air in a bag to supply the reedpipes. Many vernacular names are based on the words bag and pipe (in English for instance; and also in Greek where the primitive bagpipe is called *askavlos*, which means 'bag+aulos'). Other names are linked to the animal (usually a goat: *cabrette* in Occitan means little goat) whose skin is used to make the bag. Nevertheless, I would like to pay tribute to the ideas put forth by Hornbostel and Sachs, because their classification system, with its limits, due mostly to the time in which it was created, or other reasons we will not discuss here, remains, first and foremost, a model of rigor and logic which has helped me greatly throughout my research.

Appendix 1: Flutes

1	buccal air-duct flutes (vessel flute, South Afrika [MQB inv. 71.1989.69.3])
11	end mouthpiece and edge
111	open mouthpiece
111.1	simple (*tilinca*, Romania)
111.11	capped embouchure (*ney*, Iran; pluritubular flute from Malaita [Zemp 1971])
111.2	bevel-edged (Arabic *nay*)
111.21	capped embouchure, inserted (*kaval*, Bulgaria, *ney*, Turkey)
112	half-open mouthpiece (nose flute from the Jivaro People [Izikowitz 1935, 327])
12	end mouthpiece and shifted edge
121	end mouthpiece, slanted (*píšťalka*, Slovakia)
122	notched or partial window (*shakuachi*, Japan; flute from Argentina [MQB inv. 71.1933.72.566])
123	windowed (flute from Bielorussia [MUCEM inv. DMH1992.41.5]; *papan-oioilu*, Timor [MQB inv. 71.1971.59.7])
13	side mouthpiece and edge
131	simple (Baroque flute *traverso*)
132	with inserted embouchure (Boehm's flute; military *fifre*)
2	built-in air duct flute
21	inserted (Morilon flute [Izikowitz 1935, 375]; aztec flute [Kunitachi 1990, 41])
22	built-in, or integrated into the body of the flute
221	internal
221.1	with initial conductor
221.11	made with a plate (flute from Mexico [MQB inv. 71.1961.118.96])
221.12	made with a block
221.121	leveled with the end of the pipe
221.121.1	forming a right angle (*duduk*, Bulgaria)
221.121.11	(*taqoro*, Bolivia [MQB inv. 71.1991.268.7])
221.121.111	
221.121.111.1	(*fujara*, Slovaquia)
221.121.111.2	(*flageolet* [MUCEM inv. DMHxorg.990.15])
221.121.2	cut in a beak shape (recorder, double flute *dvojnice*, Croatia)
221.122	protruding block (*seljefloyte*, Sweden)
221.2	halfway block (flute from Mexico [MQB inv. 71.1938.164.354], from Argentina [MQB inv. 71.1908.24.189])
221.21	with deviator
221.211	simple (*osud* or *bedur*, India [MQB inv. 71.1979.20.22])
221.212	double (*pëlum-pëlum*, French Guiana [Rivière 1994, 54])
222	external
222.1	with ring (*suling*, Indonesia)
222.2	with plate
222.21	level with the end of the pipe (*bansiq*, Philippines [MQB inv. 71.1973.35.138])
222.22	beak-shaped (flute from Mexico [MQB inv. 71.1977.106.3])
222.221	the plate bears the window (*tung ti*, China [Institut d'Etudes des Cultures sur les Minorités 1986, 74])
222.222	a second plate corrects the edge (*gasuo*, China [Kunitachi College of Music, inv. 995])
23	semi-external
231	with mobile ring (flutes from Flores [Kunst 1942, 142])
232	with mobile block (courting flute from the Sioux People, North America)

Appendix 2: Bagpipes

1	*cornemuses à 'trois voix'* = 'three-voiced' bagpipes
11	*trois tuyaux indépendants (souche propre)* = three separate pipes (each with its own stock)
12	*deux tuyaux groupés sur une souche commune, un tuyau isolé* = two pipes on a common stock, one separated pipe
121	*bourdons regroupés (tuyau mélodique isolé)* = with drones in a common stock (separated chanter)
121.1	*type clarinette* = single reed type
121.2	*type hautbois* = double reed type
121.21	*une arrivée d'air (souche avec décrochement)* = one air pipe only inside the stock (stock with recess)
121.22	*deux arrivées d'air (souche sans décrochement)* = two separate air pipes inside the stock (stock without recess)
122	*tuyau mélodique et petit bourdon regroupés (grand bourdon isolé)* = chanter and small drone with common stock (separate bass drone)
122.1	*tuyaux monobloc* = pipes made from one piece of wood
122.2	*tuyaux parallèles* = parallel pipes
122.21	*une arrivée d'air* = one air pipe only inside the stock
122.22	*deux arrivées d'air* = two separate air pipes inside the stock

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Jeremy Montagu

How far do we dare to revise Hornbostel and Sachs?

The Hornbostel and Sachs *Systematik* is still the only classification system that we have, that is culture- and language-bias free. This is due to its use of numbers rather than words, for the numbers can be translated into any and every one of the world's languages and cultures, without the prejudice that many people have associated with it, due to them looking at the explanatory German or English texts, rather than looking at the numbers. I would like to present three matters here.

First, for whom did Hornbostel and Sachs intend their classification system? Was it just for us, we who can recognise most instruments at a glance? Or was it to help those responsible for musical instruments that arrive randomly in a museum or collection of mixed subjects, places where there is no organologist on the staff to help them to sort out what the instruments are and who not have the knowledge to catalogue them properly in the museum's register, nor to label them for their public display. If it is intended for such collections and museums, then perhaps we should consider preparing what biologists and botanists call a key. This is a series of questions that can be answered on a basis of 'if Yes, go to X', and 'if No, go to Y', answering lists such questions, one by one, gradually leading towards an identification and a name. John Burton and I published examples of such a key, for he is a biologist, in our abortive attempt to design a new system back in 1970. This seems to me to be a project that might be worth considering, for it could also be a useful introduction to using the Hornbostel and Sachs system for those who are entering our own profession, as well as for the non-professionals in our field.

The second is a question of definition. Roger Blench raised a point with me a while ago on: what is a string? If the African raft and tube zithers whose cortex is raised to make a 'string', and if our children put rubber bands as 'strings' round a cigar box, if those are strings, then what about the zithers in one of his areas where people use those metal strips that go round packing cases: are these string zithers or are they plucked idiophones? Following from this, it occurred to me that we have on the one hand aeolian harps, which we do consider to be blown chordophones, and on the other hand a miniature version, a strip of rubber band between two small bits of wood or plastic, which we blow. Are

these ribbon reeds, i.e. aerophones, or are they miniature aeolian harps, i.e. chordophones?

But what I want to talk about primarily, is that there remains one major and glaring problem in the system as it stands, that affects both us and the inexpert. This comes in the Aerophones 'proper' and it is the way in which Hornbostel and Sachs decided to separate the reed instruments.

They decided to divide these by the reed type, distinguishing them by the single reeds, the double reeds, the free reeds, and, although these they ignored, the split-reeds or dilating or retreating reeds. We can ignore the free reeds for the moment, but the dilating or split reeds are so common in South-East Asia and a few other places that they had no excuse for ignoring them. This is why I ensured that they have their place in the new MIMO version of the system.[1] It would have been far more sensible if they had divided at least the double and single reeds by the bore-shape, because this decision of theirs produces several major problems. The first is for museum curators in that many ethnographic instruments, and as we shall see some from our orchestral culture, arrive in every collection without their reeds, and therefore, if they wish to classify those instruments, they have no way to do so save by research through the illustrated catalogues of other collections, and these they may well not have available in-house. The upper end of the body will probably be a hole which may have held a staple with a double reed on the top, or it may have had a cane reed with a tongue slit in one side, or it may have had a plant stem with two or three vertical slits in it, and there is no way for the non-expert curator to tell which it may have been. Second, is that there are at least some instruments that use both single and double reeds. In Sumatra, and perhaps in other parts of South-East Asia, there are pairs of shawms where the treble has a single reed, a piece of plant stem, sometimes of cane, with a tongue cut in one side, whereas the tenor has a normal flattened plant-stem double reed. The two are played together in musical performance, but Hornbostel and Sachs separate them into two different classes. In Hungary, folk *tárogató* (the small shawms, rather than the wooden soprano saxophones) are played with either a double reed or with a single reed that was made either from a goose quill with a tongue slit in it, or from a similar segment of cane. Third, in our own orchestral culture, you can go into any good instrument store and buy a miniature saxophone mouthpiece to fit on the end of a bassoon crook. In my student days, one of my colleagues used one of these, and I could detect no difference between his sound and that of his neighbour, who used a conventional double reed. With more difficulty, you can buy an even smaller version for an oboe; this I have seen but have not heard. Whether you can buy intermediate sizes for *oboe d'amore* and *cor anglais* I do

1. http://www.mimo-international.com/documents/Hornbostel%20Sachs.pdf (accessed October 2019).

not know, but I am certain that such mouthpieces could be made for any oboist who needed one. But the point is that both in this and in the pairs of shawms, the instruments remain the same but the major classification points do not. The only difference is an accessory, rather than the instrument, which seems illogical. There is an early nineteenth century bassoon with what appears to be a contemporary single-reed ivory mouthpiece in the Welsh Folk Museum at St Fagans – would that instrument have to be separated from the other bassoons? And how would the curator know which sort of reed the other bassoons had originally had on the ends of their crooks?

If they had divided the instruments by the bore shape, at least the first steps towards classification would be obvious to the most inexpert eye, save for a very few borderline cases, and perhaps for those curators who were ignorant of the purpose of the long forked upper insert of the Muslim shawm. That fork provides a stepped cone, and it is this that converts the cylindrical body into an effectively expanding one [Montagu 1997]. I call it 'Muslim' because while it is endemic in all Arabic musical cultures, it also extends into the Muslim areas of what used to be the USSR, though not into India.

There is also a vital acoustical significance, because instruments with an expanding bore overblow octaves and all the overtones, whereas those with cylindrical bore overblow twelfths and only the odd-number overtones, and in addition have, for instruments of the same physical length, a considerably lower fundamental pitch. Also, unless they have additional fingerholes, covering which is difficult for the human hand without adding mechanism, so as to fill the gap between the octave and the twelfth, cylindrical bore instruments without such mechanism tend to have a limited range, being restricted to either the fundamental or the overblown registers – this, after all, is why Denner 'improved' the chalumeau in order to invent the clarinet. The only surviving instrument, that I know of, that anticipated his invention, is the stille shawm that was found in Henry VIII's ship, the Mary Rose, from the 1540s, in Portsmouth, which breaks Tinctoris's description of the instrument in that the Mary Rose one does fill that gap and thus does have a complete range.

For those of us who can recognise the difference, then all the octave-overblowers would be in one list and all twelfth-overblowers would be in the other, and the two lists would be much tidier. Pairs of shawms would be together. In Hungary shawms with a goose-quill single reed would be together with the other shawms from all over southern Europe. In Tribal India, pre-Mughal, shawms with single cane reeds would also be with other shawms. In Sumatra, pairs of shawms would be reunited. In our culture, the saxophone would be where it belongs, as would the Schunda *tárogató* and other wooden saxophones, among the expanding bore instruments. And the arrival of a bassoon with a single-reed mouthpiece on the end of its crook would cause no alarm in any collection.

So far as I know, most free-reed instruments with fingerholes are of bamboo and have a cylindrical bore; the only free reeds with an expanding bore that I know of, are the Burmese and Thai mythan horns, with, as is usual for all of the free reeds with a fingerhole, the reed set or cut in the side of the body. These horns use the open narrow end of the horn as a fingerhole. And all the dilating-reed instruments that I have ever seen have been cylindrical in bore, but that does not mean that we can rule out the possibility of ever meeting one with an expanding bore. Dare we take so radical a step?

As an individual, I did not have the courage to suggest it, when I produced my revised version of Hornbostel and Sachs. Many of my proposed revisions were adopted for the new MIMO revised version, but I did not dare then to suggest so major a step as this, to change the numbers for every reed instrument in the system.

If you are prepared also to recognise this problem, and with so many of us present here who are interested in classification, are we prepared, as a group, to present this change?

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Roger Blench

Issues in the classification of multiple-feature musical instruments

Introduction: what's the issue?

Hornbostel-Sachs's *Versuch* is now over a century old and remains in current use, testifying to the durability of its ideas. The *Versuch* is a referential classification, in that it enables scholars from different traditions and cultural backgrounds to discuss musical instruments and sound-producers using a common terminology. By definition, the basis of the classification is based on a single descriptive feature, morphology. In this area it has been remarkably successful, the proof of which is that it is still being developed a century after first publication. Other proposals [Schaeffner, 1932; Kartomi 1990] have come and gone. However, the disadvantage of using only morphology is that it cannot encompass the multiple different aspects of total performance, such as playing technique, multiple sound production systems, multi-player instruments etc. This paper[1] focuses on some of the issues that arise from a morphology-based classification in classifying total performance, through the presentation of some perplexing organological examples drawn from different regions of the world, and makes some proposals for a more complete descriptive model.

Morphology-based classification. General

This section considers five issues for instrument classification. These are:

a) How can instruments that produce sound in two or more different ways simultaneously be classified? Can one technique of sound production be described as 'primary'?

b) Where instruments are classified only by morphology, significant differences in performance techniques are lost in the classification.

c) Where multiple instruments of distinct organological types are played simultaneously and in some cases 'with' one another.

1. This paper summarises a great deal of fieldwork and collecting in many parts of the world, particularly in Sub-Saharan Africa and Northeast India, and I would like to thank the many people who have assisted me over the years. The paper has been revised subsequent to presentation in Venice in July 2015.

d) Where performance depends on an ensemble of single-note instruments and a group of performers with must come together to create a melody.

e) Where two or more players play a single instrument with the same or different sound production techniques.

Instruments with multiple sound production techniques

The scraped mouth-bow. Probably the most common example of instruments with multiple sound production techniques is the use of rattles attached to drums, flutes or other instruments. Especially where the rattling elements are optional, the primary sound production method is likely to be used to classify the instrument. However, two or more types of sound production are more integrated in some instruments. Some mouth-bows in Southern Africa incorporate a scraped idiophone and sometimes a vessel-rattle (figure 1). These were probably first described by Kirby [1934], with more detail in Wegner [1984]. The bow is a small arc and the string a flat section of palm-leaf held between the lips. Different harmonics can be emphasized by placing the thumb of the right hand against the string. The lower part of the bow is cut with transverse notches, and the performer scrapes the notches with a stick. Among the San and in Angola, the scraping stick is plain, but towards Mozambique, among the Tsonga, the playing stick is threaded with small hollow rattling fruit-shells. The scraped bow potentially produces three distinct sounds, the chordophone element of the plucked string (which also has an aerophonic component), the scraped notches and the noise of the vessel rattles.
It seems very likely that this instrument was first developed by the Khoisan, and subsequently spread to Bantu speakers both east and west of the Kalahari.

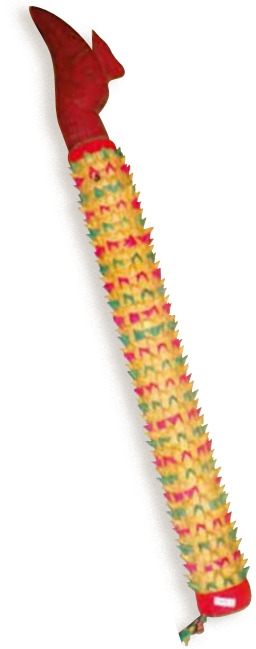
Whirled rattling aerophone. Among the Buginese of Sulawesi, an unusual whirled rattling aerophone is played only by a professional class of transvestites who must be present at all major celebrations, characteristically the *bissu* dance (figure 2). The instrument, *lalosu*, consists of a long woven rattan tube closed at one end with a carving of a hornbill, and open at the other end. Pieces of glass are embedded in small palm-leaf projections from the tube, which rattle as the tube is waved from side to side. The main sound is a whistling produced by air passing over the mouth of the tube. Typical instruments are over a metre long (figure 3).

Instruments with alternate playing techniques. The problem of morphology without performance information is exemplified by the nose-flutes of the Northern Philippines and elsewhere in South-East Asia. The same instruments are played with the nose in some communities and with the mouth in others and no structural feature of the instrument allows the organologist to decide

Figure 1.
Scraped mouth-bow, Tsonga
AUTHOR COLLECTION

Figure 2.
Lalosu in performance
ARCHIVE PHOTO COURTESY MUZIUM NAZIONAL, JAKARTA

Figure 3.
Lalosu from Makassar.
Museum La Galico, Makassar
AUTHOR PHOTO



4.

5.

6-7.

Figure 4.
Embouchure of Isneg nose-flute, Ayala Museum, Vigan
AUTHOR PHOTO

Figure 5.
Isneg nose-flute in performance
ARCHIVE PHOTO, COURTESY AYALA MUSEUM, VIGAN

Figure 6.
Garo ensemble with olongma mouth-blown flute
PHOTO COURTESY DON BOSCO MUSEUM, SHILLONG

Figure 7.
Garo performance on the olongma nose-blown flute
PHOTO COURTESY DON BOSCO MUSEUM, SHILLONG

which technique is used. In Northern Luzon, the Isneg and other peoples play long flutes with a small circular blowhole in the proximal end of a bamboo tube, otherwise sealed (figure 4). Such flutes can be played both with the nose and the mouth and figure 5 shows an archive photo of performance with the nose. Among the Garo people in North-East India, the *olongma* transverse flute can be played both with the nose and the mouth (figures 6 and 7).

Multiple instruments played together by a single performer. The use of multiple instruments by a single performer is exemplified by any percussion ensemble such as a drumkit. However, each component instrument is usually organologically of a single type, so this could be treated as an array of individual instruments. A less-known example is among the Jorai people of central Việt Nam, where two stringed instruments, the two-string tubular stick-zither, *ddong*, and the monochord stick fiddle, *köni* (figure 8), are played against one another [Zemp 1997]. Performers also use the strings of the tube-zither to play the monochord fiddle (figure 9), producing an unusual set of resonances. To describe the total performance would have to include a composite of the two instruments.

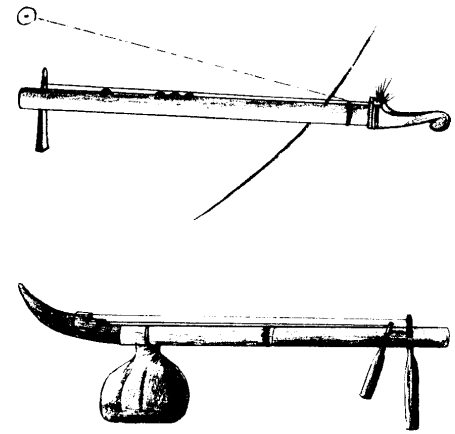


Figure 8.
Jorai string instruments, fiddle and zither
REDRAWN FROM ZEMP [1997]

Figure 9.
Jorai man playing a fiddle with a tube-zither
FROM ZEMP [1997]

Multi-player composite instruments. A performance type which has a near-global distribution is the use of wind ensembles consisting of multiple one-note instruments. Most typically, each of a set of performers has a single-note aerophone, usually composing an octave, and to construct a melody the instruments must be played in sequence. Obviously musical structures are more complex than that and in Sub-Saharan Africa typically, each performer is assigned a small rhythmic cell which is repeated ad infinitum and which overlaps the cells played by other players, creating both a melody and a rich polyphony [Arom 1986]. This is often described as 'hocket' in the literature, although it is not entirely comparable to medieval European practice. The composition *In C* by the American minimalist Terry Riley uses much the same constructional technique. In North-East India, the instruments produce block chords, thus imitating the sound of the free-reed mouth-organs common in this area.

Describing the morphology of individual instruments is not really helpful in understanding what is essentially a single instrument played by multiple players. Each player contributes a single note and the melody can only sound when the entire ensemble performs together. In terms of morphology, these are most commonly single-note whistles, but can also be trumpets, horns or clarinets. The concept of interlocking instruments is most highly developed in Sub-Saharan Africa, where groups of up to twenty-one instruments, representing a compass of three octaves have been recorded (e.g. the Ngas of Central Nigeria). The first musical study of such ensembles is probably that of Kirby [1933] who transcribed the Venda ensembles of the Transvaal. In more recent times, Simha Arom [1991] has been active in pioneering transcription techniques for Central African polyphony. Blench [2013] maps the African distribution of these ensembles and points to Saharan rock art which suggests they have an extremely deep history in the continent (figure 10). The probable origin is an instrumental contrafact of multi-part vocal music, and in Ethiopia, a fluid boundary between vocal and instrumental groupings can be observed.

Figure 10.
End-blown horn ensemble, rock-art, Libya
REDRAWN FROM ZIEGERT [1967]

Intermediate cases exist, for example the four fingerhole notch-flute ensembles of Central Nigeria, which are played in the same 'hocket' fashion as single-note ensembles. Central Nigeria is also the home of 'mixed' ensembles, where the upper octave is played on whistles while to bass is supported by one or more end-blown trumpets.

Table 1. Distribution of ensembles of one-note instruments

Continent	Country	Ethnic group	Instrument category
Africa	Sub-Saharan Africa	Numerous	End-blown whistles, end-blown trumpets, transverse horns, clarinets
Asia	Việt Nam	? Jorai	Notch-flute
Asia	Nagaland	Naga	Flutes with bevel embouchure
Caribbean	Haiti	Haitian	End-blown trumpets
Europe	Lithuania	Lithuanian	End-blown whistles, end-blown trumpets
Meso-America	Guyana	Wayapi	Clarinets
Pacific	Solomons	'Aré'aré [and others]	End-blown whistles, stamping tubes

The following photo gallery illustrates examples of performance in different continents. Figure 11, p. 152 shows a single-note flute ensemble among the Boze people of Central Nigeria. The flutes are reeds closed at the base with a circular embouchure like a panpipe.

Not far from the Boze, the Mwaghavul play what appears to be a globally unique ensemble of transverse clarinets known as *velaŋ* (figure 12, p. 152). These clarinets are well-known from the African savanna, where they are played to celebrate harvest or for amusement by hunters. However, the idea of having very long instruments in tuned ensembles seems to be confined to this region.

A not dissimilar group, with very long pipes, is performed by the Jorai of Central Việt Nam [Sandahl 2003)]. In this case the flutes have a notched embouchure (figure 13, p. 152).

A quite different ensemble is found among the Naga of North-East India – Naga is a cover term for a wide variety of ethnolinguistic groups which share many common cultural elements and are found in Nagaland, Manipur, Bangla Desh and Myanmar. This ensemble has been recorded from Nagaland, but its extension is presently unknown. The one-note flutes are cut obliquely across the top and are sounded in chords, rather than using a hocket structure. Figure 14, p. 152 shows the performance as a whole and figure 15 a close-up of the embouchure.

11.

Figure 11.
Single-note flute ensemble,
Boze, Central Nigeria
AUTHOR PHOTO, 2007

12.

Figure 12.
Single-note clarinet ensemble,
Mangu, Central Nigeria
AUTHOR PHOTO, 2008

13.

Figure 13.
Single-note flute ensemble,
Jorai, Việt Nam
FROM SANDAHL [2003]

Figure 14-15.
Single-note flute ensemble,
pheipit, Naga, North-East India
Embouchure, pheipit, Naga,
North-East India
PHOTO COURTESY DON BOSCO MUSEUM, SHILLONG

14-15.

16.

Figure 16.
Single-note horn ensemble, Haiti
FROM FLEMING [2010]

17.

Figure 17.
Single-note clarinet ensemble,
Wayapi, Guyane
FROM BEAUDET [1980]

Figure 18.
Are'are tuned stamping tubes,
Solomon Islands
FROM ZEMP [1995]

18.

Lithuania is highly unusual within Europe for this type of ensemble. They go under the general name *sutartines*, although this can also apply to vocal music. Two instruments can be used, single-note flutes and end-blown horns. This music was almost moribund, but has undergone a significant revival in recent times. A little-known form of the one-note wind ensemble is found in the Caribbean [Fleming 2010]. In Haiti, there is a particular form of street music called *rara*, which is played for certain types of festivals, which consists of single-note end-blown metal trumpets (figure 16, p. 153). The inspiration for this is evidently similar African trumpet ensembles, such as those of the Banda of Central Africa.

Unusually for the New World, one of these ensembles is found in Guyane, among the Wayapi Indians [Beaudet 1980]. As can be seen in figure 17, p. 153, the clarinets are very long and some rest on the ground during performance.

Melanesia is known for a variety of polyphonic vocal and instrumental performance types. In the Solomon Islands these have been translated into instrumental groups, including panpipes, transverse flutes and tuned stamping tubes (figure 18, p. 153).

Multi-player interlocking wind ensembles are thus a near worldwide phenomenon, taking a variety of forms in different continents. Whether these are all interconnected and represent a very ancient human practice which spread out over the world, or is simply re-invented from vocal polyphony, remains a subject for debate. The map in figure 19 synthesises known records of this type of wind polyphony.

Figure 19.
Worldwide distribution of multiple-player wind ensembles

Multiple players on one instrument. The simplest example consists of the practice of striking the body of a string, wind or membrane instrument by a second player, producing an idiophonic effect in addition to the main sound. The percussive aerophones of Sub-Saharan Africa can be played in this way, with a second player striking the body of the instrument while the primary player creates the aerophonic component. However, also in Sub-Saharan Africa, tuned percussion instruments can be designed for multi-player performance. Figure 20 shows a multi-player xylophone ensemble in the kingdom of Bafut, in the Grassfields of Cameroun. The three performers play interlocking motifs which have considerable structural similarities to the single-note wind ensembles.

Figure 20.
Multi-player xylophone ensemble, Bafut
AUTHOR PHOTO [2014]

Conclusions

Nothing in this presentation argues against morphological classification. But many individual instruments can only be understood in their performance context. Just because we can describe the 'museum' morphology of an instrument (i.e. the morphology we can observe without context) this does not necessarily tell us its most interesting features. Classifying them in a richer way will require considerable elaboration. We need to consider:

a) Allowing multiple codes for individual instruments or ensembles;
b) Methods of sound initiation (mouth versus nose, for example);
c) To code instruments that create their melody through 'interlocking' performers.

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Vincenzo La Vena

Some reflections on the use of the Hornbostel-Sachs classification in studying children's instruments

Children are particularly attracted to sound-making devices and are, therefore, known to be partial to instruments that include numerous vibration modes. My experience as a music teacher in middle school has given me great insight into the breadth of a child's creativity when playing the recorder: it can go from blowing out the most diverse syllabic sequences, to blowing air through their noses, to sucking air through the opposite end of the flute, to making the instrument a transverse flute, double flute, flute with piston, water flute, or even a trumpet, a mirliton or any other sort of thing. Of course, in Conservatories these things do not happen, and in middle school not all music teachers allow the students to improvise; the classifier could very well behave in the same way, and conclude brusquely that these ways of playing represent an improper use of the instrument and that the flute in question does not become something else just because it is played differently by an imaginative, capricious child. But let's say the objective was to study how the child makes use of the instrument, then these experiments could not simply be attributed to an improper use of the instrument and would, alternatively, be studied attentively and classified accordingly. Obviously, this would only be the case if the instruments which have been 'transformed' or modified in the way they are played (in an unconventional way, that is), are observed while being played, since the object in itself has not been transformed, and even if the transformations were visible, they would often be reversible and easily removable. On the other hand, unconventional playing techniques that stray from the intention of the instrument-maker are not in the least uncommon, since they can also be found, as in the above mentioned cases with children, in folk music revival and in world music, even in classical music, like in the 1940s with John Cage's 'prepared piano'. In all of these cases, but mostly in that of the respected musician, John Cage, the functions of the instrument, which were anticipated by the builder, and, even before that, were regularly supported by common practice, are served an astounding denial, and are reassessed on the basis of criteria that are totally new compared to the original project. I do not believe, therefore, that the classifier can continue to uphold the idea that the instrument is fixed and unchangeable, an idea that was established by the constructor beforehand. In fact, transformations that

came about for requirements that were considered more legitimate, like the gradual revolution in the playing techniques, have always interested ancient instruments, for example pipe organs, whose functions changed greatly and often irreversibly. Yet today, we find ourselves condemning anyone who attempts to erase those transformations to recover the original use of the instrument, because they have become part of our cultural horizon, which is so terribly sensitive to the historical dimension of music. The classifier cannot ignore this.

In the folk traditions I have studied, there are sound-making devices constructed specifically to stimulate the children's curiosity and to push them to experiment the multiple playing techniques. The game consists in trying to find the best way to make the most excellent sound in each vibration mode. This is a demonstration – in case one is needed – of how the classifier's attention cannot stay fixed on the object, because the variety of actions carried out on the single instrument by the player, apart from making sounds that are only understandable in relation to different typologies (like in the case of the 'transformed flute') is also in line with the function of the instrument. It is, in fact, the instrument-maker himself who stimulates the child's curiosity, and he achieves his goal to the full – a goal which, obviously, involves guaranteeing both the acquisition of knowledge and that of having fun – when he is able to secure satisfactory results in every vibration mode. Therefore, the function of the instruments cannot, in the case of these devices, be limited to one sole vibration mode, but is extended to a series of articulated acoustic expressions, which also require remarkable dexterity. What the ear can pick up – and experience can acquire – also depends on how good one is at making sounds and at controlling and modifying the parameters that fall on the ability of the player.

At the same time, what one is able to do actively conditions the possibility of enriching one's experience. The instrument-maker, who undoubtedly understands this interdependence, doses some of the elements of the device, adapting it to the skills of the child: the length and elasticity of the string, the width and sensitivity of the membrane, the weight and volume of the resonator. But is it fair to speak of planning when speaking about children's instruments? To make them, the constructor generally does not need jigs or models – like in the case of string instruments – and follows norms that are entrusted exclusively to memory, and which are evaluated the very moment the instrument is played. Instrument makers memorize the series of actions that characterize their playing schemes and which are also needed to evaluate the instruments they are building. The model they have in mind is the one that best embraces their playing techniques, thus disclosing their sensitivity to any minimal kinesis variation. This is not the case in classical instruments. For example, modern organ makers design new instruments using complex calculations and innovative technologies, without ever feeling the need to employ the tools of their own laboratories.

There lies, between making these instruments and making folk music instruments, and instruments for children in particular, the same difference, as stated by Claude Lévi-Strauss in his classic work *The savage mind* [1966], that lies between the work of an engineer and that of a bricoleur: while the engineer uses calculations to define the material and technology needed to realize his project, the bricoleur bases his work on the materials and the tools at hand, offering a precise and not so vast repertory, put together with materials that can be found easily and, most of all, which are recycled.

The instruments I chose to illustrate the variety of sound-making devices are various types of *rùacciula*[1] instruments that fall under the category of friction drums with whirling stick (232.2) but which are also used as single-skin stationary drums with friction cord (232.11), single skin stationary drums with whirling stick (232.3), plucked drums (22) and plucked idiophones (12). The first four playing modes are alternative (in the sense that one excludes the other) while the last can be both alternative to the fourth (22) and concurrent with the first (232.2).

In cases like this, the need for a shared classification system that is common to the entire scientific community is rather obvious, because if one did not exist, it would have taken much longer, and I would have had to voice a much more articulate discourse to say what I have just said in merely eight lines. I would like to underline the fact that, the way I used it, the system is not limited to evaluating morphological data, but mostly takes into account the ways to make sounds. In fact, in the first category, friction drums with whirling stick (232.2), the primary vibration is the result of the friction between the whirling stick and the cord, while the membrane receives the vibration that is transmitted by the cord and projects it over the vast, sensitive surface, delimited and completed by the cylinder, with which it forms the resonator. We could possibly discuss whether it is actually a membranophone or not, but this is not the question I wish to put forth – it wouldn't take much to set the instrument among the idiophones, even though in my publication [1996] I preferred to follow common practice and classify it under membranophones – I would only like to underline the fact that these problems are not enough to challenge the system. In the second category, single-skin stationary drums with friction-cord – basically the same device, but without the whirling stick – the primary vibration is the result of the friction produced by the players' fingers on the cord. Everything else remains the same. However, the system is sensitive to this difference and sets the instrument in a different *taxon*. Something similar happens in the other three typologies.

What I would like to underline is that by using this approach – slightly different from the one put forth by Hornbostel and Sachs, in particular with regards to the

1. The subject is dealt with in La Vena [1996, 49-52]; audio can be found in La Vena [2001, CD 1, tracks 29-37].

class of the chordophones, which should be revised – it is possible to establish, simply and clearly, what category the instrument should belong to. For instrument, however, we mean to imply a sound device to which a precise sound-making mode belongs, and not one that has certain morphological characteristics, which thus become secondary characteristics. This requires, firstly, that the primary vibration is identified, and, secondly, that every other vibration phenomenon working with it to produce the desired sound is defined. Obviously, if this perspective were to be taken to an extreme, the system would become too complicated, and, therefore, we must make do with a level of understanding that is sufficient for us to create a general typological system. For example, when speaking about how sound is produced in a guitar, we could never expect to go beyond the concept of 'pizzicato' when identifying, for example, playing techniques that are able to highlight the overtones, or when making a distinction between the use of the guitar plectrum and one's nails or thumb, etc., and the list could go on and on, and any type of classification would be impossible. Anything that goes beyond the normal concept of 'pizzicato' cannot possibly be a part of the general classification; it can, however, be included in particularly in-depth study which could, in fact, work as a specific classification.

In addition to this, by identifying the way the instrument is played, we couldn't expect to exhaust the array of questions that regard musical instruments and which touch on the reasons they are irreplaceable in their context. A similar objective cannot be reached but with a patient investigation into every aspect, whether direct or indirect, of sound-making and music [Stockmann 1984]. My research activity has helped me understand that the classifications – which are just another way of calling our discussions on the differences and similarities between the instruments – that were elaborated by the protagonists of musical tradition with whom I am in contact, contain decisive elements for the comprehension of instruments, and so I must disagree with those who consider them wrong or illogical: they are perfectly logical when using an emic approach – and in this I agree with Margaret Kartomi [1990], but I do not believe that the solution is that of eliminating general classifications. When publishing the results of my studies, I tried to describe the instruments, not just from my own point of view, but also from the specific perspective of the players and, of late, I believe it is more and more important for us to bring back, separately, the two points of view, without fusing them together. We can, therefore, come to define two different classifications, two different organizational criteria, both useful: one based on the meaning of the instrument within the culture being studied, and the other (that of the scholar) that takes a vaster geographical context into account, and which tends to trace more or less extensive typological maps of the instruments. It is not necessary for these classifications to be formalized numerically, and, in any case, even if it were necessary – for example when taking into consideration

an elevated number of instruments – every numerical order would contribute something complementary with respect to the others and would make it possible to get an overall picture, through different perspectives, to fully understand the network of relations in which the instruments are set. The analysis that was made in regards to the 'pizzicato' could very possibly be part of one of these two specific classifications.

The use of children's folk music instruments once represented a sort of educational programme in which to learn about the instruments of adults. I have included some of my studies on educational instruments to the bagpipe called *surdulina* in La Vena [2009]. This use allowed the child to learn quite a lot about all the ways you could produce air vibrations, both directly and indirectly, and, therefore, not just about aerophones, but also about idiophones, membranophones and chordophones. The huge variety of instruments and the preservation of many of their original names, give us an idea of the importance that was given to the understanding of sound-making devices. However, when talking about children's instruments, it does not seem to be limited to instruments used by adults because, in the majority of cases, it goes on to include instruments which, at least apparently, do not present any connection whatsoever with devices for adults. That may be because of the great thirst for knowledge that characterizes the very young, and which finds a privileged channel in the perception of sound, which is improvable, according to traditional beliefs, through the playing of a musical instrument.

I must admit that, before this research, my experience in air vibrating devices was very much inferior to that of traditional experts. Experts in both sound making devices and botany: two fields of study that are linked because a majority of these instruments are built using particular plants. Their construction involves an understanding of the most suitable plants, the best places to find them, the best period of the year for the right maturation etc. And the opposite can also be true, because building sound devices helps us learn more about the characteristics of plants: their consistency, hardness, elasticity and softness are researched systematically through the construction and playing of the instruments. Sometimes we search for plants that are not fully grown and that preserve a softer texture than normal: the correct functioning of the device, therefore, uncovers the correct properties of the material that is used.

Of the remaining parts that are used to build the instrument, a special place must be assigned to parts that are of animal origin: bones, horns, hooves, hairs, skins, bladders and other membranes that come from mammals, bird bones and feathers, snail and sea shells, and fish bones. In this case also the knowledge of sound devices and zoology intertwine, supporting and bettering one another, and there are mythical tales that link the two worlds and that are specifically intended for the young.

Folk instruments for children offer us the opportunity to reflect on the type of sound devices created for those who have yet to acquire – or have yet to fully acquire – a sense of what sound and music mean in a society, and who are interested, more than adults are, in the mechanisms related to the production of music and the understanding of sounds as an acoustic expression of movement, even before being material for the creation of music. These devices, through their essentiality, uncover the main systems that man has at his disposal for producing sound. In them, the functions of the device are secondary in the betterment of a melodic-rhythmical sense, and work mainly to refine perceptive skills, improve motor skills and coordination, and, more in general, to acquire the knowledge that is grounded in sound, which occupies a so very important place in folklore and tradition.

[Translated from Italian by Matilda Colarossi]

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Margaret Birley and Arnold Myers, with Rupert Shepherd

The revision of the Hornbostel-Sachs classification in 2011 by the mimo consortium

This paper discusses some of the revisions made in 2011 by the mimo consortium of museums to the *Systematik der Musikinstrumente*, the classification of musical instruments by Curt Sachs and Erich Moritz von Hornbostel published in 1914. In the first place, the organisers of this conference are to be thanked for their comments on the revisions. While the mimo consortium which made the revisions consisted primarily of museum curators, Hornbostel and Sachs envisaged that their 'systematic arrangement for musical instruments' would serve scholars working in a number of different fields, which is why comments on the revisions from those outside the museum community are particularly valued.
The revision of the Hornbostel-Sachs classification of musical instruments by the mimo consortium [2011] is published as one of the 'Resources' of the cimcim website. The cimcim working group in classification, set up in 2011, deals with matters relating to the revised classification of Hornbostel and Sachs by mimo, including further revisions which may be required. In order to widen the field of knowledge and expertise and to increase the number of contributors to a discussion on classification we would welcome comments and suggestions from interested parties such as the organisers of this conference.
This presentation is in two sections. The first part will outline the background to the mimo project and the revisions to the Hornbostel-Sachs classification made by the mimo consortium, while the second part will address specific comments on the revision raised by the organising committee of this conference.
The revision of the Hornbostel-Sachs classification was undertaken by a working group from a consortium of eleven European museums, under the aegis of the mimo project, Musical Instrument Museums Online. This project has created a single access point to digital content and information on the collections of musical instruments held in a number of those museums (http://www.mimo-international.com/mimo/). Co-funded by the European Union, the mimo project involved the harvesting of the digital content of museums' collections databases, which has been made available online at this website. These records of musical instruments are also available through Europeana, the portal to the digital resources of Europe's museums, libraries, archives and audio-visual collections. Twenty-four European museums have added their collections to the mimo

digital database, which now (2015) contains the records of over 55,500 musical instruments. There is no intention to limit the MIMO database exclusively to the museums of Europe, and museums from around the world are invited to take the opportunity to export their instrument records to the MIMO website.

At its outset in 2009, the MIMO project initially aimed to scope a simplified version of the Hornbostel-Sachs classification for museums to apply to their collections. However, it soon became obvious that there was a need to revisit the system in its entirety, principally to provide new categories for the many new instruments that had been invented since the publication of the original.

In the Hornbostel-Sachs system 'the physical characteristics of sound production' determine the four categories into which instruments are divided: idiophones, membranophones, chordophones and aerophones. A difficulty which is met at the highest level is the main principle of division: the Hornbostel-Sachs classification is based on how the sound is produced. However, this is interpreted in different ways: in the case of most idiophones and membranophones the vibrating element directly radiates most of the sound produced by the instrument and has a sizeable surface area to make this effective. With the majority of aerophones, those exploiting the resonant properties of columns of air («wind instruments proper»), the vibrating column of air leaks sufficient sound energy to the ambient air to produce audible sound effectively. The pitch is controlled by adjusting the air column length and causing the air column to vibrate in one or the other of its natural modes. In the case of chordophones the string itself produces hardly any sound directly, but transmits a part of its vibrational energy to the body of the instrument which is constructed with a sizeable surface area so as to be an effective radiator of sound. Nevertheless, since the properties of the modes of vibration of the string determine the most important musical properties of the sound (one controls the pitch by adjusting the string length and tension), it is convenient for the purposes of classification to consider the string as if it were the sound-producing element. Members of the organising committee of this conference have commented on footnote no. 13, relating to the aerophones section in the revised classification by MIMO, which reads: «Air-excited lamellaphones (free reed instruments) are treated as aerophones in accordance with conventional usage, although strictly speaking their acoustical behaviour is that of an idiophone». The committee has asked how the acoustical behaviour of free reed instruments can be shown to be the same as that of an idiophone.

The free reed is an interesting case. In some instruments (such as the mouth organ, concertina or harmonium) it is a relatively massive reed and dominates any air column with which it is coupled. The mechanical properties of the lamella determine the most important characteristic of the sound, the pitch of the sounded note. There is no need for a resonating air column or cavity, and where such a column is present (as in organ reed pipes) the pipe is tuned by

adjustment to the reed mechanics (mass, vibrating length or shape). Adjustment to an associated air column (which can be a vocal tract) is seen as pitch bending rather than pitch determination. Thus there is an argument for considering the free reed instruments to be idiophones since the reed and not the air is the primary vibrator. This parallels the case of the chordophones, where the string is the primary vibrator although the body of the instrument is the sound generator. On the other hand there is an argument for considering the free reed (as opposed to a musical box lamella) to be an aerophone. The sound radiated by the vibrating reed itself, either directly or through a soundboard, is only a part, maybe not a significant part, of the sound produced by the instrument; the lamella interrupts a flow of air, and the fluctuating pressure deriving from the interrupted flow and the air movement created by the reed together are the source of the radiated sound. The timbre of the sound largely derives from the waveform of this fluctuating pressure. With the Eastern free reed instruments such as the sheng the reeds are less massive and are dominated by the associated air column; the air column largely determines the pitch of the sounded note. Where this is the case there should be no problem in classifying them as aerophones. The MIMO consortium decided to continue classing air-excited lamellaphones (free reed instruments) as aerophones despite there being reasons for change in some cases. The opening statement for Class 4 in the MIMO revision of the Hornbostel-Sachs classification (p. 16) signals the ambivalence perpetuated by this compromise: «The air itself is the vibrator in the primary sense. In this group also belong reed instruments sounded by a flow of air in which the reed is the primary vibrator».

As anyone who has studied classification at library school will affirm, there is no perfect classification scheme for books, only schemes which are more or less suited to a particular purpose. Similarly, with musical instruments, the perfect scheme is an unattainable goal, and one can only hope to develop a scheme whose principles, assumptions and compromises make it useful for whatever task is in hand. In the case of the revision of Hornbostel-Sachs for MIMO, this was to produce a scheme which a) was sufficiently comprehensive and detailed to effectively use to classify the partners' distributed holdings of 45,000 instruments of all kinds (and allow for growth in these holdings and for new partners subsequently joining MIMO), b) was devised and implemented in partners' documentation systems within the two years of the project (September 2009 - August 2011), and c) was achievable with reasonable expenditure of time and money, in proportion to the project budget.

Devising the scheme and implementing it within two years dictated that the only solution was to use Hornbostel-Sachs, already used by several partner museums. Achieving the scheme economically required that any modifications to the Hornbostel-Sachs classification already in use in partner museums should be minor; although removing inconsistencies in previous versions of

Hornbostel-Sachs was desired, a radical revision was ruled out as it would have required excessive re-classifying of thousands of instruments. Being sufficiently comprehensive and detailed dictated that the main effort should be devoted to extending the classification to include instrument types not covered by existing versions of Hornbostel-Sachs, in particular addressing the explosion in the diversity of electronic instruments of recent years.

One property of the established Hornbostel-Sachs scheme was its ability to list the classes in a single sequence. The classes are laid out in a determined order, seen in the 1914 original, the 1961 translation, and the MIMO revision on the CIMCIM website; this order allows the instruments in a collection to be virtually ordered in the same way, which is useful for published lists and catalogues. This is facilitated by the numerical (decimal) codes attached to the classes, from 111.11 to 56. Hornbostel and Sachs adapted the Dewey decimal system used for classifying books in libraries as a numerical shorthand for the divisions of their classification. Like the Dewey decimal system, their sets of symbolic digits are usually grouped in threes, for ease of reference. When applied to a hierarchical scheme such as Hornbostel-Sachs, decimal coding tends to limit the number of divisions at any one level: since in Hornbostel-Sachs the digit 0 is not used, the maximum number of divisions is nine (not a serious limitation in practice). Although the use of suffixes is a step in the direction of a faceted scheme, their use was minimised by MIMO.

Many of the revisions to Hornbostel-Sachs classes 1-4 by MIMO are based on those made by Jeremy Montagu, in his revised version of the classification that was published in the Polish journal «Muyzika» in 2009 and also in «Liranimus» in 2012. The MIMO consortium owes Jeremy Montagu a debt of gratitude for generously sharing all resources associated with his revised classification.

For some scholars, the Hornbostel-Sachs classification has represented a starting point for developing their own systems for classifying musical instruments. Hans Dräger [1948] and Mantle Hood [1971] have developed the Hornbostel-Sachs classification by adding musical and sociocultural frames of reference for instruments, such as Hood's for using instruments in ritual contexts. However the latter frames of reference were not considered useful models for MIMO's revision, since museums do not always hold information about the cultural contexts of the historic instruments in their collections.

In the membranophones group, the MIMO consortium has expanded and renamed the kettledrums section to include vessel drums of all shapes in which the single membrane and body form an enclosed entity. The membranophones categories have also been expanded in order to make them easier to use. Among the collections of drums housed in most museums are tubular drums with one skin at each end. Often there is no information available to curators as to whether one or both skins are struck. When using the original Hornbostel-

Sachs classification, it is essential to know whether both or only one membrane is struck before a drum can be categorised as single or double membrane, since according to the authors an unused membrane «does not count as a membrane in the present sense». The new subdivisions introduced by MIMO have an inclusive category for drums with two membranes, one of which may or may not be played. A familiar example is the bass drum: struck on one head in the orchestra but on both in the marching band.

Since the classification deals with instruments worldwide, the MIMO consortium advocates changes to nomenclature in the aerophones section, with the use of the more neutral term 'reedpipes' for all wind instruments proper played with a reed, as an alternative to 'oboes' and 'clarinets' which are closely associated with western orchestral instruments with specific bore profiles. 'Horns' and 'trumpets' may similarly evoke European brasswind. MIMO has replaced the terms 'Horns' and 'trumpets' with the term 'labrosones', thus reinforcing awareness of the fact that not all lip-vibrated instruments are made of brass.

The labrosones constituted a further area in which the MIMO consortium expanded the classification. There are numerous examples of European brass instruments in partners' collections: the previous Hornbostel-Sachs classification failed to divide them into classes which corresponded to how the instruments are treated by makers, musicians, or composers. Although musicians readily recognise B-flat trumpets, B-flat cornets and B-flat flugelhorns as types each with significant museum populations Hornbostel-Sachs did not accommodate the distinction. Also, with other types of brass-wind (such as baritone saxhorns and euphoniums) one accepted species of instrument can merge into another without a clearly defined boundary. For reasons of stability the primary division was retained as with or without extra devices to alter the pitch while playing, and at the secondary level the 'chromatic' labrosones were divided into those with tone-holes, those with slides and those with valves. Below this came the acoustically important features of tube shape and bore size and, new for Hornbostel-Sachs, tube length was introduced as a criterion. Most brass instruments can be classified by recognising them among the examples given, but the scheme now allows consistent classification of unfamiliar types. There are some residual anomalies and problems (such as distinguishing the larger valve trumpets from the small valve trombones), but overall the scheme allows a more consistent ordering of brass-winds.

Among the principles of division in labrosones are:

a) chromatic capability provided by: tone-holes / slides / valves
(this distinction is easily recognised by non-specialists)

b) bore profile is: conical / intermediate / cylindrical

No instruments are perfectly conical or completely cylindrical, but these terms are widely used and have an intuitive meaning. Most users will probably recognise the examples given and be able to apply the classification scheme.
An entirely new class of instruments has been added to the classification by the MIMO consortium, that of electrophones, class 5. Categories of 'electrophonic' instruments were initially identified by Canon Francis Galpin in his *Text-book of European Musical Instruments* published in 1937, and the term 'electrophone' was first used by Curt Sachs in his *History of Musical Instruments* of 1940. In the MIMO revision of the Hornbostel-Sachs classification, unmodified acoustic instruments with attached microphones or pickups are still classed within groups 1-4, according to the primary source of acoustic vibration. All instruments built or structurally modified to deliver a signal to an amplifier and loudspeaker are classed as electrophones, even if they have some capability of sounding acoustically. The main subdivisions of the electrophones group include those identified by Hugh Davies [1984a, 1984b] and other authors as electroacoustic, electromechanical and electronic instruments. The MIMO consortium is indebted to Maarten Quanten of the Musical Instrument Museum in Brussels for work on this section of the classification and his extensive knowledge of this field of instruments. In proposing a classification of electrophones for MIMO Hornbostel-Sachs, Maarten Quanten advocated the merits of a modular scheme, possibly viable if one had been starting with a *tabula rasa*, but which was not adopted since it did not conform to the familiar step-by-step divisions of the Hornbostel-Sachs hierarchies. Instead, a simpler classification of electrophones which could be implemented by non-specialists was devised. Dr Tim Boon of the Science Museum in London and Professor Clive Greated of the University of Edinburgh also advised MIMO on this section of the classification. A proposed modular framework for subdivisions solely for analogue electronic modules and configurations in class 5 was subsequently published by Maarten Quanten and Stéphanie Weisser [2011]. In its current form it is too rudimentary to be useable by the organological community, principally because unlike the MIMO classification, it features no digital or hybrid analogue/digital examples. Nevertheless, it could be useful to establish whether or not it would be conceptually robust enough for development, and for practical application.
The organising committee of this conference has raised a number of points and questions regarding MIMO's revision of the Hornbostel-Sachs classification and the application of the classification within the MIMO database, shown below, together with our responses.

1. In the entries concerning the instruments (as they appear on the MIMO website) there are no references to the Hornbostel-Sachs system and the subdivision into families http://www. mimo-international.com/MIMO/instrument-families.aspx) does not account for its classes.

We think it is important to highlight the reason why in its practical application MIMO uses the Hornbostel-Sachs classification. The MIMO database is intended for a use by the general public as well as subject specialists, and in order for non-specialists to be able to interrogate the database, it is essential for them to access familiar and widely used terms for groups of musical instruments. It would be confusing and probably off-putting for non-specialists if the instrument family names used by MIMO were mixed with Hornbostel and Sachs's instrument category names, since most of them are not synonymous. The majority of the then nine museums in the MIMO consortium that contributed their records to the project between 2009 and 2011 did not, and do not use Hornbostel-Sachs, so during the two years of the project the MIMO consortium focussed on building multilingual lists of keywords for musical instruments that could be used as search criteria for all the museums' collections. Both the keywords and the Hornbostel-Sachs classification, with limited use of suffixes, are embedded in the MIMO database http://www.mimo-db.eu. Using the Advanced Search option with instrument classification, it is possible to navigate through all the Hornbostel-Sachs classes, including some to which suffixes have been applied, such as *321.322-71 Necked box lutes or necked guitars sounded by bowing with a bow*. The MIMO website http://www.mimo-db.eu was the technical platform built during the MIMO project in order to manage the metadata harvesting and enrichment, and is still recommended by MIMO as the optimum site for research into MIMO's use of Hornbostel-Sachs codes. The aim of the practical application of the Hornbostel-Sachs classification and of keywords by MIMO is that of assigning each instrument to its class or descriptor, and achieving consistent results in searches across the collections.
It is possible to interrogate the new MIMO website that has been online since 2014 http://mimo-international.com using Hornbostel-Sachs terms, and even deploying some complex Hornbostel-Sachs numerical codes for polyorganic instruments, such as the code for the Klavier-harmonium, the combined piano and harmonium, that requires a numerical code using several suffixes: 314.11-4-8+412.132-62-8. However the results can be inconsistent, and MIMO still has work to do in ensuring that searches using Horbostel-Sachs class names and numbers produce reliable results in the database. It should not be forgotten that it is also possible to interrogate the MIMO database using instrument names, makers' names and places of manufacture as search criteria.

2. The document regarding your revision, does not give any indication as to how to expand the subdivisions following the needs of single collections. In order to give this system the necessary adaptability to the contents of each specific collection, Sachs and Hornbostel have adopted Dewey decimal numbers and the elaboration system of specific Hornbostel-Sachs numbers for polyorganic instruments using suffixes, points, colons and square brackets. You claim: «Since the numerical codes must be used consistently within the databases of

> the different MIMO partners, in the practical application of Hornbostel-Sachs numbers to multicategory instruments within this digital context none of the abbreviations suggested by Hornbostel and Sachs have been used, rather, the codes have been used in full, without colons or brackets» [Introduction to MIMO's revision of Hornbostel-Sachs, p. 1].

The points between each three group of digits and some but not all of the suffixes are used in the MIMO revision of the Hornbostel-Sachs classification. There are instructions for classifying polyorganic instruments in the introduction to the MIMO revision of the Hornbostel-Sachs classification, where a Highland bagpipe which has a conical-bore double reed chanter with fingerholes and cylindrical bore single reed drones is cited as an example. Using the Hornbostel and Sachs classification as revised by MIMO, the numerical code for a set of Highland bagpipes would appear as: 422.112-7+422.22-62 i.e. double-reed chanter, conical bore (-7 with fingerholes) + set of single-reeds (drones) with cylindrical bore (-62 with flexible air reservoir for all pipes). In Hornbostel and Sachs's original classification the numerical code may be re-arranged and abbreviated thus: 422-62:.2]1+2 for the purposes of brevity. The MIMO revision has not adopted this strategy, nor that suggested by Hornbostel and Sachs of switching the positions of figures to elevate subordinate criteria of division in polyorganic instruments. Nor does it turn a main criterion of division into a subordinate one by replacing a relevant figure by a point that is added after a square bracket at the end of the number. It does not incorporate into the higher ranks of the classification criteria that have not so far been used, as exemplified by Hornbostel and Sachs's paradigmatic table itemising the morphological differences in xylophones that the authors suggest might be utilised for a monograph on these instruments. These options to re-arrange and abbreviate the numerical sequences in the Hornbostel-Sachs classification have not been replicated in the revised version of the classification, in the interests of maintaining consistency in the numerical codes for object records among all museums intending to subscribe to the MIMO database. MIMO's revised system has simplified the use of these numerical codes, advocating that the numbers in a code signifying a particular type of instrument should always appear in the same order, for the purposes of maintaining the consistency required for digital systems of information storage and retrieval.
Scholars such as Laurence Picken [1975] and Jeremy Montagu [2001] have used Hornbostel-Sachs's terminology and numerical codes in their respective catalogues of Turkish instruments and reed instruments. To our knowledge, few if any scholars have opted to take up Hornbostel and Sachs's recommendation in the introduction to their classification to reorder the numerals to emphasise particular features of the instruments, and to use points and square brackets to replace figures and to bring closer together groups which are separated in the system. However, in order to make provision for these options, and to make the MIMO revision useful for the greatest number of people, the introduction to

MIMO's revision of the classification should be modified by the addition of the following sentence to the final paragraph: «The demands of particular areas of research may give rise to the adoption of Hornbostel and Sachs's suggested options to reconfigure the numerical codes and to expand the subdivisions [Hornbostel and Sachs 1914, 560-561; 1961, 11-12], but for the purposes of maintaining consistency within the MIMO database for object records exported to the MIMO platform, the standard codes itemised below should be used».

3. How is the Hornbostel-Sachs classification used in the Horniman Museum database?

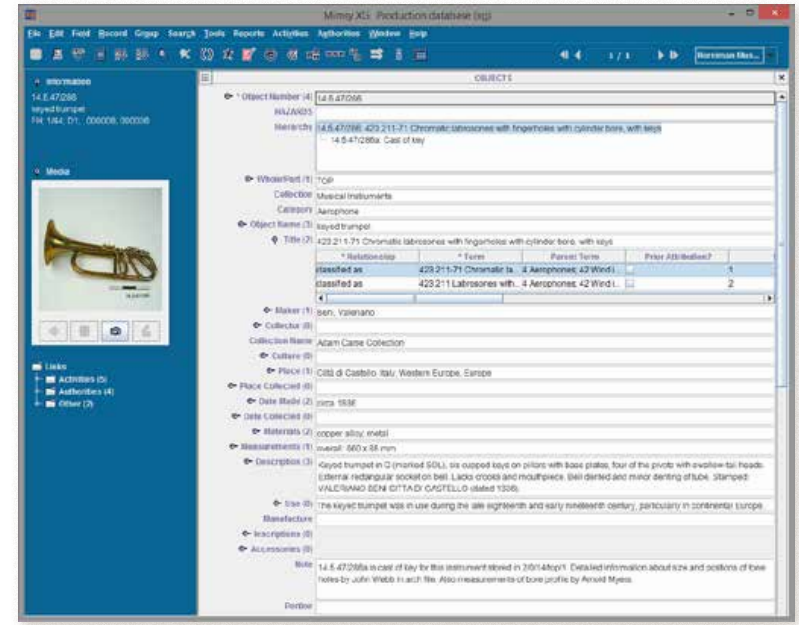

Figure 1. Record for a keyed trumpet in the Horniman Museum's database

The above image shows the record for a keyed trumpet by Valeriano Beni in the Horniman Museum's database, which uses the commercially-available Mimsy collections management system, distributed by Axiell. Within Mimsy, we set up the Hornbostel-Sachs classification as a separate, hierarchically-arranged thesaurus within the database which can be linked to an individual object's record. Other thesauri within the Horniman Museum database that are applied to musical instruments include:

MIMO thesaurus of instrument names (keywords)
Makers' names
Cultures
Places
Materials and Techniques

The Horniman content was not included in the MIMO database during the life of the MIMO project. However, the Horniman database is now being organised for a future upload of content under the aegis of the Minim-UK project, launched in November 2015, which will add up to 20,000 records of UK museums and collections to the MIMO platform.

4. Does the use of numeric codes from the Hornbostel-Sachs system pose any difficulties to museum databases, and if so of what kind?

We can answer this question with respect to the application of Hornbostel-Sachs numeric codes to the Horniman Museum's database, Mimsy.

a) In the Hornbostel-Sachs classification every term exists in two forms: the number, and the verbal description. The former is not easily intelligible to humans, nor the latter to machines. Logically, these should be stored in the authority file (thesaurus) in separate fields, and both applied to the object via a single link to the authority file; but most systems allow for only one form of a term to be added to a record per link – particularly if other thesauruses are stored in the same authority module, as is usually the case. The problem is reduced if Hornbostel-Sachs is the only authority being used. The pragmatic solution is to do what we have done, and produce a compound term in a single field, combining both numeric code and verbal description.

b) The use of suffixes means that the system can produce a very large series of potential combinations. Authority files work on the assumption that all the terms that need to be used can be listed as separate terms: there is no leeway for improvisation in producing combinations (the difficulty of doing this would be exacerbated by the two-part structure of the terms). This either increases the work required to enter up the complete Hornbostel-Sachs authority at the beginning of a project; or leads to more work during data entry as new compound terms are created as required. We have adopted the latter course. In our case, this has led to a problem which is more one of management, than one caused by the Hornbostel-Sachs system itself: the unauthorised entering of terms free-hand means that the relevant terms are no longer digitally linked to the authority, which causes problems for information retrieval. Such entries will

now need to be tidied up and linked to newly-created authority records.

c) Compound instruments like bagpipes are another problem. We would code them as a series of links to separate Hornbostel-Sachs terms, but the Mimsy system's syntax for doing this (separating individual terms with semi-colons), differs from the true Hornbostel-Sachs syntax.

d) One of the core functions of museum databases is the retrieval of information, and authority files should, where possible, facilitate this. The descriptions are very technical, which means that, as an information-retrieval tool, Hornbostel-Sachs is only suitable for experts. This is why the Horniman has also adopted the MIMO thesaurus of instrument names as a widely intelligible classification system, to sit alongside Hornbostel-Sachs and be used by the general public and our colleagues outside the organological community. However, we hope to create links between terms in the MIMO thesaurus and Hornbostel-Sachs classifications, based upon those already established by the MIMO project.

5. We have been asked for specific information on some of the new classes in MIMO's revision of the Hornbostel-Sachs classification. The first of these is the Flexed diaphragms class in the idiophones class.

These are instruments that are superficially similar to friction drums, but they are not played by friction. The string in the centre of the flexible diaphragm is not rubbed, but is tugged to pull the diaphragm out of shape and cause it to emit a clucking sound.

6. The next question concerns the difference between the older pianos that have a soundbox and the modern ones that do not have one, a distinction which was first made in Jeremy Montagu's revision of the Hornbostel-Sachs classification [2009], and incorporated into the MIMO revision.

This distinction was first made in Jeremy Montagu's revision of the Hornbostel-Sachs classification [2009], and has been incorporated into the MIMO revision. All pianos have soundboards so they are all classed as board zithers. Modern pianos, which do not have a base board, or wooden underside to the case, are classed as board zithers without resonators (314.11) while older pianos which have a base board are classed as board zithers with a box resonator (or box zithers) 314.122. The organising committee asked whether this distinction was easily accepted by the curators of piano collections. «True board zithers without resonator», HS classification 314.11 has been assigned to the piano component of the Klavier-harmonium in the Grassi Museum für Musikinstrumente (inventory number 4299) in the MIMO database, and the whole reads 314.11-4-8+412.132-62-8 (true

board zithers without resonator, sounded by hammers or beaters, with keyboard + sets of free reeds, with flexible air reservoir, with keyboard.) However, none of the pianos per se that are not combined with other instruments are assigned to the «True board zithers without resonator» category (314.11).

> **7.** The next point concerns the new Hornbostel-Sachs class number 424 Membranopipes, where the column of air is made to vibrate with the intermittent access of an air stream produced by means of a membrane that periodically opens and closes an aperture.

Since no examples are given in the MIMO's revised Hornbostel-Sachs classification it would probably be useful to discuss some within this context. An example is the Do It Yourself smallpipes (a bagpipe, figure 2), that can be viewed at the following link: http://www.instructables.com/id/Build-your-own-Smallpipes-for-a-few-bucks-Membra/step2/The-Drones/.

Figure 2.
DIY Smallpipes (Membrane Bagpipes). The drones
PHOTO ©TODD MEDEMA, FABRICATE.IO: INVENTION STUDIO

In both the drones and the chanter (the melody pipe) of these bagpipes the membrane used is a plastic bag. With the bag stretched taut around a ¾in. (19.05 mm) pipe, the ½in. (12.7 mm) body pipe is slid inside and contacts the membrane. When air is blown into the ¾in. pipe, it travels up, past the membrane, and into the ½in. pipe. The pitch of the drone depends on the length of its main pipe, the ½in. pipe. The chanter of the bagpipe is constructed in the same way, but it is of course built with fingerholes. Instruments that use a similar principle of sound-production, the Sonic Blast Horn and the Mega Blast horn are discussed by Roderic Knight [2014]. They are also shown on the web

pages for his musical instrument collection, which can be accessed through the following link: http://www2.oberlin.edu/library/digital/knight/. In the case of the Sonic Blast horn the air column is the dominant partner and the length of the air column determines the pitch, so like the Do-It-Yourself smallpipes, it would fall into the Hornbostel-Sachs category 424 as a «wind instrument proper».
The Mega Blast horn is a considerably shorter instrument. Here the modes of vibration of the enclosed air have frequencies too high to couple with the membrane, so it acts in an analogous way to the beating reed (motor horn) – but of course a membrane is not a reed. The Hornbostel-Sachs free aerophones class 412.2 «non-idiophonic interruptive instruments in which the interruptive agent is not a reed», would seem to be the most appropriate category for this instrument. The Ainu deer call described by Batchelor [1901] and Galpin [1902-1903, 129] would also be allocated to this class.

The revisions to the Hornbostel-Sachs classification by MIMO were devised principally for museums to achieve consistency in their classification of their musical instrument collections, using a universally-referenced system that encapsulates many of the salient features of instruments, and yet is remarkably concise. It is hoped that the revised classification will also aid the work of members of other communities interpreting musical instruments, such as the «musicologists and ethnologists» identified as potential users by Hornbostel and Sachs in their introduction to their original classification. To this end, this conference provides a valuable opportunity for MIMO and the CIMCIM working group for classification to engage in a dialogue with scholars using the classification who are working in fields other than museums.

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Nico Staiti

For a revision of the reeds taxonomy (also in the light of some new discoveries)

I must admit that I totally agree with the criticism put forth by André Schaeffner [1936] on the Hornbostel-Sachs system. According to Schaeffner, in fact, the four classes are not hierarchically equivalent, since idiophones, membranophones and chordophones share a property that excludes aerophones: they are all solid body instruments, while in aerophones the vibrating body is gaseous. In addition, the class of idiophones, as it is now conceived, constitutes a sort of residual category, a storeroom of sorts in which the remaining objects are set, objects which do not find a place in any of the other categories. These include both solid body instruments and flexible vibrating bodies. Among these we find: instruments whose entire body is vibrating (for example clappers or triangles) and objects in which one part has a fundamental role in producing vibrations that are acoustically perceptible and other parts do not (for example bells or gongs); objects in which – although made of one body and one matter – one part makes up the vibrating body of the instrument, and the other has the function of resonator (for example bronze drums, or a coffee tin struck from the bottom); and also objects in which the resonator is attached to the vibrating body (many xylophones), and objects in which the vibrating body is connected to an acoustically inert support (Jew's harp, sanza).

So, a first main division must be divided into two main classes:

1 Solid body instruments
2 Wind instruments

The first articulation of the first class should be:

11 Solid rigid body (idiophones)
12 Solid flexible body (idiophones)
13 Solid stretched body (membranophones and chordophones), divided in:
131 Membranophones
132 Chordophones

It is, however, true, adds Schaeffner, that if the nature of the vibrating body is taken into account, this and this alone should be the principle according to which each class is organized. Yet this principle, for obvious reasons that are linked to the morphology of the objects, is applied in full only when dealing with chordophones, whose articulation only takes into account the relation between the string (or strings) in tension and the support, whether «simple» or «composite». In membranophones, the morphology of the instrument plays only a partial role, and the way the membrane vibrates (which is not taken into consideration at all in chordophones) is key. Idiophones are subdivided, from the very start, into categories that take into account how the body or bodies are made to vibrate (111 struck directly, and 112 indirectly struck idiophones). Schaeffner has put forth his own classification system, which is extremely stimulating but, in actual fact, impracticable, because by using, as he does, the matter with which the vibrating body is made as a guideline for the classification of the instrument, numerous difficulties and contradictions arise (a synthetic membrane, for example, would have to be classified differently from one in animal skin; and a bone flute, which may have an internal bore that is identical to that of a wood or terracotta flute, would also have to be classified differently, etc.). I have, therefore, often thought of revising the whole system by attempting to classify the other three classes using the subdivisions that Hornbostel and Sachs use in the classification of chordophones, while bearing in mind the criticisms expressed by Schaeffner. The project is massive, but perhaps not impossible: I have, in fact, never finished it. Yet the discovery of various aerophones whose reed is a tense membrane (marginal instruments, certainly, newly constructed, and which exist mainly as a consequence of the progress made in the production of elastomeric materials) have compelled me to review the class of aerophones, and in particular free idiophonic interruptive aerophones, moving forward in my own revision of the articulation of 412.1. In general terms, we can say that in all aerophones the gaseous vibrating body is set in motion by the interaction with the solid body, which can be rigid (in the case of displacement free aerophones and flutes), flexible (in the case of free reeds, percussion reeds, and, naturally, oboes, clarinets and trumpets), and tense, in the case of ribbon reeds and membrane reeds – on which this reflection is based. However, it must be clear that I do not wish to claim that in aerophones, at one time or another, a specific principle – idiophonic, membranophonic or chordophonic – is in function, but that there are morphological relations between solid sonic bodies and non-sonic bodies which set in vibration the movement of the air. In addition, a relation exists between displacement free aerophones and edge instruments, as it does between idiophonic interruptive aerophones and reed instruments on the one hand, and lip-reed instruments on the other; and, therefore: air set in vibration by rigid bodies (displacement free

aerophones and edge instruments); air set in vibration by flexible bodies (free and percussion reeds, oboes, clarinets, trumpets); air set in vibration by tense bodies (membrane reeds, ribbon reeds).

Let us now consider the objects which have encouraged these reflections and on which my observations are based: membrane reed instruments. I have identified two types: whole membrane reeds – percussion reeds – and split membrane reeds – which I have defined free. The *tornado*, an instrument sold in the 1990's and played in stadiums by Italian football fans, is a plastic cylinder made of two parts which fit together. Set on the opening that is closer to the player's mouth is a larger cylinder covered with a synthetic membrane that sits on the edge of an interior cylinder. The lower end of the cylinder, which slips over the tube, sits on the rigged edge in order to close the passage of air which, blown through a lateral hole, is forced to pass between the membrane and the edge of the internal tube, producing a vibration of the membrane and, consequently, the vibration of the air column inside the tube.

Figures 1 and 2. *Tornado*
NICO STAITI COLLECTION, AUTHOR PHOTO

The sound produced is strong, with a notably stable timbre, although it is subject to vibrations that vary depending on the wind pressure, producing a sound which is similar to single reed instruments. It is, in fact, a percussion reed, but not simple: what produces the periodic vibration of the air stream is not a flexible lamella but a tense membrane. In other percussion membrane clarinets the reed is made from an inflatable balloon. The wind is interrupted by the walls of the balloon, which beat against themselves. This second example is to the Tornado what the double reed is to the simple reed: here the vibrating parts beat against themselves as in the Tornado the membrane beats against a rigid body.

Figures 3, 4 and 5.
Percussion membrane clarinets
NICO STAITI COLLECTION, AUTHOR PHOTO

Figures 6 and 7.
Free membrane reeds
NICO STAITI COLLECTION, AUTHOR PHOTO

Membrane clarinets, uncovered in Calabria by Enzo La Vena [1996, 157-158, 270], are composed of a cylindrical *Arundo donax* tube without fingerholes, where the terminal end is partially covered by a membrane in rubber (part of a kitchen glove) and held to the body of the instrument by an elastic. The membrane does not beat against an internal cylinder: the vibrations are free, which is to say that the vibrations are not interrupted by a rigid body (as in single reeds and the *tornado*), nor by a flexible symmetric body (as in double reeds). They are blown from the open extremity (the reed being at the terminal end), and therefore without a resonator: they are free aerophones.

Obviously the difference between flexible percussion reeds and free reeds creates different acoustic effects: varying air stream in the percussion reeds makes the sound higher, while in free reeds the pitch remains the same notwithstanding the speed of the air stream. This basic difference is not found in membrane reeds, or it is impossible to detect: the air stream entering, in reeds in tension (and therefore in ribbon reeds like in membrane reeds), determines a variation in the tension of the vibrating body. I wish to add that the category of reed instruments should include the fact that all flexible reed instruments can be idioglots or heteroglots, and that double reeds can be flattened or made of two symmetrical lamellae with an orifice, inserted into the upper end or in the side of the instrument, with or without a staple. I would like to call your attention to another fact: every percussion reed inevitably includes a portion of tube, and therefore, an additional resonator. This is particularly evident in clarinets (which, not surprisingly, more often than shawms, are made of one piece that includes the reed). We should, therefore, determine, in terms of proportions, when an object must no longer be considered a reed – that is to say a free aerophone – but rather a wind instrument proper. Of course we cannot decide to classify as wind instruments all those objects in which a portion of the tube that extends beyond the distal end of the vibrating lamella or lamellae is longer than the diameter of the distal opening: for, in this case, almost all single reeds would be clarinets. I suggest we consider reeds all those objects in which the tube is equal to or inferior to the length of the vibrating lamella or the lamellae, and as wind instruments all those instruments in which the tube is longer than the lamella or lamellae. With regards to reed membranes, we could consider free aerophones all those instruments whose membrane diameter is inferior to or equal to the length of the tube, and wind instruments all the others. I wish to put forth an additional suggestion: all reeds should be considered free aerophones when they must be coupled with a resonator, and considered wind instruments only when (independently from the relation between the tube and the length of the vibrating lamella) they, in fact, are one with the relative instrument.

The question is not solvable in abstract, nor in terms of proportions alone:

we must also add that every staple acts as a resonator (which is to say that it influences the timber, quality and pitch of the sound produced): but if we were only to consider the acoustic principle all percussion membrane reeds would be wind instruments proper. It is a rather grey area in which the confines are blurred, and so it must be treated. A similar situation exists in the case of, for example, frame drums and tubular drums: the frame, in abstract and in theory, is a mere drum tension support, while the tube acts as a resonator. This is, however, never completely true: the frame is a resonator; and as explicitly stated by the authors of the system, a snare drum is a tubular drum. Both its history and morphology sustain this fact, even though the proportion between the width of the membrane and the depth of the support place it among the frame drums. On the basis of the considerations put forth thus far, I propose the following articulations for idiophonic interruptive aerophones.

412	Interruptive free aerophones
412.1	Idiophonic interruptive aerophones or reeds
412.11	Flexible beating reeds
412.111	Concussion reeds
412.111.1	Idioglot concussion reeds
412.111.11	Blade concussion reeds
412.111.12	Flattened concussion reeds
412.111.121	End-blown idioglot concussion reeds
412.111.122	Side-blown idioglot concussion reeds
412.111.2	Heteroglot concussion reeds
412.111.21	Tied concussion reeds
412.111.22	Concussion reeds with staple
412.112	Percussion reeds
412.112.1	Idioglot percussion reeds
412.112.11	Upper cut idioglot percussion reeds
412.112.12	Lower cut idioglot percussion reeds
412.112.2	Heteroglot percussion reeds
412.112.21	Upper cut Heteroglot percussion reeds
412.112.22	Lower cut Heteroglot percussion reeds
412.12	Flexible free reeds
412.13	Stretched reeds
412.131	Ribbon reeds
412.131.1	Ribbon reeds without frame
412.131.1	Ribbon reeds with frame
412.132	Membrane reeds
412.132	Percussion membrane reeds (complete membrane reeds)
412.132	Free membrane reeds (cropped membrane reeds, figures 6 and 7).

The classification of wind instruments should be modified accordingly.

422	Reed aerophones
422.1	Double reed instruments
422.11	(Single) shawms
422.111	With cylindrical bore
422.111.1	Without fingerhole
422.111.2	With fingerholes
422.112	With conical bore
422.12	Sets of shawms
422.121	With cylindrical bore
422.122	With conical bore
422.2	Single reed instruments
422.21	(Single) clarinets
422.211	With cylindrical bore
422.211.1	Without fingerholes
422.211.2	With fingerholes
422.212	With conical bore
422.22	Sets of clarinets
422.3	Reedpipes with free reed
422.31	Single pipes with free reed
422.32	Double pipes with free reeds
422.4	Percussion membrane clarinets (figures 3, 4 and 5)
422.41	(Single) percussion membrane clarinets
422.42	Sets of percussion membrane clarinets

[Translated from Italian by Matilda Colarossi]

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Stéphanie Weisser

The Hornbostel-Sachs system: a model for the twenty-first century?

1. Introduction

As any other object existing in the world, musical instruments have probably been classified since the dawn of humanity. However, the project of a 'universalist' classification can be traced back to both a practical need for organizing a very specific corpus of objects (musical instruments kept in museum, see Jairazbhoy [1990]), together with a social climate favouring a positivist view and an essentialist conception of the physical world. Facing a very pragmatic problem of sorting and organizing their collections, curators needed a reference framework. According to the ideal of positivism of the time, such a reference framework had to be logical, systematic and apply to all the instruments, present or to be acquired by the institution – hence its ambition to be applicable to instruments of «all nations and all times» [Hornbostel and Sachs 1961, 5]. In order to realize this objective, the system-to-be was constructed based on an analogy: instruments were assimilated to living organisms and classified in a similar way, according to the theories and knowledge of the time. In a way, the Mahillon/Hornbostel-Sachs system is a culture-emerged scheme – as defined by Margaret Kartomi [1990] –, but with an important distinctive feature: Mahillon/Hornbostel-Sachs's ambitions for the system to be applied to objects belonging to their own, as well as all other societies.

2. Yet another critique of Hornbostel-Sachs

Critiques and attempts to improve the Hornbostel-Sachs system are numerous. Although the entire scientific community recognizes the interest and quality of the work carried out by Mahillon, Hornbostel, Sachs and the numerous improvements made to the system by contributors over the years, it appears that issues still remain. Looking at the causes of such permanent discontent, many researchers have pointed out that the primacy given to morphology as a criterion to operate (sub) division constitutes a major issue. The fact that the sound produced by the instrument – even though sound is an essential trait of an instrument – is somewhat secondary in the system is also troublesome. In the Mahillon/Hornbostel-Sachs, it mostly derives from other characteristics (such as the morphological traits and/or the playing technique for the idiophones

category). Sound, therefore, is considered 'secondary' in the taxonomy. Finally, several organologists (including those present at this meeting) have noted that the system does not take into consideration data related to playing techniques, context, musical characteristics, etc.

Decades ago, the limitations of Mahillon/Hornbostel-Sachs led to the development of two relatively separate approaches to musical instruments: analytic and classificatory [DeVale 1990]. Except in the case of museums and collections, the point of a universal classification was not considered crucial for research, and typologies of specific kinds of instruments provided much more data and prospects for research. As put by Grames [1963, 138],

> one can discern an alarming tendency on the part of some to use the [Hornbostel-Sachs] system as a basis for scholarly investigation, when it is, in fact, merely an extraordinarily ingenious way of arranging musical instruments in one of many possible logical orders.

Indeed, after the instrument is 'identified' according to the Hornbostel-Sachs system, what else can be done? Musicologists either strove to solve major problems of the system (in museum context), or just resigned to 'deal' with it.

However, with the development of large databases such as MIMO, the situation has changed: there is a need, just as it was needed some 150 years ago, for a reference framework which can handle the sorting, in a unified system, a large number of diverse instruments. Of course, we are now talking about tens of thousands of instruments as compared to hundreds in the 1870's, and the sorting must be performed in the virtual world now and not in the physical world, but the problem remains quite similar. Why not just continue to use the existing system, then? This is what has happened so far.

The problem is that the inconsistencies of Mahillon/Hornbostel-Sachs are no longer acceptable. We are now living and doing research in a society that has operated many conceptual and paradigmatic changes since the publication of the system. In the field of organology, too, the changes have been numerous: the development of anthropology and cultural studies has led to the broadening of the concept of musical instruments (figure 1), leading to the inclusion of many aspects, formerly neglected, but now considered pertinent – and, therefore, to be integrated in their definition and study.

Musical acoustics and psychoacoustics have developed tools and concepts that explain and reproduce how the human ear works – and how musical instrument sounds are (physically) produced and (humanly) perceived. It would be impossible to cite here the discoveries (even only the groundbreaking ones) that have been made in the fields of acoustics and psychoacoustics during the last century, mostly thanks to the development of technical tools (recording devices and computers, namely) developed during this period of time. Instrumental

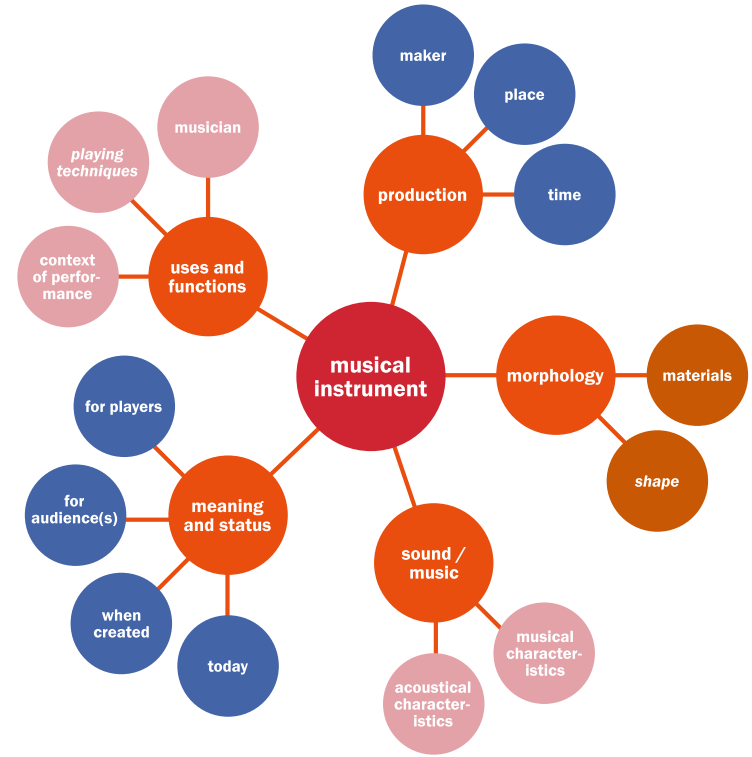

Figure 1.
Some of the data pertinent to the study and organization of musical instruments.
In italics, data considered important in the Hornbostel-Sachs classification.
FIGURE DERIVED FROM INFORMATION FOUND IN BIRLEY, EICHLER AND MYERS (1998).

sounds can now be recorded, analysed and transformed; and the growing use of computerized modules in music making in the last decades [Barthelemy *et al.* 2010] demonstrates that the way we conceptualize and analyse these 'sound-making devices' that are instruments is far from being universally relevant.

3. A look at other disciplines

In order to better understand the situation, it is interesting to turn to other disciplines and to examine the history of the reception of the Linné taxonomy – as this taxonomy served as the model for Mahillon/Hornbostel-Sachs. Linné's downward taxonomy as a representation of living organisms was definitely proved inadequate since the 1950's. This inadequacy is mostly

due to the discovery that apparent structural similarity (the criterion used to operate division and grouping in categories between individuals) is not always reliable and objective. Moreover, the aim of the classification of living things has changed: with the endorsement of the Darwinian theory of evolution [Duranthon 2010], the goal was not only to classify individuals within a group anymore, but to integrate their phylogeny, their evolutionary relationships with other groups. To identify living organisms based on resemblance only was not considered pertinent anymore. It was necessary and pertinent to consider another (not visible) element. The process of classification becomes therefore less 'anthropocentered' and more based on tools and techniques, such as DNA sequencing. The development of science information and knowledge societies has also led to an important change. Many fields of research elaborate and discuss ways to organize data, such as artificial intelligence, semantic web, etc. Alternate models to downward taxonomy were developed and are now widely used. For example, as theorized by Guattari and Deleuze [2005], an interesting way to represent culture and knowledge is not as a tree anymore, but a rhizome. The integration of the concept of multiplicity, as opposed to binary thinking and dualist categorization is undoubtedly one of the most interesting features of this new model.

4. Back to musical instruments

Considering the scientific and conceptual changes that occurred in the past century, it seems quite problematic to continue to use a nineteenth century system such as Mahillon/Hornbostel-Sachs. The nature of the primary criterion is not the issue here. Replacing the criterion of morphology with another would not solve the problem. The reducing effect of downward taxonomy is due to its very nature.

Its essentialist nature also raises many questions. Some cognitive scientists have even argued that an invariant basis on which we categorize might just not exist. Without embarking upon this debate, it is, however, important to start asking ourselves a fundamental question: what do we need a classification system of musical instruments for? In other words, what needs does the classification meet?

a) An environment rather than a classification

In its most general acceptance, classification refers to an arrangement of people or things in groups based on likenesses[1]. In this definition, we find thus the idea of grouping objects according to their similarity. To achieve this goal, what do we need? First, we need to organize the available knowledge we have on musical instruments.

1. http://www.merriam-webster.com/dictionary/classification (last consulted November 2019).

b) Multi-criteria instead of morphologic criterion alone

For decades, we have known that this knowledge is diverse and vast. Indeed, a musical instrument, understood here as a non-living interface used by humans to produce sounds in a musical context is much more than an object with specific morphological characteristics: it is, first of all, a sonorous device, played using specific technique(s), used in specific social contexts and musical systems and embedded with symbolical and aesthetical values (figure 1, p. 187). A musical instrument is, therefore, not *one*, but *many*. Taking into consideration criteria that goes beyond morphology is, thus, indispensable. In databases using the Mahillon/Hornbostel-Sachs system, the Hornbostel-Sachs code of an instrument is one of the many pieces of information used for identification: historical data, geographical area, local name, are sometimes as important (if not more important) traits. Such databases already use a multiple-trait classification, as it is possible to research instruments according to each of these traits – all of them being potentially equally important for hypothetical research (before an eventual selection by the user). Numerous researchers have built systems to address the polysemic nature of musical instruments [Kartomi 2001, 288-289]: in 1948, Hans Heinz Dräger integrated numerous characteristics (no longer just a few) for each step of the classificatory process; in 1969, Oskar Elscheck built typologies; Mantle Hood [1971] designed the organogram, a system of graphic representations for multiple traits (including playing techniques and contextual information). René Lysloff and Jim Matson [1985] suggested the computer-helped in the calculation of a multidimensional 'distance' based on several features (grouped in over thirty categories), etc. But neither of these attempts was widely adopted. Multi-criteria are, therefore, needed, *but are not enough*.

c) Unhierarchical instead of arborescent

Researchers have mentioned that one important issue of taxonomy is the predetermined ordering of the classificatory operation. It prevents us from connecting objects 'horizontally', across what are now considered watertight categories. It seems that no matter how hard we try, we will never be able to properly include all the real objects (including the equivalent of biological 'hybrids') within such a system. As frankly put by Kartomi [2007-2015]:

> The very imposition of boundaries creates problems: borderline cases always arise when boundaries are imposed. (…) [P]erfectly logical schemes that deal adequately with all aspects of a body of data simply do not evolve in living cultures, since the primary aim is virtually never to comply with the requirements of strict logical division.

d) Connection instead of difference

Instead of thinking in terms of 'same' and 'different', we could consider 'how connected' an object is to another one. In the last twenty years, the development of research in disciplines such as network-based approach, graph theory and ontologies has proven the relevance of the concept of connection in numerous fields, including in the fields of organology [Veloz, Tëmkin and Gabora 2012] and museum collections [Wray and Eklund 2011].

Conclusion

It appears that neither the typological nor the taxonomical approach seems to be a satisfactory solution to our problem. What, then, could provide an answer to our century-old dilemma? I believe that we need to abandon the idea of producing one univocal classification. Instead, we should aim at producing 'an environment' (rather than a classification system), consisting in an inclusive, unhierarchical and flexible tool to organize musical instruments. With the goal of including the complexity and the richness of these multifaceted objects, it would include the manifold aspects of musical instruments into one unique environment. Contrary to the previous model, richness would not be a problem to be solved, but an asset for the environment. The environment would be based on the temporary grouping of instruments among their 'peers', according to user-defined criteria. This would allow for an important variability in the level of specificity: it could be used to group instruments according to a morphological criterion (such as the presence, on the instrument, of a representation of legendary beings, figure 2), to constitute a temporary corpus of very specific instruments based on sound characteristics (for example, instruments equipped with devices contributing to provide buzzing sounds, figure 3), or, on the contrary, to constitute a group of similar instruments made/played by a specific group of people, in specific places, at a specific period of time – if needed.

It would also allow us to integrate sounds, images, films, body movement information, and so on. And these elements would not *in fine* be mere illustrations, but real data, open to investigation, interpretation and extensive exploitation. Such an environment would of course require the processing of an important amount of heterogeneous data. The practical issues raised by this requirement can be considered one of the main reasons for keeping the system as it is. Nevertheless, within the context of the development of knowledge societies, the managing of large quantities of information has become not only possible, but familiar – since we use such environments every day. This familiarity would allow us to avoid the reasons for failure met by previous attempts. In my opinion, the lack of success of multidimensional classifications operated so far can be due, at least partially, to the technical difficulties that

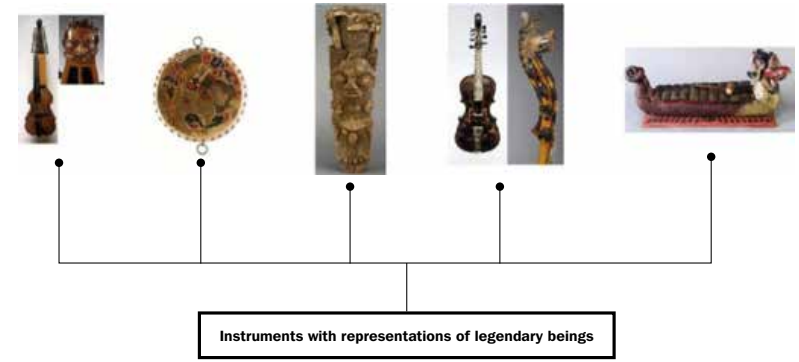

Figure 2.
Representation of a partial potential result for a query based on the criterion 'representation of legendary beings'. From left to right:
eighteenth century European Baryton, inv. 0231;
Chinese drum from Java Kao Kao, inv. 0829; Drum from Cameroon, inv. 4468;
Norwegian hardingfele, inv. 1329; Indonesian gender, inv. 0804
(PHOTOS: COURTESY OF MUSICAL INSTRUMENTS MUSEUM, BRUSSELS, BELGIUM)

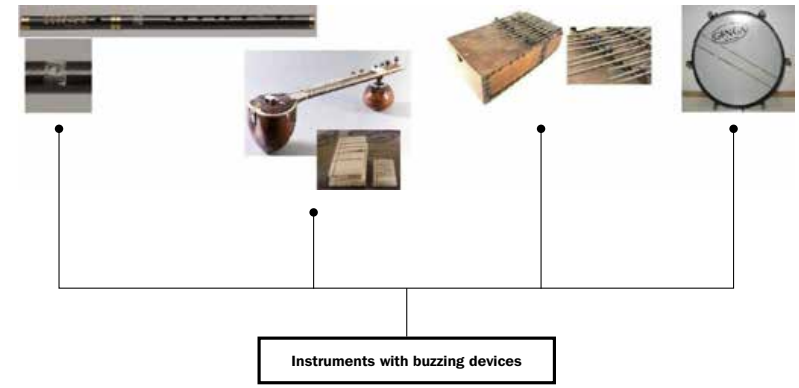

Figure 3.
Representation of a partial potential result for a query based on the criterion 'instruments with buzzing devices'. From left to right:
Chinese membrane flute *dizi*, inv. 1991.072; North-Indian *sitar*, inv. 2007.001;
Congolese *likembe*, inv. 1767; Brazilian *caixa*, Pedagogical Department
(PHOTOS 1-3: COURTESY MUSICAL INSTRUMENTS MUSEUM, BRUSSELS, BELGIUM; PHOTO 4 BY STÉPHANIE WEISSER)

rose from the treatment of the data. With the generalization of computers and network-based systems, these difficulties can now be overcome.
Rhizome-like systems used for musical instrument organization could still include taxonomies (namely, in micro-levels), but it would not be limited to this type of organization, especially at a macro-level. Therefore, it would not mean the demise of the Hornbostel-Sachs system (nor typologies), but rather their integration in a wider conceptual framework for organizing the objects under scrutiny. In order to maintain its scientific nature, such an environment would require collaborative work, consensus, constant re-evaluation of the processes at work, and frequent updates to include newly discovered elements – as any classification would. As put by Geneviève Dournon [2007, 844], «a classification can only be a work in progress» (my translation). Such a system would be much less secure and univocal than a 'key', defined by Jeremy Montagu and John Burton [1971, 51], as «a series of questions by the means of which an instrument can be identified». Indeed, it would require us to 'let go' of the fallacious impression of safety and simplicity the Mahillon/Hornbostel-Sachs system provides, as no instrument would continue to have a fixed place in a univocal system. In our society, still impregnated with Aristotelian concepts, this would not be an easy conceptual change to carry out. However, replacing the term «this instrument 'has' traits in common with this one with regards to this criterion» with «this instrument 'has' traits in common with this one with regards to this; and it has other traits in common with this other one with regards to that other criterion». Such an approach would allow for new connections, new groupings and new leads for research to emerge. It would maybe even be a way to reconcile classificatory and analytical approaches to organology, as they would not be mutually exclusive anymore. It would also require intensive collaborative work, between organologists, but also with researchers from many other disciplines, such as information science, computer science, signal processing, acoustics, anthropology, philosophy, mathematics, etc. In my opinion, this is the road to take to maintain the spirit of Mahillon's, Hornbostel's and Sachs's original project (for instruments of all nations and all times) by including a much needed third 'all': in all their dimensions. We are now technically and conceptually ready. If not now, when?

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Cristina Ghirardini

How to create Hornbostel-Sachs codes for polyorganic instruments and other marginal subdivisions

Throughout my academic training, especially, I worked with musical instruments held in public museums or in private collections, being involved in projects that dealt with cataloguing. Particularly important were the experiences in three collections: Museo Guatelli in Ozzano Taro (Parma), 1999-2002 [Ghirardini 2006]; Civico museo del paesaggio sonoro in Riva presso Chieri (Torino) 2006-2012 [Ghirardini, Raschieri *et al.* 2016], and the recently founded mechanical instruments museum of the Italian association of mechanical music in Villa Silvia near Cesena [Ghirardini 2015], where I have been working since 2002. Using Febo Guizzi's list of entries as a scheme for cataloguing, as all his students do, the Hornbostel-Sachs classification was one of the first problems to be dealt with. Normally, my aim is to find, or to construct, proper Hornbostel-Sachs numbers for challenging instruments, trying to use all the means suggested in the authors' introduction to the classification properly, including the suffixes, the brackets and the special punctuation for polyorganic instruments, which, as far as I know, are not particularly popular. I have often discussed the most difficult specimens with Febo Guizzi and Nico Staiti, and that is why some of the instruments that I have taken into consideration have been included in Febo Guizzi's Italian translation and revision of the Hornbostel-Sachs system – originally published in Guizzi [2002, 409-482]; its new version, revised and integrated, which Febo Guizzi had shared with the participants in the 2015 Venice meeting, has been translated into English and published in these proceedings.

I have worked mainly on collections of Italian folk music instruments that were extremely diverse, and, therefore, suggested different approaches to the Hornbostel-Sachs system. In some cases the problems were caused by the characteristics of the polyorganic instruments; in other cases I had the chance to work on instruments that had apparently not been taken into account by Hornbostel and Sachs. Understandably, I have often encountered the same difficulties that everybody cataloguing musical instruments has, finding my own personal solutions for them at times. I came to the conclusion that the Hornbostel-Sachs classification should not be considered as a set of ready-to-use labels, but as a flexible tool that can be adapted to the needs of a specific

collection, essay or catalogue. This was, in fact, the spirit in which Hornbostel and Sachs proposed their attempt of classification, as many passages in their introduction suggest.
The adoption of the Dewey decimal system, according to Hornbostel and Sachs, was meant to facilitate the creation of new subdivisions, and to immediately underline their hierarchical status.
The second edition of the Dewey Decimal Classification was published in 1885. It is an expanded and improved version, and it contains major changes with regards to the first. Its structure is the same as that found in current editions [Comaromi 1976, 154-155; 1983, 144-147]. Among the many changes, some may have been particularly inspiring for the Hornbostel-Sachs system:

> in the second edition of DDC, standard subdivisions reached their fixed form;
>
> the decimal point was added after the third digit;
>
> the Alphabetical Index was expanded. It is an alphabetical list of subjects that are scattered throughout different classes: as stated in the first edition (1876) the index «gives the number of the class to which it is assigned after each subject» [Comaromi 1983, 142].

The DDC is subdivided into disciplines, and one of the problems of the system was to properly classify subjects that could be studied under different disciplines. Hornbostel and Sachs had a similar problem, which is to say the need to «bring closer together groups which are separated in the system» [Hornbostel and Sachs 1961, 11], however, being it impossible to create an index, they devised a system based on the suffixes, square brackets and punctuation. There are many passages from the introduction to the Hornbostel-Sachs classification that demonstrate the fact that the two authors deliberately gave a flexible nature to their system. Quoting from Baines and Wachsmann's English translation [*ibidem*, 10]:

> The ingenuity of Dewey's idea lies in the exclusive use of figures, replacing the more usual conglomeration of numbers, letters and double letters by decimal fractions. These are so used that every further subdivision is indicated by adding a new figure to the right-hand end of the row; the zero before the decimal point being always omitted. Thus it becomes possible not only to pursue specification to whatever limits one desires and with never any trouble in the manipulation of the numbers, but also directly to recognize from the position of its last figure the ranking of a given term within the system.

The suffixes and the special use of the + sign, as well as the colon and square brackets, have the same purpose, which is to adapt the system to particular cases, for instance, as mentioned before, «in order to bring closer together groups which are separated in the system» [*ibidem*, 11]. Without the use of

these devices, instruments like organs, bagpipes, and many other polyorganic instruments cannot be properly defined within the Hornbostel-Sachs system. In my cataloguing experience, I have tried to use them consistently with the authors' instructions, and I have usually reached satisfactory results. As I will try to demonstrate, it is important to distinguish when polyorganic instruments are properly defined by a composite number that makes use of +, brackets and punctuation, or when it is preferable to improve the subdivision, or to add suffixes. In general, I think that the presence of timbre modifiers, like sympathetic strings, the vibrating bridge or the snare in snare drums, should be better defined by improving the subdivision or by adding a suffix, leaving composite numbers for polyorganic instruments made of sound devices belonging to different classes or to instruments that can be classed only through the use of them, like bagpipes and organs. An immediate example can be seen in the hurdy-gurdies found in the Museo Guatelli in Ozzano Taro (Parma). Ettore Guatelli has collected what are believed to be three Italian hurdy-gurdies employed by itinerant musicians from the Val Taro and the Val Ceno, and one French hurdy-gurdy.
The Italian instruments (figure 1) are generally viol-shaped and have four strings: one melody string and three drones. One of the drones includes a vibrating bridge. The French hurdy-gurdy (figure 2) preserved in the Museo Guatelli (by Gilbert Nigout, 1837-1921) is lute-shaped, it has two melody strings, four drones (one of them with a vibrating bridge) and a set of sympathetic strings.

Figure 1.
Italian hurdy-gurdy, probably from Val Taro (Parma)

Figure 2.
French hurdy-gurdy, Gilbert Nigout, Jenzat

Museo Ettore Guatelli, Ozzano Taro (Parma)
AUTHOR PHOTO

Since the vibrating bridge is a structural element which can also be found in other chordophones, in my opinion, it may be defined by a suffix, -3. Moreover, a hurdy-gurdy needs two more suffixes:
-72 bowed by a wheel, -8 with keyboard. The keyboard in chordophones could be subdivided into:

-8	with keyboard
-81	the keyboard is connected to a set of tangents
-82	the keyboard is connected to a set of plectra
-83	the keyboard is connected to a set of hammers

Therefore:

321.321-3-72-81	Lute shaped hurdy-gurdies, with vibrating bridge, bowed by a wheel, with a tangent keyboard
321.321.1	with only one melody string and drones
321.321.11	without sympathetic strings
321.321.12	with sympathetic strings
321.321.2	with two melody strings and drones

Viol-shaped hurdy-gurdies, with vibrating bridge, bowed by a wheel, with a tangent keyboard

321.322-3-72-81	
321.322.1	with only one melody string and drones
321.322.11	without sympathetic strings
321.322.12	with sympathetic strings
321.322.2	with two melody strings and drones

Therefore, the Nigout hurdy-gurdy would have the following HSN:

321.321.22-3-72-81

While for the Italian hurdy-gurdies:

321.322.11-3-72-81

The suffixes
Since Hornbostel and Sachs realized their system as an improvement on Mahillon's, suffixes, the + sign, square brackets and punctuation were adopted in order to go beyond the limits of the Mahillon classification. Suffixes are used by Hornbostel and Sachs as special codes to be applied to musical instruments from the same class or from different classes, independently from their position in the hierarchical system. The suffixes employed in the class of the chordophones

allow the playing action to be recovered, which Mahillon used as a more relevant criterion for the subdivision of idiophones, membranophones and chordophones. Hornbostel and Sachs considered the subdivision of chordophones according to the playing action «a dubious procedure»: «a violin remains a violin whether one bows it with a bow, plays it *pizzicato* with his fingers, or strikes it *col legno*» [*ibidem*, 7-8]. The playing action, however – found in the suffixes –, is what in the Hornbostel-Sachs system distinguishes a lute from a hurdy-gurdy, the piano from the harpsichord and the psaltery.
As Febo Guizzi has argued, Hornbostel and Sachs probably employed the same decimal system used in the classification, but they started from 9 and went in diminishing order; -9 and -8, corresponding respectively to «with mechanical drive» and «with keyboard», are shared by three classes: idiophones, chordophones and aerophones, while the suffixes in the membranophones only refer to the way in which the membrane is fixed to the resonator. The presence of a keyboard and a mechanical drive is relevant only in European instruments; they are not relevant in the greater part of musical instruments found in museums in the colonial era, which preserve instruments from outside Europe, and that is why Hornbostel and Sachs refused to use them as subdivision criteria and attributed them with a special code to be applied independently from the hierarchical order.
The suffix for mechanical drive might be further developed according to the device used to play the musical programme, for instance:

-9	mechanical drive
-91	with cylinder mechanism (*musical boxes with metal comb*, *barrel piano*, *barrel organ*, figure 3, p. 200)
-92	activated by a perforated card or disc (Giovanni Racca's *piano melodico*, *organs and free reed instruments*, figure 4, p. 200)
-93	pneumatically operated mechanism (autopiano, reproducing piano, piano-orchestrions, etc., figure 5, p. 200)

Like Mahillon, Hornbostel and Sachs did not provide the class of the membranophones with the suffixes for keyboards and mechanical drive, even if they are not theoretically implausible. A double-skin cylindrical drum with mechanical drive, called *tamburo di Leonardo*, can now be found in the mechanical instruments collection in Villa Silvia in Lizzano, near Cesena (figure 6, p. 200).
Leonardo's drum was built by the Italian Association of Mechanical Music (AMMI) using Leonardo's drawings in 2009. According to the AMMI, it was ideally meant to act in the place of soldiers (for safety reasons) in ancient armies.

3.

4.

5.

6.

Figure 3.
The cylinder of a barrel organ
by Bartolomeo Quaglia

Figure 4.
Piano melodico by Giovanni Racca

Figure 5.
Vorsetzer, The Aeolian Company

Figure 6.
Tamburo di Leonardo

Figure 7.
Barrel organ by Bartolomeo Quaglia, Cuneo
Museo di Musica Meccanica, Villa Silvia, Cesena

PHOTOS 3-7 COURTESY MUSEO DI MUSICA MECCANICA

7.

If we take the mechanical drive of this instrument into consideration, another suffix can be added to the class of the membranophones, -5 if we respect the actual list of suffixes. It is interesting to observe that the drum designed by Leonardo has two sets of beaters; each of them is moved by a cylinder, so the suffix -5 may be further developed in this way:

-5	mechanical drive
-51	with cylinder mechanism
-511	one cylinder
-512	two cylinders

Leonardo's drum, preserved in Villa Silvia, could possibly have this Hornbostel-Sachs number:

211.212.1-512 Individual double skin cylindrical drum, activated by two cylinders

or, according to Montagu's [2009] and MIMO's [2011] revisions, which distinguish the double skin cylindrical drums with only one skin for playing from those where both heads are played:

211.212.12-512 Individual double-skin cylindrical drum, both heads played, activated by two cylinders.

As you can see from the picture, in this case the snare membrane is played, while normally, in European snare drums, it is not. The snare drums often pose organological questions: should snare drums be considered polyorganic instruments? In my opinion, it is important to keep another passage from the Hornbostel and Sachs introduction in mind [*ibidem*, 9]:

> Other obstacles in the path of the classifier are instruments showing adulterations between types [Kontaminationen]. The fact of adulteration should be accounted for by placing such instruments in two (or more) groups. In museums and catalogues these cases will be arranged according to the dominant characteristic, but cross-references to other characteristics should not be omitted. Thus, among instruments of every class one may find rattling devices which belong to the inventory of idiophones – a feature which cannot be taken into account when placing the instrument in the classification. But where the adulteration has led to an enduring morphological entity – as when kettle-drum and musical bow combine in a spike lute – it must have a place of its own within the system.

Hornbostel and Sachs suggest we arrange instruments according to their dominant characteristic, which is why I would not consider the snare drum a polyorganic instrument, despite the fact that Jeremy Montagu and Stéphanie Weisser [Weisser and Quanten 2011, 129] have considered the strings of the snare drums independent sound producers. Instead of adding another sound

device, I would improve the subdivision of cylindrical drums, taking into consideration the presence or absence of the snare.

211.212.11	Individual double-skin cylindrical drum, one head played
211.212.111	without snare
211.212.112	with snare
211.212.12	Individual double-skin cylindrical drum, both heads played
211.212.121	without snare
211.212.122	with snare

Therefore, the *tamburo di Leonardo* would be:

211.212.122-512

Another solution would be the inclusion of the snare among the suffixes, since it can be found in different types of membranophones. In this case, suffix -4 would be fine for the snare, so Leonardo's drum would have this Hornbostel-Sachs number:

211.212.12-4-512

About + sign, brackets and special punctuation

In the Hornbostel-Sachs classification, the easiest case in which to create the number for polyorganic instruments is when two sound devices pertaining to different classes are combined in one instrument and a + sign is required. This is the case of the frame drum with rattling discs, of xylophones with mirliton, or of Eastern flutes with mirliton, ex:

211.311 + 112.112	single-skin frame drum + stick rattles
111.212 + 242	set of percussion sticks + tube or vessel kazoo
421.121.12 + 242	single side-blown flute with fingerholes + tube or vessel kazoo

In the first case, I have considered the small discs inserted in the frame of a drum as rattles, because the player cannot control each individual stroke. The case of a frame drum with castanets or bells inside the frame is quite different, in my opinion, because normally the player, by striking the membrane, is also applying individual strokes to the castanets and bells inside. That is why they still remain directly struck idiophones, that is:

211.311 + 111.141	(frame drum with castanets)
211.311 + 111.242.122	(frame drum with bells)

When two idiophonic devices are included in a frame drum, it is possible to make use of the system of abbreviation suggested by Hornbostel and Sachs [1961, 11].

> In order to bring closer together groups which are separated in the system, it is possible to turn a main criterion of division into a subordinate one without destroying the system: one simply replaces the first relevant figure by a point (.) and then adds it after a square bracket] at the end of the number.

Therefore, in a frame drum with both rattling discs and vessel rattles, we can isolate the common features of the idiophonic part, that is to say the fact that they are shaken idiophones or rattles 112.1 and put a square bracket before the specification regarding the fact that they are being strung on a bar or enclosed in a vessel. That is, a frame drum with both rattling discs and vessel rattles would have this HSN:

211.311+112.1.]12+3 (it means 211.311 + 112.112 + 112.13)

If the idiophonic component is made of directly struck and indirectly struck idiophones, the common part is only 11. Therefore, a frame drum with both rattling discs and castanets:

211.311+11.]2112+1141 (that is 211.311+112.112+111.141)

Other examples from the world of mechanical instruments allow us to understand how only the use of suffixes and special punctuation allows the definition of instruments that had a more privileged position in Mahillon's subdivision. This is the case with the organs and bagpipes listed by Mahillon in the *branche C*, dedicated to *Instruments polyphones a réservoir d'air*. Like the playing action of chordophones, keyboards and the mechanical drive of idiophones, chordophones and aerophones, the fact that they are polyphonic instruments and that they present an air reservoir were not relevant features for Hornbostel and Sachs: many free aerophones and wind instruments proper, in their opinion, could exist in sets and include an air reservoir. This is why they can be better defined by a suffix. The first example is a portable barrel organ made by Bartolomeo Quaglia in Cuneo (figure 7, p. 200), preserved in Villa Silvia in Lizzano (Cesena). It is composed of a set of flute pipes, both open and closed, and by a set of reed pipes.

That is:

421.222.11 set of open flutes with internal duct without fingerholes
+
421.222.31 set of stopped flutes with internal duct without fingerholes
+
412.122 set of percussion reeds

-61-91 with rigid air reservoir, with cylinder mechanism

It is possible to isolate the common part of the instrument, that is to say the duct flutes without fingerholes. This case is a little more difficult than the case of the idiophonic part of the frame drum, because it is necessary to put two digits that are internal to the numbers, that is to say 1 and 3, which qualify an open or a closed flute, after the square bracket. If we maintain the normal point after the three digits, a set of duct flutes without fingerholes, composed of open and closed pipes would be:

421.222..1]3+1

Therefore, the complete instrument, with reed pipes added, would be:

412.122 + 421.222..1]3+1-61-91

Finally, the bagpipes preserved in the Museo Guatelli allow an insight into how to create the Hornbostel-Sachs number for bagpipes. Three kinds of bagpipes are preserved there: the so called *piva emiliana*, which is a bagpipe with a chanter and two separate drones, which was once played in Emilia-Romagna (figure 8, p. 207); the so-called *müsa*, a bagpipe with one chanter and one tunable drone, played together with a shawm called *piffero* in Emilia-Romagna, Lombardy, Piedmont and Liguria (figure 9, p. 207); and some *zampogne a chiave*, from the area across Campania, Calabria and Basilicata (figure 10, p. 207). The two Northern bagpipes have a double reed chanter and single reed drones, while the southern bagpipes have two chanters and drones with double reeds.

When explaining how to form the Hornbostel-Sachs number for polyorganic instruments, the authors of the classification give the example of bagpipes. Bagpipes have in common the first part of the number and the suffix indicating that they are reed instruments with a flexible air reservoir, that is:

422-62:.2]

where

422	reedpipes
-62:	flexible air reservoir (the colon means that the number continues after the suffix; the full-stop replaces the number corresponding to the typology of the pipes' reeds, which will be written after the square bracket)
2	the instrument is made of a set of pipes
]	the bracket closes the common part of the number and means that other digits follow

After the square bracket we must specify the characteristics of the pipes.
Piva emiliana: composed of one conical chanter with a double reed and two cylindrical drones with single reeds, therefore:

422.112.2	single oboe with conical bore, with fingerholes
+	
422.211.1	single clarinet with cylindrical bore without fingerholes
+	
422.211.1	single clarinet with cylindrical bore without fingerholes

The common part of the bagpipe number 422-62:.2] already specifies that the instrument is made of a set of pipes, so we do not have to include again the digit corresponding to a single or a set of pipes. In order to show the quantity of chanters and drones, I would repeat the groups of digits corresponding to the typology, shape and presence or absence of fingerholes for all the pipes of the instrument.
Therefore, the *piva emiliana* is:

422-62:.2]122+211+211

The *müsa* has a tunable drone, so it is useful to improve the subdivision of single clarinets with cylindrical bore, adding the option 'with tuning holes'. The drone of the *müsa* must be tuned before it is played, closing the holes with wax or opening them.

422.211.3 single clarinet with cylindrical bore with tuning holes

Therefore, the *müsa* has this HSN:

422-62:.2]122+213

The *zampogna a chiave* is made of oboes: it has two conical chanters, one of which has a key, and two semi-conical drones. The semi-conical bore is not contemplated in the Hornbostel-Sachs classification, so we should improve it:

8.

9.

Figure 8.
Piva emiliana

Figure 9.
Müsa

Figure 10.
Zampogna a chiave

Museo Ettore Guatelli,
Ozzano Taro (Parma)
AUTHOR PHOTO

10.

422.112.1 single oboe with conical bore without fingerholes
422.112.2 single oboe with conical bore with fingerholes

422.113.1 single oboe with semi-conical bore without fingerholes

HSN for *zampogna a chiave*:

422-62:.2]122+122-71:+131+131

Piva and *müsa* have the pipes inserted in different stocks, while in the *zampogna a chiave* all the pipes are inserted in the same stock. It may be useful to improve the digits corresponding to the set of pipes in order to explain if they are all in one stock or in different stocks, if the pipes are joined in a 'yoke', or if the pipes are built in one piece of wood. For example:

422.13 set of oboes in separate stocks
422.23 set of clarinets in separate stocks

422.14 set of two oboes in one stock
422.24 set of two clarinets in one stock

422.15 set of two oboes in one stock with yoke
422.25 set of two clarinets in one stock with yoke

422.16 set of two oboes built from one piece of wood
422.26 set of two clarinets built from one piece of wood

422.17 set of more than two oboes in one stock
422.27 set of more than two clarinets in one stock

422.18 set of more than two oboes in one stock with yoke
422.28 set of more than two clarinets in one stock with yoke

Therefore, the *piva emiliana*, *müsa* and *zampogna a chiave* would be represented by these digits:

422-62:.3]122+213 *Müsa*
422-62:.3]122+211+211 *Piva*

in both cases all the pipes are inserted into separate stocks

422-62:.7]122+122-71:+131+131 *Zampogna a chiave*

all the pipes are inserted in the same stock

When the bagpipes have pipes in the same stock and others in another stock, I suggest we not add the digit corresponding to the *single / set of / in separate stocks / in one stock* etc. in the common part of the number, but that we put all the digits corresponding to the morphology of the pipes after the suffix.

Example, Uilleann bagpipe

422-62: reed pipes with flexible air reservoir

the Uilleann pipes are blown by a bellow, which can be mentioned using a suffix, -5

422-5-62:

422.112.2-71 single oboe with conical bore, with fingerholes, with keys
+
422.172.2-71 a set of oboes in one stock with cylindrical bore, with fingerholes, with keys (regulators)
+
422.271.1 a set of clarinets in one stock with cylindrical bore, without fingerholes

422-5-62:112.2-71: + 172.2-71: + 271.1

This improvement on the digits corresponding to the variables *single / set of / in separate stocks / in one stock*, *etc.* works properly if 7 means that all the pipes being qualified by that digit are in the same stock, even if they are separated by a + sign. This allows us to clearly understand that in the Uilleann pipe, as well as in the *zampogna*, all the pipes, both oboes and clarinets, are in the same stock. At the same time, 4 should be used to define instruments made of two pipes in one stock whether they are oboes and clarinets or one oboe and one clarinet (as is the case with certain bagpipes from central and northern Europe). The case studies that I have been dealing with may appear overly specific, however, they may be quite frequent in musical instruments collections. I believe that despite its apparent complexity, the Hornbostel-Sachs classification, if used as a flexible instrument, and following the instructions provided by the two authors, may well solve many questions, and is still a challenging tool that can be used to better define musical instruments during the cataloguing process.

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Maarten Quanten

Synth in a box. On the systematic classification of electric, electronic and experimental instruments using the Hornbostel and Sachs taxonomy

Introduction

'Electronic sound' has had an enormous impact on music in the last century. In future, museums of musical instruments will play an important role in the historical research on electronic instruments, by preserving, restoring, copying and researching those machines that are not in production, nor even in use, anymore. Of course, this implies a considerable investment in new types of conservation and restoration practices, in both cases the knowledge of (historic) electronic technologies should be included.

In 2010, however, a first concern of the mimo consortium was the lack of a sufficiently developed classification for this relatively recent 'species' of musical instruments. Moreover, the group of instruments had to be systematically described and classified within the formal criteria of the Hornbostel-Sachs taxonomy. This was quite a logical decision given the huge number of instruments that made up the mimo database would be interlinked, using the Hornbostel-Sachs code. I was asked to develop this fifth Hornbostel-Sachs category, containing all possible electrophones. The assignment thus implied creating objective and systematic links, relations of resemblance and difference, even of sameness between electronic sound machines within (up to a certain degree) a preformed, hierarchical taxonomy. The subsequent research project resulted in a) a new fifth category (electronic instruments, including electric instruments), b) theoretical critiques regarding the limitations of this and other attempts to classify electrophones, and c) practical solutions to some of the main problems. This text is focused on a specific problem: the fundamental incongruence between the hierarchic nature of the taxonomical system and the modular, often even hybrid constitution of the instruments, which is caused by the specificity of electric sound production.

First of all, I will discuss the first and most important criterion of subdivision, on which the Hornbostel-Sachs system is founded: the identification of the initial vibration. By doing so, I want to point out the specificity of 'electrical sound signals' and highlight how they differ from acoustic sounds and how they actually do not fit within the logic of the initial vibration, or at least thoroughly problematize it. This specificity is further developed within the scope of a

description of sound production in early electronic studios in the 1950s and the performance of live-electronic works in the 1960s and 1970s. Electric sound signals behave in a fundamentally different way, which is reflected by the modular electronic set-ups and assemblages of electronic modules to be found in standardized electronic music synthesizers as well as in unique experimental musical instrument designs and sound art works. The intrinsically modular nature of these designs does not fit into the hierarchical formal layout of the Hornbostel-Sachs system. In this context, it highlights its theoretical weaknesses from a highly practical perspective. To this aim, I will discuss some concrete examples, hypothetical cases, and existing instruments.

On the initial vibration

The initial vibration, and its location of occurrence within the instrument, was of crucial importance to Curt Sachs and Erich von Hornbostel. It was the first, most important and distinguishing of many criteria of identification, on which they based their taxonomy. They considered it to be a scientifically relevant, strongly distinguishing, neutral, universally and inter-culturally applicable quality of a musical instrument. Following the logic of Victor C. Mahillon, they identified the four traditional main categories or families of musical instruments upon this different generating quality.

In the case of electric and electronic instruments, this first step immediately seems to create a situation of non-clarity. Even though, at first sight, the solution to the question of where the initial vibration takes place, seems to be solved easily: the loudspeaker creates the air pressure wave, we call sound. It is a transducer, in which an electrical sound signal modulates the magnetic field of an electromagnet. The field fluctuates analogous to the electric current, the voltage signal, and is at the basis of the movement of the voice coil and its membrane, which, finally (or initially!) creates the air pressure wave we call sound, electric energy being converted into mechanical movement. Scholars, however, have been looking for the initial vibration within this electroacoustic system, before the conversion of the electric signal into mechanical movement, locating it, for instance, in the electronic oscillator or the tone wheel generator. The oscillator circuit is built to transform line current into specific electrical waveforms or voltage signals, patterns of alternating current that, amplified and sent to a loudspeaker, is converted to what we call an 'electronic sound', an effectively sounding sine tone, for instance. By locating the initial vibration in the oscillator, we were able to construct a high level differentiation between electrophones (instruments with oscillators) and electric instruments. This last group would, following the logic of the Hornbostel-Sachs system, be dispersed throughout the four initial groups: an electric guitar is an amplified chordophone, an electric piano is an amplified idiophone or a chordophone and

so on [Bakan *et al.*, 1990]. One can easily imagine that this approach conforms to the intuitive perception of electric instruments that closely resemble their very similar acoustic ancestors.

Still, this approach should also be questioned, not because of its 'impure' use of the Hornbostel-Sachs system, nor because it would be 'wrong' or 'illogical', but rather because this exclusive focus denies the huge impact of (many possible) other electronic modules on the vibration of the loudspeaker diaphragm. A similar critique is, indeed, applicable to acoustic instruments, yet much more obvious and, therefore, necessary in the case of electric sound signals [Weisser and Quanten 2011]. Apart from that, even if high level differentiation and big taxonomical distance between electric and electronic instruments seems very clear at first sight, it might become somewhat less clear-cut when delving into the deeper physical reality of these devices.

Electric versus electronic

A first point of discussion concerns the concept of an 'initial vibration'. We can very well follow the logic of locating it in the oscillator circuit. It provides the fundamental fluctuation of electric energy that will, later on, be 'transformed' into a vibration of air. Yet, a high level differentiation between electric and electronic instruments on these grounds 1) is based on a rather questionable interpretation of the physical grounds of the Hornbostel-Sachs system. And, even more importantly, 2) it neglects many important relations of resemblance and difference between on the one hand electric and electronic and, on the other hand, acoustic musical instruments.

The oscillator gets its 'raw, unshaped current' from mains electricity and transforms it into an electrical sound, a voltage signal characterized by a certain wave form and a frequency. The analogous mechanical vibration that sets air into motion, however, is to be located in the loudspeaker. This might very well seem like a pedantic theoretical discussion, yet if we take a closer look at some other principles of 'electric' and 'electronic' sound generation, the importance of this analysis might become clearer. Intuitively the electric guitar is formally a chordophone because it is closely related to the acoustic guitar. Without any doubt, that is true. However, from the perspective of the Hornbostel-Sachs system and more specifically, the procedure of sound generation, it is quite a different thing. In the case of an electric guitar, electricity is usually generated by the movement of a metal string in front of an electromagnetic transducer, commonly referred to as a pick-up (a process of energy conversion somewhat comparable to a bicycle dynamo). An air pressure wave (sound) is indeed created by the vibrating string, yet it can be considered a mere by-product of the 'effective' process of sound generation. It is not even analogous to the electric signal generated by the same string oscillation, as the magnetic

field of the pick-up is affected by a relatively small part of the guitar string. The resulting electrical waveform takes shape, analogous to this specific part of the oscillation. The actual 'sound of the electric guitar' is initiated by means of, again, energy conversion inside the loudspeaker, as it is the case for the full-electronic oscillator. In a way, the electric guitar might be called an in-between since it resembles acoustic instruments as well as 'fully-electronic' instruments, especially those equipped with electromechanical oscillators. This last category creates some confusion. This confusion, however, is important, because it questions differences and similarities between acoustic, electric and electronic instruments, specifically from the perspective of (electrical) sound signal generation. Therefore, it casts doubt upon the distance created between the taxonomic positions of these 'species'.

The electromechanical oscillator of a tone wheel instrument, such as the old-school Hammond organ or the Thaddeus Cahill Telharmonium, strongly resembles the string-electromagnetic transducer configuration of an electric guitar. In the case of the tone wheel generator, the magnetic field of a pick-up is modulated by the movement of a so called metal 'tone wheel'. Here, however, no vibration of a string (or other vibrating or oscillating conductor) is involved. The teeth on the wheel move in front of the pick-up, generating a signal which takes the form of the teeth on the wheel (e.g. sine wave). The process of creating a voltage signal is very similar to the one used in an electric guitar: the fluctuating distance (movement) of the conductor (string) within the magnetic field of the transducer. Tone wheel instruments would, despite the strong resemblance to a string and pick-up configuration, be classified among the electrophones (figures 1-2).

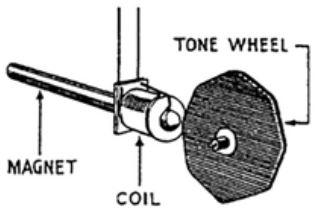

Figure 1.
Tone wheel from a Hammond Service Manual

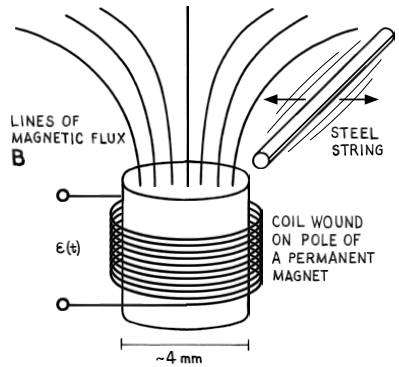

Figure 2.
Diagram of a simple pickup

And, in defiance of its name, the RCA Mark I synthesizer (1955) developed by Harry F. Olson and Herbert Belar, would – following the logic of the initial vibration – have to be assigned to the category of the idiophones. The tone generator of the instrument is made up of twelve electrically excited tuning fork oscillators connected to electronic oscillator circuitry [Olson and Belar 1955, 598]. The initial vibrations creating a sound wave (as it was the case with the electric guitar) are caused by the (electrically excited) tuning forks.

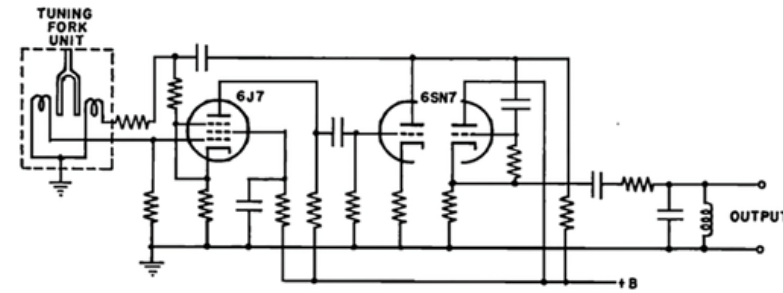

Figure 3. RCA synthesizer FROM OLSON AND BELAR [1955]

And tuning forks are, of course, idiophones according to Hornbostel and Sachs. However, not the sounds of the idiophones, but the stabile electrical sine waves generated by the movement of metal in front of pick-up transducers are relevant in this case. Figure 3 shows a tuning fork unit of the RCA Mark I, connected to the electronic oscillator circuit.

After having been generated, the electrical waves pass through many other circuits, from frequency gliders to amplifiers, filters and envelope generators (figure 4, p. 216, *ibidem*, 597). Actually, the basic sound signal could just as well have been generated by a tone wheel or a fully electronic oscillator without profoundly changing the 'processed' end result. In such a case, the specificity or individuality of the instrument is to be found in the combination of its modules (cf. infra: assemblages), putting the single focus on the generator or oscillator into perspective.

The electric guitar and the acoustic guitar have (plucked) strings in common, they are 'genealogically' and 'typologically' related. A high level differentiation seems strange. The electric guitar, the RCA Mark I and the tone wheel Hammond Organ, however, share the principle of electromagnetic induction. Their sound waves are initiated by means of electrical energy conversion inside a loudspeaker. Again, a differentiation at the highest level seems strange. A semi-acoustic guitar (classical acoustic guitar equipped with pick-up transducers)

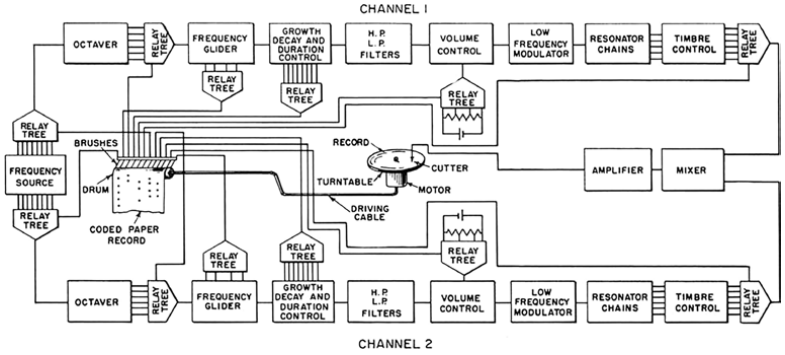

Figure 4.

is undeniably both. Sometimes it is used as an electric instrument, other times as an acoustic instrument. The tone wheel organ and the synthesizer both generate sounds without any acoustic vibration occurring before the electric sound signal is converted into an air pressure wave in the loudspeaker.

From a formal perspective, however, the Hornbostel-Sachs classification is binary ordered. An instrument cannot be both an electrophone and a chordophone, both acoustic and electric, both electric and electronic, and so on. Multiplicities or networks of similarities and differences, to be found in and between complex assemblages, are systematically excluded from the hierarchic tree system. The classifier has to make a choice, chose a category, discarding all complexity, creating superficial, yet inflexible and unchangeable links. One should, indeed, call into question the scientific meaning, usability and even validity of such a structure in a context of twenty first century organological analysis, databasing and network modelling [Weisser and Quanten 2011].

And if it does not make any sound?

Hornbostel and Sachs based their classification system on a nineteenth and early twentieth century knowledge of music and musical instruments. It might, however, have been developed differently, had they had the opportunity of analysing the modes of electronic or concrete music production used in the 1950s and 1960s by composers such as Pierre Schaeffer or Karlheinz Stockhausen. Without going into too much detail, it is easy to distinguish a completely new and strongly differing approach to sound, music and their production processes. In a 1950s studio, for instance, composers realized their compositions in stepwise procedures.

A hypothetical example might bring some clarity: a recording of a train whistle could be the raw material. This basic material can be 'filtered' (using filters) but also 'mixed' with electric sine waves and/or square waves (using a ring modulator). The result of these procedures is a sound complex on tape that, in a next production step, can be cut into pieces and glued back together in a different order (a permutation of sound elements or even granular synthesis), maybe combined with pieces taken from another sound complex in which other sound generators and modifiers were used. The end result would be a complex assemblage, again unified in what we call a sound, produced by a loudspeaker diaphragm. But what instrument produced this sound besides the transducer? The train whistle alone? Or should the ring modulator and filters also be mentioned?

Filters, as well as ring modulators are musical instruments in many ways. If, at least, we consider electrical sound signals or waveforms musical elements before they are converted into real sound, and consider the process in which they are shaped music making. Filters as well as ring modulators were popular modules in early electronic music studios but were also often used in live-electronic music performances. In pieces such as Karlheinz Stockhausen's *Mikrophonie I* (1964), *Mikrophonie II* (1965) and *Mantra* (1970) they are played by musicians in a live concert situation, as musical instruments transforming or 'sculpting' sounds, generated by other instruments or electrical signal generators. This kind of electronically modified sound, whether it originates from the output of a microphone, an electric guitar, a tone wheel organ or a fully electronic square wave oscillator, is at the core of this discussion. By its very nature, it exemplifies the fundamental difference between an air pressure wave and an electric wave. The second behaves differently: it is a voltage signal, physically fit to be infinitely transformed by all sorts of circuitry. In theory, that is. Modules such as filters and ring modulators can be interconnected in all sorts of combinations, can be operated by musicians and can fundamentally alter the sound. Except for 'making a sound', they actually behave as musical instruments. One could state that the function of a module (or electronic instrument) depends on its specific use within a certain disposition. An oscillator can be used to produce the basic sound signal, a basic frequency and spectrum that can be modified by other modules. It can, however, just as well be used to control, modify or modulate other signals. Seen from that perspective, filters and ring modulators are actually quite similar to oscillators, for those modules/circuits are not fit to produce sounds by themselves. A voltage signal, generated by a low frequency oscillator can, for instance, be used to modulate the output of a 'normal' oscillator (creating a vibrato), filter (creating sweeps) or an amplifier (creating a tremolo). These are all basic functions of analogue electronic synthesizers.

Classifying networks of modules or electronic assemblages

For the performance of the above mentioned live electronic compositions, Stockhausen assembled acoustic and electronic modules to create new, highly experimental instruments. *Mikrophonie II*, for example, is performed by a group of singers (choir) and a Hammond tone wheel organ. The audience, however, does not perceive the organ sounds nor the voices as such. What they do hear sounds like a group of electronically modified singing voices. The acoustic sounds are ring modulated with alternating current signals, generated by the Hammond tone wheel generators. In the end, human voices are still recognizable, although heavily 'infected' by the electric waveforms. The (otherwise quite characteristic) Hammond sound is no longer recognizable as such, it has blended with the voice. The sounds affect each other on a molecular level through the intermediation of ring modulators to become something entirely new. The result is one sound produced by three types of instruments: the human voice, the Hammond organ and the ring modulator.

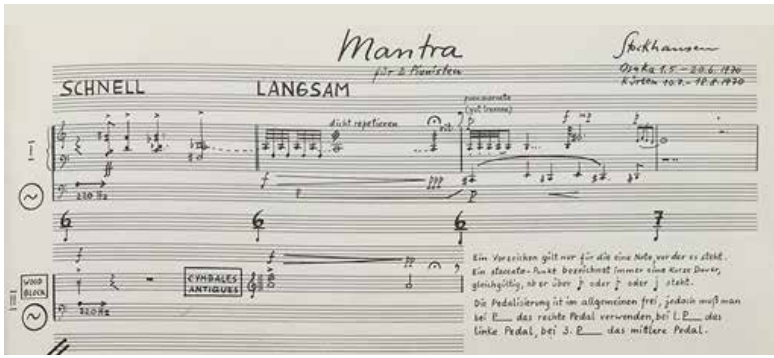

Figure 5. Karlheinz Stockhausen, *Mantra* (1975)

In the case of *Mantra*, microphones pick up the sounds of two pianos. That way the sound waves mechanically affect the diaphragm of the microphone, converting their energy pattern into analogue electrical waveforms that are to serve as input signals for two ring modulators, one for each piano. The second input signal for each modulator is delivered by sine wave oscillators. The audience hears the piano sounds, transformed or modulated by the oscillators and ring modulators.

Stockhausen, thus, built new musical instruments in order to create a new, individually composed sound universe for each of the pieces, a way of thinking

founded upon his experiences in the electronic music studio and his theories on serial music. Such temporary assemblages of acoustic, as well as electronic modules, would never have been possible without electrical sound signals and their specific physical criteria. I have only mentioned two rather uncomplicated examples of many, even of an unlimited number of possible configurations of acoustic instruments, transducers, sound signal generators and modifiers to be found in experimental instruments and sound art works. There really are too many variants for a detailed and meaningful hierarchical taxonomy. Stockhausen's live electronic set-ups can only be described and classified by taking into account their constituent parts, by describing the assemblage and going beyond arborescent schemes. For example: the *Mantra* and *Mikrophonie* instruments are similar because of the use of a ring modulator, they differ on the level of the acoustic and electrical input signals.

One can still argue that the Mantra-piano is not one existing instrument. But what if it were? What if Stockhausen had set up a production line of Mantra Pianos? Or Mikrophonie Voice Modulation Organs? Many other experimental instrument builders, as a matter of fact, did build 'permanent' instruments of this kind and even of a much more intricate nature.

Synth in a box?

An electronic synthesizer is, from this perspective, quite similar to an electronic studio or a live-electronic set-up. It is an assemblage of modules, often fixed in a box and equipped with a piano keyboard controller. These modules can be interconnected to affect, modulate and each transform the output of the other, or control their input. They can, however, without doubt be considered as one instrument, once they are assembled to generate complex sound signals, the result of a modular processing procedure: an instrument made up of instruments, of modules. The 'nature' of the electric and electronic instrument is, up to a certain extent, to be found in the modular or molecular design of the assemblages, founded upon the specific physical characteristics of electrical sound waves.

In *Rethinking Musical Instrument Classification. Towards a Modular Approach to the Hornbostel-Sachs System* [Weisser and Quanten 2011], we made a plea to 'modularize' the Hornbostel-Sachs taxonomy. The basic idea of hierarchically ordered codes could be kept, yet not without the possibility of giving several codes to one instrument. In the case of electric and electronic instruments, a high level differentiation should be made between 'modules' and 'configurations' or 'assemblages' of modules. A simple example: both the small Moog Mini and the room-filling EMS Synthi 100 are synthesizers. Although every observer would immediately and intuitively notice they are quite different. However, both musical instruments are equipped with fully electronic oscillators to generate the basic

electrical sound signals, both contain circuitry such as filters and amplifiers, both are played using keyboard controllers. Yet, apart from the similarities, there are many, crucial differences: the Moog synth only contains one oscillator, the EMS on the other hand has twelve; the EMS is equipped with a sequencer (which can, by the way, be a configuration of modules on its own!), the Moog is not; the sound signals generated by the EMS can be modulated using a build-in ring modulator, in case of the Moog an external device (instrument) has to be used, …
And what if (in a highly hypothetical case) the oscillator circuit of the Moog were replaced by a set of tuning fork-oscillators? Many of the modules and functions of the synthesizer would remain the same but it would be possible to create a link between the 'hacked' commercial design and the one RCA Mark I. For a more detailed discussion on modularization in the Hornbostel-Sachs system, the classification of experimental and ambiguous designs and its application within a database and network context, the aforementioned article can be consulted.

Conclusion

A scientific classification or taxonomy aims to order and interlink a well-defined group of objects logically. It is developed to be a systematic approach to what seems to be a chaotic reality, and it is expected to provide knowledge about the world, shed light on the order of things. Musical instruments, for instance, are not ordered according to their colour, not even according to their emerging culture, the social class of their players or the context in which they are played. Hornbostel and Sachs attempted to rely solely on 'neutral' formal criteria, by trying to grasp the formal 'nature' of the instruments. Persian, African and Native American flutes may be labelled with the same Hornbostel-Sachs code. They are all flutes, no matter where they come from, what they are called and how or where they are used. Musical instruments are built to produce sounds, and this is their most defining characteristic, and what differentiates them from other objects such as tractors or churches. Musical instruments produce sounds in different ways, moreover the procedure of sound production is a way to differentiate them within this well-defined group. Without doubt that was and is a systematic and interesting idea; without doubt it can just as well be criticised from many other points of view. The same goes for the very idea of hierarchic classification, of taxonomies, tracings denying complex relationships of similarity and difference. Especially in a twenty-first century context of computer technology and digitally interlinked databases, the further development of a hierarchical taxonomy becomes highly questionable. It seems to be a relic of the nineteenth century library, not a modern classification tool. At the core of this specific discussion, however, is the specificity of electrical sound signals within the given structure of the Hornbostel-Sachs classification.

In this text, I have tried to show the incongruence between the hierarchical structure of the classification system and some important physical characteristics of electrical sound signals that differ a great deal from acoustic sounds. Not only the first and most important subdivisional criterion causes a substantial lack of clarity, but most of all, it is the modular nature of the instruments, a consequence of the physical singularity of voltage signals, which speaks against the use of a hierarchical classification system.

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Erich M. von Hornbostel - Curt Sachs

Classification of Musical Instruments

translated from the original German by Anthony Baines and Klaus Wachmann, with additions and revisions by Febo Guizzi[1]

1. Treatises on systems of classification are by and large of uncertain value. The material to be classified, whatever it may be, came into existence without any such system, and grows and changes without reference to any conceptual scheme. The objects to be classified are alive and dynamic, indifferent to sharp demarcation and set form, while systems are static and depend upon sharply-drawn demarcations and categories.

2. These considerations bring special difficulties to the classifier, though also an attractive challenge: his aim must be to develop and refine his concepts so that they better and better fit the reality of his material, sharpen his perception, and enable him to place a specific case in the scheme quickly and securely.

3. A systematic arrangement for musical instruments concerns first of all musicologists, ethnologists, and curators of ethnological collections and those of cultural history. Systematic arrangement and terminology are urgently needed, however, not only for collections of material, but also for their study and in its interpretation. He who refers to a musical instrument by any name or description he pleases, being unaware of the points which matter, will cause more confusion than if he had left it altogether unnoticed. In common speech technical terms are greatly muddled, as when the same instrument may be indiscriminately called a lute, guitar, mandoline, or banjo. Nicknames and popular etymology also mislead the uninitiated: the German *Maultrommel* is not a drum, nor the English *Jew's* (properly *Jaw's) harp* a harp, nor the Swedish *mungiga* a *Geige* [fiddle], nor the Flemish *tromp* a trumpet; only the Russians are correct when they call this same instrument, a plucked lamella, by the uncommitted term *vargan* (from Greek ὀργανον, 'instrument'). Homonyms

1. The translation into English of Febo Guizzi's additions and revisions are by Cristina Ghirardini, a revision of the English language was carried out by Matilda Colarossi. In this version of the Hornbostel-Sachs classification, the 1961 translation by Baines and Wachsmann has been maintained for the introduction and the *taxa* that do not change in Guizzi's version of the Hornbostel-Sachs classification. Guizzi's additions and remarks are in blue. The footnotes and comments dealing with the choices about the terminology to be used in the Italian translation have not been translated into English. Guizzi's original Italian text was distributed to the participants in the international meeting on *Reflecting on Hornbostel-Sachs's Versuch a century later*, organised by the Fondazione Levi, Venezia, 3-4 July 2015.

are no less dangerous than synonyms: the word *marimba,* for instance, denotes in the Congo the set of lamellae usually called *sansa,* but elsewhere it denotes a xylophone. Ethnological literature teams with ambiguous or misleading terms for instruments, and in museums, where the field-collector's report has the last say, the most senseless terms may be perpetuated on the labels. Correct description and nomenclature depend upon knowledge of the most essential criteria for the various types, – a condition which, as a visit to a museum will show, is hardly ever met. One will find, for instance, that oboes, even when still in the possession of the double reed which unmistakably proclaims them for what they are, are noted as flutes, or at best as clarinets; and should the oboe have a brass bell one may be certain of the label 'trumpet'.

4. A system of classification has theoretical advantages as well as practical uses. Objects which otherwise appear to be quite unrelated to each other may now become associated, revealing new genetic and cultural links. Herein will always be found the leading test of the validity of the criteria upon which the system is based.

5. The difficulties which an acceptable system of classification must surmount are very great, since that which suits one era or nation may be unsuitable as a foundation for the instrumental armoury of all nations and all times. Thus the Ancient Chinese based their classification on material, distinguishing between instruments made of stone, metal, wood, gourd, bamboo, hide and silk; consequently, to them, trumpets and gongs, stone harmonicas and marble flutes, shawms and clappers, each belonged together.

6. Our own present-day practice does not amount to much more. Sound-instruments are divided into three major categories: stringed instruments, wind instruments, and percussion instruments. This cannot be defended even on the grounds that it satisfies day-to-day requirements. A large number of instruments cannot be fitted into any of the three groups without placing them in an unnatural position, like the celesta, which, as a percussion instrument, is brought into close proximity to drums and so on. As a remedy one introduces a fourth group under the disconcerting heading 'miscellaneous' – in any systematic grouping an admission of defeat. Moreover, the current classification is not only inadequate, but also illogical. The first requirement of a classificatory system is surely that the principle of demarcation remains the same throughout for the main categories. Our customary divisions, however, follow two different principles, stringed instruments being distinguished by the nature of the vibrating substance but wind and percussion by the mode of sound-excitation ignoring the fact that there are stringed instruments which are blown, like the

Aeolian harp, or struck, like the pianoforte. The customary subdivisions are no better. Wind instruments are divided into woodwind and brass, thus giving a subordinate criterion of differentiation, namely, material, an unjustifiable predominance and flagrantly disregarding the fact that many 'brass' instruments are or were once made of wood, like cornetts, serpents and bass horns, and that in any case many 'woodwind instruments' are optionally or invariably made of metal, as flutes, clarinets, saxophones, sarrusophones, tritonicons, etc.

7. The objections which can be raised against the crudity of the customary divisions are now familiar to organology [*Instrumentenkunde*], and in recent decades scholars have made more than one attempt to attain something more satisfactory. Leaving aside classifications which have owed their structure to the peculiarities of this or that collection, catalogues have latterly in general adopted a system which Victor Mahillon has used since 1888 for his comprehensive catalogue of the Museum of the Brussels Conservatoire.

8. Mahillon takes the nature of the vibrating body as his first principle of division, and thus distinguishes between instruments 1) whose material is sufficiently rigid and at the same time sufficiently elastic to undergo periodic vibration, and named by him 'self-sounding instruments' [*instruments autophones*[2]]; 2) in which sound-waves are excited through the agency of tightly-stretched membranes; 3) in which strings vibrate; and lastly 4) in which a column of air vibrates. Thus he distinguishes four categories: self-sounders, membrane instruments, stringed, and wind instruments. Besides the uniformity of its principle of division, the system has the great advantage in that it is capable of absorbing almost the whole range of ancient and modem, European and extra-European instruments.

9. Mahillon's system of four classes deserves the highest praise; not only does it meet the demands of logic, but also it provides those who use it with a tool which is simple and proof against subjective preferences. Moreover, it is not so far removed from previously-used divisions as to offend well-established custom.

10. It has seemed to us, however, that the four-class system stands in pressing need of development in fresh directions. Mahillon started on the basis of the instruments of the modem orchestra, with which, as an instrument manufacturer and musician, he was in closest contact, and it was these which gave him the initial challenge to work out his system. Then, as the collections

2. For reasons which Sachs has explained in his *Reallexikon der Musikinstrumente* [1913, 195a], we prefer the term *idiophones.*

of the Brussels museum grew under his direction, he explored over years of relentless effort the limitless field of European and exotic organology. Inevitably a newly-acquired specimen would now and then fail to fit into the system, while certain subdivisions which figure importantly among European instruments – e.g. those of keyboard and mechanical instruments – assumed an unwarrantably prominent place. Mahillon had indeed been led for the sake of the European instruments, to juxtapose categories which did not logically build a uniform concept. Thus he divided the wind instruments into four branches, 1) reed instruments [*instruments à anche*], 2) mouth-hole [*instruments à bouche*], 3) polyphone instruments with air reservoir, and 4) cup-mouthpiece instruments [*instruments à embouchure*]. Consider too the drums, which he grouped as frame drums, vessel drums, and double-skin drums; he consequently divided the skin drums corresponding to our side- and kettle drums – and likewise the autophones – into instruments of untuned pitch [*instruments bruyants*] and those of tuned pitch [*à intonation déterminée*]. This is an awkward distinction, since a wide range of transitional sounds occurs between pure noises and noise-free tones; indeed, save for a few laboratory instruments, there are no sound-producers that can truly be said to yield either pure noise or pure tones, the sounds of all the usual musical instruments being more or less wrapped in noise. Mahillon later seems to have sensed this when he contrasted noise-instruments with those *à intonation nettement* or *intentionellement déterminée;* but the criterion is subjective and as a rule incapable of proof.

11. In general, Mahillon was right to subdivide the four main classes into 'branches' differentiated by playing action. Yet for stringed instruments it was a dubious procedure; a violin remains a violin whether one bows it with a bow, plays it pizzicato with the fingers, or strikes it *col legno.* Perhaps this seems a lopsided argument, since the violin is, after all, designed to be bowed. But there are other instances. One could cite instruments whose playing action has changed in the course of time but whose form has remained unaltered. This was the case, for example, with the ancient Celtic crowd, which can be proved to have been plucked in the earliest times, but which came to be bowed in the High Middle-Ages: should the history of instruments therefore deal with it half in a chapter on plucked stringed instruments and half in one on bowed, although the instrument itself remains just the same? Then there is the psaltery, which is turned into a dulcimer [*Hackbrett*] when the player uses beaters; should one, in a collection, separate the psalteries, otherwise indistinguishable from each other, into two groups on the ground that in one country of origin it was customary to pluck it but in another to beat it? Should I place the clavichord and the pianoforte side by side but house the harpsichord with the guitars because its strings are plucked?

12. All these considerations have persuaded us to undertake afresh the attempt to classify musical instruments. We were fortunate in having at our disposal as a ready-made base the large and extensively described collections of the Brussels museum out of which Mahillon's system had grown. At the same time we are aware that with increasing knowledge, especially of extra-European forms, new difficulties in the way of a consistent classification will constantly arise. It would thus seem impossible to plan a system today which would not require future development and amendment.

13. Like Mahillon, we accept the physical characteristics of sound-production as the most important principle of division; but even at this point considerable difficulties are met since acoustic physics has so far covered but the smallest fraction of the preliminary investigations. Thus inadequate research has yet been undertaken on the sound-production of the bull-roarer, the vibratory manner in north-west American 'ribbon-reeds', the vibration events in bells, gongs, kettledrums, plucked drums, and wind instruments with free reeds and fingerholes. To such difficulties must be added others arising from the morphology of instruments. The problem of defining the term 'frame drum' (*tamburin*) for example, is scarcely capable of satisfactory solution; undoubtedly the typical frame drum represents a concise concept not to be disregarded in any classificatory system, but the transition between this and the pronouncedly tubular drum occurs without a break, often making it impossible to decide on the basis of shape whether a specimen belongs to the one kind or to the other.

14. Other obstacles in the path of the classifier are instruments showing adulterations between types [*Kontaminationen*]. The fact of adulteration should be accounted for by placing such instruments in two (or more) groups. In museums and catalogues these cases will be arranged according to the dominant characteristic, but cross-references to other characteristics should not be omitted. Thus, among instruments of every class one may find rattling devices which belong to the inventory of idiophones – a feature which cannot be taken into account when placing the instrument in the classification. But where the adulteration has led to an enduring morphological entity – as when kettledrum and musical bow combine in a spike lute – it must have a place of its own within the system.

15. We must refrain from arguing our subdivisions in detail. Whosoever will check these critically, or test them in practice, will doubtless repeat the lines of thought which are not set out here, with minor variations of his own.

16. In classifications it is often customary to indicate the ranking·of divisions

within the system by means of specific headings, as especially in zoology and botany with expressions like class, order, family, genus, species, variant. In the study of instruments, Mahillon himself felt this need and met it by introducing the terms *classe, branche, section, sous-section;* on Gevaert's advice he refrained from using the term 'family' on account of its widely-known use for instruments of like design but of different sizes and pitches.

17. We consider it inadvisable to maintain consistent headings throughout all rubrics for the following reasons. The number of subdivisions is too big to manage without bringing in a petty superfluity of headings. Moreover, in any system one must leave room for further division to meet special cases, with the result that the number of subdivisions could for ever increase. We have purposely not divided the different main groups according to one uniform principle, but have let the principle of division be dictated by the nature of the group concerned, so that ranks of a given position within a group may not always correspond between one group and another. Thus terms like 'species' may refer in one case to a very general concept but in another to a highly specialized one. We therefore propose that the general typological headings be restricted to the topmost main groups, though one could, like Mahillon, speak of the four main groups as classes, of the next divisions (with a two-unit symbol [*zweiziffrig*]*)* as sub-classes, the next (three-unit) as orders, and the next (four-unit) as sub-orders.[3]

18. We have refrained from providing a subdivision containing no known existing representative, save in cases where a composite type may be assumed to have had a precursor in a simpler type now extinct. Thus it can be assumed from analogy with numerous types that Man rubbed a solid, smooth block of wood with the moist hand before he ever carved a series of differently-pitched tongues by cutting notches into the block, as in the friction block of New Ireland. Again, where the wealth of forms is exceptionally vast, as with rattles, only the more general aspects of their classification can be outlined in the scheme, and these will certainly require further elaboration.

19. In general we have tried to base our subdivisions only on those features which can be identified from the visible form of the instrument, avoiding subjective preferences and leaving the instrument itself unmeddled with. Here one has had to consider the needs not only of museum curators but also of field workers and ethnologists. We have carried the subdivisions as far as seemed important

3. Translators' [Baines and Wachsmann] note: It is not clear whether the authors here refer to Mahillon's letter-symbols or to their own numerical coding described further on.

for the observation of cultural history and detail, though the plan of the whole classification makes possible its application to the material either summarily or in great detail as desired; general treatises and smaller collections may not require to follow our classification to its last terms, while specialist monographs and catalogues of large museums may well wish to extend it in further detail.

20. The application of our findings in describing and cataloguing is substantially facilitated by use of the Dewey numerical system.[4] If those in charge of large collections who issue catalogues in the future decide to accept our numerical arrangement, it will become possible to find out at first glance whether a given type of instrument is represented in the collection.

21. The ingenuity of Dewey's idea lies in the exclusive use of figures, replacing the more usual conglomeration of numbers, letters and double letters by decimal fractions. These are so used that every further subdivision is indicated by adding a new figure to the right-hand end of the row; the zero before the decimal point being always omitted. Thus it becomes possible not only to pursue specification to whatever limits one desires and with never any trouble in the manipulation of the numbers, but also directly to recognize from the position of its last figure the ranking of a given term with the system. It is also feasible in a row of numbers to divide off any set of figures by points. Say, for example, that it is a bell chime [*Glockenspiel*] which is to be coded and placed in the system. In the context of the system we are dealing with an idiophone, the class to which the initial code-figure 1 is allotted. Since the instrument is struck it belongs to the first sub-class, and so another 1 is added (struck idiophones = 11). Further addition of relevant code-figures produces the ranking 111 since it is struck directly; and then, as a struck-upon [percussion] idiophone, it earns a fourth figure, in this case 2 (1112 = percussion idiophones). Further specification leads to 11124 (percussion vessels), 111242 (bells), 1112422 (sets of bells), 11124222 (sets of hanging bells), and 111242222 (ditto with internal strikers) – obviously, everyone must decide for himself how far to go in a given case. Instead of the unmanageable number now arrived at, we write 111.242.222. The first cluster shows that we are dealing with an idiophone that is struck directly, while the second and third together imply that we are dealing with bells.

22. Common considerations among all instruments of a class – e.g. with membranophones the method of fixing the skin, and with chordophones the playing method – may be noted with the aid of figures appended to the essential

4. Since the numerical arrangement for the Bibliographie internationale of musical instruments applies only to European instruments, and is anyhow as inadequate as can be, we have planned our own numerical order independently.

code-number by a hyphen: the pianoforte would be entered as 314.122-4-8 and the harpsichord 314.122-6-8, because 8 represents the keyboard, 4 the hammer playing-action, and 6 the plectrum playing-action, both instruments having the same main number indicating board zithers with resonator box.

23. Any of the subordinate criteria of division may, if desired, easily be elevated and treated as a higher rank in the classification, by switching the positions of figures. Thus, for a bagpipe in which chanter and drone are both of the clarinet type, the code-number would read 422.22-62,[5] i.e. a set of clarinets with flexible air reservoir. But if, for instance in a monograph on bagpipes, one wished to especially distinguish these [chanter and drone] features, one could write 422-62:22, i.e. reed instrument with flexible air reservoir whose pipes are exclusively clarinets.

24. Conversely, in order to bring closer together groups which are separated in the system, it is possible to tum a main criterion of division into a subordinate one without destroying the system: one simply replaces the first relevant figure by a point (.) and then adds it after a square bracket] at the end of the number. Thus in the example of bagpipes, it might be important to specify these instruments as always polyorganic[6] but with components which are sometimes clarinets and sometimes oboes; instead of 422-62 : 22 = reed instrument [*Schalmeien-Instrument*], with flexible air reservoir, polyorganic, composed of clarinets, it might be preferable to write 422-62 : . 2 = set of reedpipes [*Schalmeienspiel*] with flexible air reservoir = bagpipe, and then to differentiate further by writing 422-62 : .2]1 = bagpipe of oboes, or 422-62 : . 2]2 = bagpipe of clarinets.[7]

25. Other specifications applying to a subordinate group are suffixed to the code-figures of the latter, e.g. 422-62 : . 2]212 = a bagpipe of clarinets with cylindrical bore and fingerholes.

26. These innumerable cases in which an instrument is composed of parts which in themselves belong to different groups of the system could be indicated by linking appropriate figures by a plus sign. One then avoids repetition of a number common to both such parts, writing this number once and following

5. In Febo Guizzi's revised text, clarinets do not correspond to *taxon* 422.2, they are classed as 422.3.

6. Polyorganic means composed of several single instrumental units.

7. This use of the symbols - : and] is slightly different from that of the Classification bibliographique Décimale, but is nevertheless within its spirit. The rules are: the hyphen is employed only in connection with the appended figures listed in the tables [at the end of each of the four main sections]; subdivisions beyond these are preceded by a colon (thus 422-62 = reed instrument with flexible air reservoir, but 422-6 : 2 = 422.2-6 = clarinet with air reservoir); subdivision answering to the omission of a figure is preceded by a square bracket.

it with a point: a modem trombone with slide and valve would then appear not as 423.22+423.23, but as 4232.2+3, and similarly bagpipes composed partly of clarinets and partly of oboes as cited above, would become 422-62 : . 2]1+2.

27. In certain circumstances it may be necessary not only to re-arrange the rankings of the concepts and create new subdivisions, but also to incorporate into the higher ranks of the classification some criterion which has purposely not so far been used. There is nothing to prevent this being done, and we should like to illustrate it by a final example, at the same time showing how we envisage the development of our system for special purposes. Let us imagine the case of a monograph on the xylophone. The system divides struck idiophones (111.2) by the shape of the struck bodies, thus: struck sticks (111.21), struck plaques (111.22), struck tubes (111.23), and struck vessels (111.24). Xylophones could fall into any of the first three, but the shape of the sounding bodies is here of little relevance – the transition from sticks to plaques being quite fluid – and so the fifth figure may be removed, and, if desired, added as]2 at the end. For the sixth figure we insert 2, if the description is to concern only multi-tone instruments, giving 1112. .2 = sets of struck idiophones [*Aufschlagspiele*]. We must, however, exclude sounding bodies of metal, stone, glass, etc., and must therefore create a subdivision according to material which the system does not already provide, thus:

1112. .21	= xylophone	sounding bodies of wood
1112. .22	= metallophone	sounding bodies of metal
1112. .23	= lithophone	sounding bodies of stone
1112. .24	= crystallophone	sounding bodies of glass

28. Further stages in this classification of the xylophone would make use of morphological criteria significant from an ethnological point of view:

Classification

1112. .21.1	**Bedded xylophone**	The sounding bodies rest on an elastic foundation
1112. .21.11	**Log xylophone**	The foundation consists of separate logs. N.B. There is generally a shallow pit in the ground beneath the sounding bodies *Oceania, Indonesia, East and West Africa*
1112. .21.12	**Frame xylophone**	The bearers are joined by cross rods or bars

1112. .21.121[8]	**Rail xylophone**	The frame hangs from the player's neck on a sling and is kept clear of his body by a curved rail *South East, East and West Africa*
1112. .21.122[9]	**Table xylophone**	The frame is borne on a trestle *Senegambia*
1112. .21.13	**Sledge xylophone**	The sounding bodies lie across the edges of two boards *Central Africa*
1112. .21.14	**(Bedded) trough xylophone**	The sounding bodies lie across the edges of a trough- or box-shaped vessel *Japan*
1112. .21.2	**Suspension xylophone**	The sounding bodies lie on two cords without any other foundation *Cochin China*
1112. .21.21	**(Free) suspension xylophone**	Without case *Cochin China*
1112. .21.22	**(Suspension) trough xylophone**	With trough-shaped box *Burma, Java*

29. The systematic survey of musical instruments which now follows in tabular form is meant equally to serve the purposes of identification. Hence the descriptions of characteristics are here and there expanded to include warnings against likely misunderstandings and confusion.
Explanations and examples are kept to a minimum; the former are not intended as descriptions, nor the latter as notes on the history of cultures. Also, visual study of specimens far outvalues pages of written description. The expert will know what we are driving at, while the layman will be able to find his bearings with the aid of a visit to a museum.

8. To be further subdivided thus:
1 Without resonators
2 With resonators
21 With resonators suspended singly
22 With resonators stuck into a common platform
N.B. The resonators, in most cases gourds, often have holes sealed by a membrane, showing adulteration with 242 (vessel kazoos). Possibly the method of mounting the membranes (directly, or over a cone-shaped frame) will demand another subdivision. One can, however, dispense with adding another number since frame xylophones without resonators are unknown.

9. See note 7.

Classification	Characteristics	Examples
1 Idiophones	The substance of the instrument itself, owing to its solidity and elasticity, yields the sounds, without requiring stretched membranes or strings	
11 Struck idiophones	The instrument is made to vibrate by being struck upon	
111 Idiophones struck directly	The player himself executes the movement of striking; whether by mechanical intermediate devices, beaters, keyboards, or by pulling ropes, etc., is immaterial; it is definitive that the player can apply clearly defined individual strokes and that the instrument itself is equipped for this kind of percussion	
111.1 *Concussion idiophones or clapper*[10]	Two or more complementary sonorous parts are struck against each other	
111.11 Concussion sticks[11] or stick clappers		*Annam, India,*[12] *Marshall Islands*
111.12 Concussion plaques or plaque clappers		*China, India*
111.13 Concussion troughs or trough clappers		*Burma*
111.14 Concussion vessels or vessel clappers	Even a slight hollow in the surface of a board counts as a vessel	
111.141 Castanets	Vessel clappers, either natural, or artificially hollowed out	

10. Hornbostel and Sachs use the specific term *Klappern* to condense the general definition «concussion idiophones». The term exists in English as well (*clappers*), and it is supposed to be onomatopoeic in origin, since the verb 'to clap' means 'to applaud' (i.e. hit your hands – which are pre-eminently symmetrical – against each other). The Italian language does not have a similar onomatopoetic, universally widespread term. However, in Italian the signifier historically used to mean this type of concussion in cultivated language is *crotalo*, a word of Latin origin, which in turn comes from the Greek. It is as univocal as its English and German linguistic equivalents, even if it is limited to literary usage [Battaglia 1964].

11. In Italian *bacchetta* or *barra* (as in 111.21): it may have a cylindrical or polygonal (with edges) section; it may be solid or hollow (tubular); it may have a linear shape or a ring shape (the latter is a significant morphological variant, which may be located slightly under the distinctive level corresponding to 'sticks / plaques / troughs / vessels'). It is important to notice that while later the *taxon* referring to «percussion tubes» (111.23) is provided, the tubes are not autonomously considered among the clappers. However, it is easy to add the systematics with the *taxon* 111.15 Concussion tubes or tubular clappers.

12. In German *Vorderindien*, a geo-political denomination, which in 1914 identified the Western part of India belonging to the British Empire; it includes the actual Pakistan, Kashmir and the Western territories of continental and peninsular India. It is opposed to *Hinterindien*, which is the Eastern part that reaches to modern-day Myanmar.

111.142 Cymbals	Vessel clappers with everted rim	
111.15 Concussion tubes or tubular clappers	Hollow stick	
111.2 *Percussion idiophones*	The instrument is struck either with a non-sonorous object (hand, stick, striker) or against a non-sonorous object (human body, the ground)	
111.21 Percussion sticks		
111.211 (Individual) percussion sticks		*Japan, Annam, Balkans; also the triangle*
111.212 Sets of percussion sticks	Several percussion sticks of different pitch are combined to form a single instrument	*All xylophones, as long as their sounding components are not in two different planes [nicht biplan]*[15]
111.22 Percussion plaques		
111.221 (Individual) percussion plaques		*In the oriental Christian Church*
111.222 Sets of percussion plaques		*Lithophone (China), and most metallophones*
111.23 Percussion tubes		
111.231 (Individual) percussion tubes[14]		*Slit drum, tubular bell*

13. Initially, this problematic – in its conciseness – expression lead me to think that the bi-dimensionality had to be intended in a virtual sense, that is as a geometric shape in which length and width largely prevail over height (or thickness): which is directly pointing to the specific case of the plaques that is given immediately after [i.e. the sticks], according to the idea that the sounding parts of a xylophone not corresponding to that shape should be included in *taxon* 111.222 «Sets of percussion plaques». In any case, the distinction regards the different morphologies of sticks, on the one hand, and of plaques, on the other hand, which is accomplished by the provided autonomous morphologies of sets of percussion tubes (111.232) and sets of percussion vessels (111.241.2 gongs or 111.242.2 bells). The original German term is *biplan*, in Italian *biplanare*, an adjective having a Latin root and scarcely used in German. The necessity to give a literal translation may appear obvious, however, this option leads to something hardly explainable: one cannot understand what a xylophone with its sounding parts 'resting in two different planes' means, moreover one cannot understand why such xylophones cannot be referred to with the *taxon* of sets of percussion sticks. This, however, is the option chosen by Baines and Wachsmann in their English translation: «as long as their sounding components are not in two different planes». The fact that even the two renowned English organologists were not fully convinced is evident from the fact that this translation is cautiously followed by the original German expression in square brackets [*nicht biplan*]. Carlos Vega [1946], on the other hand, keeps the original term without any elaborations or interpretations («si sus componentes sonoros no son biplanos»). It is important to underline that Vega was a pupil of Curt Sachs and that, what matters most, he submitted his translation to Sachs who personally verified it. All things considered, the point is the arrangement of the sounding elements (referring to all the given options): a xylophone is characterised by the fact that it has a plurality of percussion elements which are aligned, which is to say 'on the same plane'. This justification should not be strictly intended in the sense of planarity, since in many xylophones (in Africa as well as South-East Asia) the series of sounding elements is suspended in order to obtain a curve with its ends up and its centre down. An arrangement on two planes involves the hypothesis that various sounding elements of different sizes are arranged both on a horizontal plane and on a vertical plane or on intermediate planes between them.

14. Here the concept of tube includes the elongated bodies, cylindrical and polyhedral, naturally or artificially hollowed, with the internal part longitudinally communicating with the exterior or not: this justifies the coexistence [in this *taxon*] of both tubular bells and slit drums. Moreover, the latter might be easily confused with vessels; on a morphological and functional ground, the distinction is very difficult, especially in the case of wooden bells with a

111.232 Sets of percussion tubes		*Tubaphon, tubular xylophone*
111.24 Percussion vessels		
111.241 Gongs		
111.241.1 (Individual) gongs		*South and East Asia; including the so-called metal drums, or rather kettle-gongs*
111.242.2 Sets of gongs [*gong chimes*]		*South and East Asia*
111.242 Bells	The vibration is weakest near the vertex	
111.242.1 (Individual) bells		
111.242.11 Resting bells	The cup is placed on the palm of the hand or on a cushion; its mouth faces upwards	*China, Indo-China, Japan*
111.242.12 Suspended bells	The bell is suspended from the apex[15]	
111.242.121 Suspended bells struck from the outside	No striker is attached inside the bell, there being a separate beater[16]	
111.242.122 Clapper bells	A striker (clapper) is attached inside the bell	
111.242.2 Sets of bells [*chimes*] (subdivided as 111.242.1)		
112 Indirectly struck idiophones	The player himself does not go through the movement of striking; percussion results indirectly through some other movement by the player. The intention of the instrument is to yield clusters of sounds or noises, and not to let individual strokes be perceived	

separate clapper («suspended bells struck from the outside»), which are not rarely hollowed in a polygonal shape, and very similar to many wooden slit drums: to solve the problem one needs to consider the context of use and the different destination.

15. It is important to specify that among the bells «suspended from the apex» one must include the 'handbells', which is to say the bells that are provided with a handle. The taxonomic principle groups together in one field all the bells whose working depends on the existence of a central pivot, which may also be a handle.

16. The external percussive devices are normally separate from the bell, not only as far as the structural aspect of the mechanical connexion is concerned, but also from a functional one: the separate beater is normally struck against the stationary bell, while the attached clapper, which is normally internal, moves as a consequence of (even if not only) the oscillation of the bell. However, there are also suspended bells with separate hammers, which are external but joined to the same device which supports the bell and which strikes the bell as a consequence of its movement. This is the case with Indo-Chinese bells for animals, made of wood or bamboo, or even of metal, having a double external beater. Some misunderstandings may arouse among non-experts, who tend to classify bells, as well as rattles used as noise makers during the holy week, as indirectly struck idiophones, among shaken idiophones. Actually, the possibility to obtain clearly defined individual strokes, which the structure of these instruments offers the player, excludes any misinterpretations.

112.1 *Shaken idiophones or rattles*	The player executes a shaking motion	
112.11 Suspension rattles	Perforated idiophones are mounted together, and shaken to strike against each other	
112.111 Strung rattles	Rattling objects are strung in rows on a cord	*Necklaces with rows of shells*
112.112 Stick rattles	Rattling objects are strung on a bar (or ring)[17]	*Sistrum with rings*
112.12 Frame rattles	Rattling objects are attached to a carrier against which they strike	
112.121 Pendant rattles	Rattling objects are hung from a frame	*Dancing shield with rattling rings*
112.122 Sliding rattles	Non-sonorous objects slide to and fro in the slots of the sonorous object so that the latter is made to vibrate; or sonorous objects slide to and fro in the slots of a non-sonorous object, to be set in vibration by the impacts	*Anklung (recent), sistrum with rods*
112.13 Vessel rattles	Rattling objects enclosed in a vessel strike against each other or against the walls of the vessel, or usually against both. N.B. The Benue gourd rattles with handle, in which the rattling objects, instead of being enclosed, are knotted into a net slipped over the outer surface, count as a variety of vessel rattle	*Fruit shells with seeds, 'pellet bells' enclosing loose percussion pellets*
112.2 *Scraped idiophones*	The player causes a scraping movement directly or indirectly: a non-sonorous object moves along the notched surface of a sonorous object, to be alternately lifted off the teeth and flicked against them; or an elastic sonorous object moves along the surface of a notched non-sonorous object to cause a series of impacts . This group must not be confused with that of friction idiophones	

17. If the main feature is the relative freedom to run along a linear or ring-shaped piece, it is not easy to distinguish stick rattles from sliding rattles. The difference lies in the the fact that the former are pierced and crossed by the stick, the latter are made of mobile elements inserted in the provided slots. Therefore the *sistro apulo* (made of sliding tubes on a stick) belongs to the first, while the sistrum of ancient Egypt (with sliding sticks inside the slots in the carrier) belongs to the second.

112.21 Scraped sticks	A notched stick is scraped with a little stick	
112.211 Scraped sticks without resonator		*South America, India (notched musical bow), Congo*
112.212 Scraped sticks with resonator		*Usumbara,*[18] *East Asia (tiger)*
112.22 Scraped tubes		*South India*
112.23 Scraped vessels	The corrugated surface of a vessel is scraped	*South America, Congo region*
112.24 Scraped wheels or cog rattles[19]	A cog wheel, whose axle serves as the handle, and a tongue fixed in a frame which is free to tum on the handle; when whirled, the tongue strikes the teeth of the wheel one after another	*Europe, India*
112.3 *Split idiophones*	Instruments in the shape of two springy arms connected at one end and touching at the other: the arms are forced apart by a little stick, to jingle or vibrate on recoil	*China (huan t'u), Malacca, Persia (qāsik), Balkans, Calabria (Italy)* [La Vena 1996, 89-90]
12 Idiophones elastically dislocated[20]	Thin elastic elements, normally metallic plaques, small or big, wide or linear, fixed at one end and free at the other, are displaced from their position of rest, where they return with an oscillatory or sussultatory movement	
121 Directly dislocated or plucked	Lamellae, i.e. small elastic plaques fixed at one end, are flexed and then released to return to their position of rest, thanks to their elasticity	
121.1 *In the form of a frame*	The lamella vibrates within a frame or hoop	

18. Mountains in the actual Tanzania, ex Tanganyika.

19. In analogy with what is later provided for friction drums with cord (232), which are subdivided into stationary (232.1) and with whirling stick (232.2), it is advisable to provide this *taxon* with the further subdivision in stationary cog rattles (112.241) and rotating cog rattles (112.242). The former are cog rattles whose wheel is moved by a handle, while the frame, generally of medium or large size, remains still; the latter are cog rattles that fit the Hornbostel and Sachs description more precisely, and are made of a frame (incorporating the flexible tongue) which is caused to rotate, thanks to the centrifugal force, around the wheel, which remains still, joined with the handle kept by the player.

20. The existence of shaken metallic plaques, which produce sound by virtue of the dislocation that their elastic structure allows as an effect of the action of shaking, leads to propose an emendation of the taxonomy of idiophones concerning the actual *taxon* 12 «Plucked idiophones», according to the sequence inserted in the table, which is composed of new entries as well as existing ones that have been located differently.

121.11 Clack idiophones (cricri)	The lamella is carved in the surface of a fruit shell, which serves as resonator	*Melanesia*
121.12 Guimbardes (Jew's harps)	The lamella is mounted in a rod- or plaque-shaped frame and depends on the player's mouth cavity for resonance	
121.121 Idioglot guimbardes	The lamella is carved in the frame itself, its base remaining joined to the frame	*India, Indonesia, Melanesia*
121.122 Heteroglot guimbardes	A lamella is attached to a frame	
121.122.1 (Single) heteroglot guimbardes		*Europe, India, China*
121.122.2 Sets of heteroglot guimbardes	Several heteroglot guimbardes of different pitches are combined to form a single instrument	*Aura*
121.2 *In board- or comb-form*	The lamellae are tied to a board or cut out from a board like the teeth of a comb	
121.21 With laced-on lamellae		
121.211 Without resonator		*All sansas on a plain board*
121.212 With resonator		*All sansas with a box or bowl below the board*
121.22 With cut-out lamellae (musical boxes)	Pins on a cylinder pluck the lamellae	*Europe*
122 Indirectly dislocated or shaken	Wide elastic plaques, fixed at one end, are shaken in order to produce one or more displacements, even contemporary and distributed all along the whole surface, which, thanks to the elasticity of the plaque itself, cause an indefinite series of oscillatory or sussultatory movements. The player executes a dislocatory action only indirectly, it is a consequence of other movements, normally the act of shaking. By definition, the instrument allows us to hear only complex sounds or noises, not single controlled impulses	
122.1 *Pivoted*	The plaque, normally large, is pivoted on a vertical support, which leaves the opposite end free, where the player acts	*The thunder sheet in symphonic orchestra*

122.2 *Freely held*	The plaque, normally of small-medium size, is held by the player's hands. The plaque is made to oscillate by shaking it, normally by carrying out a horizontal movement	*The plaque used to call the swarms of bees or the one used in Calabria (Italy) as a noise maker during the Holy Week*
13 Friction idiophones	The instrument is made to vibrate by friction	
131 Friction sticks	The rubbed element is a stick	
131.1 *(Individual) friction sticks*	A single stick is rubbed	
131.11 With direct friction	The stick is rubbed by means of a rigid device	*The call for larks made of a small wooden cylinder which is internally rubbed by a lead rotating device*
131.12 With indirect friction	The stick is joined to other devices, which are rubbed. The devices convey the vibration to the stick	
131.2 *Sets of friction sticks*		
131.21 With direct friction	The sticks themselves are rubbed	*Nail fiddle, nail piano, Stockspiele*
131.22 With indirect friction	The sticks are connected with others which are rubbed and, by transmitting their longitudinal vibration, stimulate transverse vibration in the former	*Chladni's euphon*
132 Friction plaques		
132.1 *(Individual) friction plaques*[21]	A metallic plaque is rubbed	

21. Among the friction plaques, Hornbostel and Sachs have considered only those in sets, exemplified by the *livika* or *lunet*, employed in the *malagan* funeral ceremonies of New Ireland. The authors also underlined this in the introduction, where this rank was taken as an example of an exception, because despite the fact that they had «refrained from providing a subdivision containing no known existing representatives», this case was one «where a composite type may be assumed to have had a precursor in a simpler type now extinct». Therefore, the *taxon* 'individual friction plaques' exists but the corresponding instrument resulted unknown. However, they failed to notice that there exists an instrument made of a single plaque which is rubbed by a violin bow: it is the so-called 'harmonic saw', that is, the long carpenter's saw (actually it is constructed for musical purposes with high quality steel) which is rubbed by a bow and bent to various degrees to obtain different pitches. However, it may create another problem about the classification of this instrument: its shape results more properly considered among the lamellae, that is, as Hornbostel and Sachs wrote about plucked idiophones (*taxon* 12) «small elastic plaques fixed at one end», which are bent and then released, making good use of their elasticity. Even if lamellae are a kind of plaque, rather than leaving things as they are, including the harmonic saw as a generic example of a single friction plaque, one can not only stress the peculiarity of lamellae in themselves, but also oppose them to the rigid plaques, of which at least Chladni's laboratory device, invented for his experiments, is a non-negligible example. It is advisable to remember that the sets of friction plaques of the instrument of New Ireland are made of a series of flat and sharpened surfaces, differently tuned, obtained by engraving a massive block of wood, solid and polished, therefore, the two instruments are morphologically very distant. Another hypothesis may suggest to add another rank for friction lamellae, with *taxon* 134. However, I prefer the first solution, since the morphological differences should not prevail over the common criteria of the basic functioning.

132.11 Single rigid friction plaques or rubbed plaques proper	The plaque is rigid	*The quadrangular Chladni's plaque, which is rubbed by a bow in order to visualise, through the movement of iron filings, the pattern of the vibratory waves*
132.12 Single flexible plaques or ramellae	The plaque is flexible	*Harmonic saw*
132.2 *Sets of friction plaques [livika]*	Two or more plaques, which are separate or obtained from a single frame, are rubbed	*New Meklenburg (New Ireland)*
133 Friction vessels[22]		
133.1 *(Individual) friction vessels*		
133.11 Directly rubbed vessels (hand friction vessels)	The friction is carried out directly by the player's hand on the body of the instrument	*Brazil (tortoise shell), single crystal glass*
133.12 Indirectly rubbed vessels	The player executes a different movement than that of direct friction, or s/he rubs something different than the body of the instrument, from which the transmission of the impulse determined by that friction to the body of the instrument results	
133.121 Stationary	The body of the instrument is still	

22. The existence of some interesting toy instruments in various Italian traditions (they can exist also elsewhere, even if not yet identified) suggests the integration of the systematics with some non-secondary specifications: within the friction idiophones in fact, there exist some vessels (which may be considered similar to gongs as far as the shape and probably the acoustic behaviour is concerned) which are rubbed not by hands (this is the case of the Brazilian tortoise shell and of the *glass harmonica*) but through some systems comparable to those described in the class of membranophones, in *taxa* 232.1 «Stationary friction drum with cord» and 232.2 «Friction drum with whirling stick». In Calabria, Vincenzo La Vena [1996, 51-52] has documented the usages of friction 'drums' with whirling stick (even if they are used also as stationary friction drums) whose box and 'membrane' are obtained from a recycled tin box. Another instrument related to this one is the *mitraglia* of the Parmesan Apennines –preserved in the Museo Ettore Guatelli in Ozzano Taro [Ghirardini 2006, 275-276] – made of a big tin box, which is held still while the cord is rubbed through a stick that rotates in the noose of the cord. I now believe that both cases may be considered vessel idiophones, even if the contiguity between plaques and membranes is very close, and virtually uninterrupted. Laurence Picken [1975, 160-161] introduces the *taxon* 232.3 «Single-skin stationary drums with friction cord and rotated stick or cylinder», therefore he distinguishes the rotating friction drums from those which are kept still, and whose stick rotates in a loop of the cord. Picken chose to insert among the membranophones the toy 'telephones' built in Turkey using small cardboard boxes for matches: his opinion was based on the already explained idea of contiguity between idiophones, in the case of plaques, and membranophones. His argument also established a border between the two sound sources, which was placed in the point where membranes stop to be elastomers. This border has resulted of such relevance that one cannot authorise the inclusion of rigid plaques, which cannot be stretched, among membranes, that are made of elastomers, and not only can they be stretched, but, to work as sonorous identified, they must be stretched. Even if the acoustic behaviour may be similar in circular plaques that are extremely thin, and in true membranes, I believe that it is not easy to demonstrate that the secondary modes of vibration coincide, as well as the consequently generated series of harmonic or non-harmonic partials. However, the solely acoustic arguments, even if very relevant, are not enough to elude the general criteria of systematic arrangement elaborated by Hornbostel and Sachs, where the morphological and functional characters often determine the distinctions of the main classes. Therefore, I propose the integration to the systematics in the following table.

133.121.1 Friction vessels with stick	A rotating stick rubs the body of the instrument	*Giranoci (Italy)* [Guizzi 2002, 351]
133.121.2 With cord	A cord is rubbed	
133.121.21 With cord rubbed by the hand	The player's hand rubs the cord which is fixed to the body of the instrument, creating an impulse	*Calabria (Italy): rùocciola played by rubbing the cord directly* [La Vena 1996, 49-52]
133.121.22 With cord rubbed by the stick	The impulse is determined by rubbing the cord fixed to the body of the instrument through a stick	*Mitraglia (Italy: Emilia)*
133.122 Rotating	The body of the instrument is rotated, allowing the cord to rub the groove in the stick, which constitutes the handle	*Calabria (Italy): rùocciola played by allowing the cord to rotate around the stick* [La Vena 1996, 49-52]
133.2 *Sets of friction vessels*		
133.21 Directly rubbed sets of vessels (hand friction vessels)		
133.121 Stationary		*Glass harmonica with fixed glasses*
133.122 Rotating		*Glass harmonica with a pedal movement*
133.22 Indirectly rubbed sets of vessels		
133.221 Stationary		*Unknown*
133.222 Rotating	A whirling stick rubs a vessel, which in turn is rubbed by one or two similar sounding vessels, which are reciprocally involved in the friction	*The giranoci (Italy) made of more than one vessel rubbed by the stick* [Guizzi 2002, 351]
14 Blown idiophones	The instrument is made to vibrate by being blown upon	
141 Blown sticks		
141.1 *(Individual) blown sticks*		*Unknown*
141.2 *Sets of blown sticks*		*Aeolsklavier*
142 Blown plaques		
142.1 *(Individual) blown plaques*		*Unknown*
142.2 *Sets of blown plaques*		*Piano chanteur*
15 Singing idiophones (idiophonic mirlitons): idiophones solicited by the pressure of sounding waves.[23]	The instrument is made to vibrate by speaking or singing into the hollowed space between two symmetrical valves put one above the other. The vibration of the valves does not yield a note of its own but merely disguises the voice	*Ravi (Monferrato, Piedmont), cusa (Riva presso Chieri and area of Asti, Piedmont), sücchetta (Ponente ligure)*

23. This subclass is absent in the original German, since, at the time it was written (and also later for a long time), examples of voice disguisers that did not make use of membranes were unknown, and their existence had

Suffixes for use with any division of this class (idiophones)[24]
-5 struck by hands
-6 struck by hammers or beaters
-7 sounding by friction
-8 with keyboard
-9 mechanically driven

not been potentially speculated. It was the study of the *ravi* in Monferrato and of the *sücchette* in Liguria which led to the discovery of this further subdivision in the field of idiophones. Many other discoveries have been made since 1914 in the field of instrumental music, however it is not always possible to integrate the text by Hornbostel and Sachs, especially if one considers that many instruments may be taken into account in the existing *taxa*, eventually integrating the subdivisions to fulfil the need for more careful distinctive layers. I believe it is necessary to make an exception when, like in this case, the discovery affects a high level of the taxonomic hierarchy. See Guizzi [1985].

24. It is important to note that the common suffixes for idiophones are very few, which may cause surprise if one considers that this is the most numerous class. However, the very nature of this further specifications gives the reason for this only apparent strangeness: the suffixes are intended as further identifiers, which are independent from the basic distinctive criterion of each class or subclass of the taxonomy. Therefore, they do not refer to optional or secondary specifications, and they would not make sense if they were intended as sources of alternative criteria to those already codified, or as tautological repetitions of what the systematics has already chosen as the skeleton of its arrangement. Since the idiophones are primarily subdivided according to the way in which the sound is produced, and therefore, according to basic human actions, the only common suffixes taken into account are those integrating human action with the impressive mediation of the usage of a keyboard, or those separating the time of the human action from performance, deferring it to previously programmed mechanical movements, human action being spent in the action of programming, which is necessary for performance. In the text, inside the column of characteristics, we find, regarding the primary distinction between direct and indirect percussion, that «the player himself executes the movement of striking; whether by mechanical intermediate devices, beaters, keyboards, or by pulling ropes, etc., is immaterial» (also, as an implicit consequence, the absence of intermediate devices, that is the bare hand percussion, is immaterial). This explains why Hornbostel and Sachs did not take into account, among the common suffixes, the variegated field of ways to activate the sound, which are either taken into consideration [in the taxonomy] or considered irrelevant. However, I believe that it is not wrong to underline to the transversal nature of the suffixes (which are common in the sense that they do not depend on a typological segment or on a specific hierarchical zone) by choosing a redundant integration of them, therefore, by introducing hypotheses which were originally not contemplated (also not to compromise the logic by which the authors had declared irrelevant some practical aspects of manipulation), especially in relation to the use of bare hands or of technical intermediates, which are carriers of the gestures produced by human limbs. That's why I have decided to integrate the table of common suffixes of each class with other items, starting from the class of idiophones, to which the hypothesis of percussion with bare hands or with beaters, and that of being played with a friction bow are added. On how to elaborate the classification in order to make it more suitable to study in depth some specific cases, i.e. on how to give a high general value to a suffix, in order to express typological and opposition variants, see the instructions in the introduction, where Hornbostel and Sachs explain the versatile usage of the Dewey decimal system. I think it is interesting to inquire how the numerical series of common suffixes of each class have been conceived, since the authors have not given explanations about that, and since the suffixes appear 'irrational' at first sight, apparently lacking homogeneity and coordination in the four classes. This, of course, is essentially related to the formulation of the numerical equivalents of the suffixes which, in their verbal expression, do not pose any particular interpretative questions. My hypothesis is that Hornbostel and Sachs applied the Dewey decimal system (which, as we know, is based on the decimal series from 0 to 9) starting from the highest number (9) and then applying the other ones in descending order, until the requirements of each class were fulfilled. It is clear that there is no hierarchical value if one considers equivalent layers: the function is only distinctive, therefore, the collocation is irrelevant and the descending or ascending order has no meaning. Since the series of idiophone's common suffixes is limited only to two cases, there are only suffixes -9 and -8; since the most numerous group is that of chordophones (counting only the most general items, which require only one digit), including six entries, we have suffixes from -9 to -4. The fact that in two cases the same digit corresponds to the same definition (three times over four, it is the case of -8 with keyboard and -9 mechanically driven) is a mere coincidence. In turn, the fact that the same digit corresponds to different characteristics in each class does not create confusion: the suffixes are listed at the end of the series, which are characterised by the whole of their components, and by the sense that each component expresses according to the position that it occupies in the series, which is primarily identified by the first digit that indicates its class. If one pays attentions to the hyphen explaining the nature of the digit immediately following, one is also able to identify, without misunderstandings, the content which is 'concealed' below the numerical formulation.

Classification	**Characteristics**	**Examples**
2 Membranophones	The sound is excited by tightly-stretched membranes	
21 Struck drums	The membranes are struck	
211 Drums struck directly	The player himself executes the movement of striking; this includes striking by any intermediate devices, such as beaters, keyboards, etc.; drums that are shaken are excluded[25]	
211.1 *Kettle drums (timpani)*	The body is bowl- or dish-shaped	
211.11 (Separate) kettle drums		*European timpani*
211.12 Sets of kettle drums		*West Asian permanently joined pairs of kettle drums*
211.2 *Tubular drums*	The body is tubular	
211.21 Cylindrical drums	The diameter is the same at the middle and the ends; whether or not the ends taper or have projecting disks, is immaterial	
211.211 Single-skin cylindrical drums	The drum has only one usable membrane. In some African drums a second skin forms part of the lacing device and is not used for beating, and hence does not count as a membrane in the present sense	
211.211.1 (Individual) single-skin cylindrical drums		*Malacca*
211.211.11 Open single-skin cylindrical drums	The end opposite to the membrane is open	*West Indies*
211.211.12 Closed single-skin cylindrical drums	The end opposite to the membrane is closed	
211.211.2 Sets of single-skin cylindrical drums		
211.211.21 Sets of open single-skin cylindrical drums		

25. This warning integrally repeats what has been specified for directly struck idiophones, and it justifies the fact that Hornbostel and Sachs did not take into account – among the suffixes of the membranophones – the various ways in which percussion is obtained – with or without beaters, with bare hands, or using both techniques: one beater and one hand. Membranophones too, in fact, are primarily distinguished according to the way in which sound is produced, that is, according to fundamental human actions; secondly, according to the shape of the body and of the membrane; and finally, according to the number of membranes and to the nature and shape of playing devices. Since the playing techniques are without doubt a useful defining element to enhance a classification, they can be taken into account in a more specific taxonomic examination of directly struck membranophones, according to the general criteria established by Hornbostel and Sachs in their introduction.

211.211.22 Sets of closed single-skin cylindrical drums		
211.212 Double-skin cylindrical drums	The drum has two usable membranes	
211.212.1 (Individual) cylindrical drums[26]		*Europe (side drum)*
211.212.2 Sets of cylindrical drums		
211.22 Barrel-shaped drums[27]	The diameter is larger at the middle than at the ends; the body is curvilinear	*Asia, Africa, Ancient Mexico*
211.23 Double-conical drums	The diameter is larger at the middle than at the ends; the body is rectilinear with angular profile	*India (mrdanga, banya, pakhavaja)*
211.24 Hourglass-shaped drum	The diameter is smaller at the middle than at the ends	*Asia, Melanesia, East Africa*
211.25 Conical drums	The diameters at the ends differ considerably; minor departures from conicity, inevitably met, are disregarded here	*India*
211.26 Goblet-shaped drums	The body consists of a main section which is either cup-shaped or cylindrical, and a slender stem; borderline cases of this basic design like those occurring notably in Indonesia, do not affect the identification, so long as a cylindrical form is not in fact reached	*Darabuka*
211.3 *Frame drums*	The depth of the body does not exceed the radius of the membrane. N.B. The European side-drum, even in its most shallow form, is a development from the long cylindrical drum and hence is not included among frame drums	
211.31 Frame drums (without handle)		
211.311 Single-skin frame drums		*Tambourine*
211.312 Double-skin frame drums		*North Africa*

26. The original Hornbostel and Sachs classification of membranophones shows an inconsistency: the distinction between individual drums and sets of drums was reserved to double-skin cylindrical drums. That is, while in double-skin cylindrical drums the distinction between individual and sets of is immediately after the *taxon* referred to the double-skin cylindrical drums (211.212), in single-skin cylindrical drums, after the *taxon* 211.211 one finds the distinction between open and closed, and not that between individual and sets of, which one would expect. Also single-skin drums, in fact, can be individual or in a set. To re-establish full coherence, in this point the table has been amplified according to this need.

27. To be sub-divided like 211.21.

211.32 Frame drum with handle	A stick is attached to the frame in line with its diameter	
211.321 Single-skin frame drums with handle		*Eskimo*
211.322 Double-skin frame drums with handle		*Tibet*
212 Rattle drums (sub-divisions as for drums struck directly, 211)	The drum is shaken; percussion is by impact of pendant or enclosed pellets, or similar objects	*India, Tibet*
22 Plucked drums[28]	A string is knotted below the centre of the membrane; when the string is plucked, its vibrations are transmitted to the membrane	*India (gopi yantra, anandalahari)*
221 Directly plucked drums [by hands]	A natural membrane (half of the blade of a lanceolate leaf) is temporarily stretched by the fingers of the player, who plucks the margin near the central nervature	*Plucked leaf kpa-kpàpsɛ̀ɛ of Pigmy Baka, Northern Gabon* [Campagnoli 2010, 113-121]
222 Indirectly plucked drums [by a stretched cord]	A string is knotted below the centre of the membrane; when the string is plucked, its vibrations are transmitted to the membrane	*India (gopi yantra, anandalahari)*

28. This group has caused and continues to cause misgivings: the fact that the player plucks a string, in fact, immediately recalls the class of chordophones, where these instruments could be rightfully included. One can recall the *gopi yantra*: it is made of a cylindrical or barrel-shaped resonator – or having the shape of a truncated cone – closed by a stretched membrane at the bottom; one or two vertical arms come out of the body, perpendicular to the membrane. One end of the string is fastened to the joint of the two arms, while the other is knotted below the centre of the membrane. This morphological structure recalls *taxon* 322 «Harps»: «the plane of the strings lies at right angles to the sound-table [...]». However, this is not sufficient, since normally in these instruments [plucked membranophones] the string meets the membrane at a right angle, while in harps the angle of incidence is normally acute (and, complementarily, obtuse). Picken [1975, 154-155] has noticed that Sachs himself revised his previous definition, when in *Geist und Werden* [1929, 61] and in *History* [1940, 54-55] he included these Indian instruments (*gopi yantra* and *anandalahari*) among the *Erdbogen* (ground bow) in the former title and among the ground harp's miniaturised substitutes in the latter and more recent text. Picken himself has contributed in making this point clear: «in general such instruments should only be transferred to the group of chordophones, however, if it can be shown that the *string* is exhibiting sharp resonance at a frequency immediately related to the wave-length of its transverse motion». One can object that this argument lies outside the general taxonomic organisation criteria, because it is not fully coherent with the goals and the conceptual structure of the classification, therefore, the analysis of the acoustic behaviour of the instruments is not justifiable, especially if it sets to zero other fundamental characteristics, above all the morphological ones, on which the fundamental criteria of taxonomic individuation are grounded. In this specific case we do not run such a risk, however, it is useful and not of minor importance to add an argument that is coherent with the unavoidable morphological elements of the taxonomy, which is valid at least for the *anandalahari*. This instrument is made of two drums: a big one and a small one, which are connected by a string being temporarily, and to a different extent, stretched by the player's muscular strength, while s/he plucks the string. This excludes the presence of a permanent structure which acts as a string bearer and where the string is stretched, as the more general description of chordophones prescribes. One can find the same situation in the toy telephones, made of two pots connected by a string. The *gopi yantra*, on the other hand, has a permanent bearer, sometimes with a peg to regulate the string's tension, however these characteristics do not prevent us from considering it among membranophones, at least by analogy with its corresponding relative *anandalahari*. This does not question the derivation of these instruments, from the ground bow or ground harp, as Schaeffner has demonstrated, which is a different matter; and about these relationships one can object that while the *gopi yantra* shows in its structure the signs of a derivation from the ground harp, the absence of a permanent string bearer in the *anandalahari* may give rise to doubts about its descent from the same origin.

23 Friction drums	The membrane is made to vibrate by friction	
231 Directly rubbed drums [by hands][29]	Friction is obtained directly when the player rubs his hand on the membrane of the instrument	
232 Indirectly rubbed drums	The player executes a different action than that of rubbing the membrane directly, the consequence of which is the transmission of an impulse determined by the friction of the membrane of the instrument	
232.1 *Stationary*[30]	The body of the instrument is stationary. The drum does not rotate, but it is the cord or the stick that is moved, possibly also by rubbing the cord with the stick to produce the vibration of the membrane	
232.11 Friction drums with cord	A cord, attached to the membrane, is rubbed	
232.111 Single-skin friction drums with cord		
232.111.1 The cord is rubbed by the hand	The impulse is generated by rubbing the hand on the cord attached to the membrane	
232.111.2 The cord is moved by the hand	The player's hand drags a cord with an alternate movement, the cord rubs the membrane	*Romagnol pignata* [Lombardi 2000]
232.111.3 The cord is rubbed by a stick	The impulse is generated by rubbing a cord (which is connected to the membrane) with a stick	
232.112 Double-skin friction drums		
232.12 Friction drums with stick	The friction is caused by the movement of a stick	
232.121 Friction drums with passing stick	The stick passes through a hole in the membrane	
232.121.1 Friction drums with fixed stick	The stick cannot be moved; the stick alone is subjected to friction by rubbing	*Africa*
232.121.2 Friction drums with semi-fixed stick	The stick is movable to a sufficient extent to rub the membrane when it is itself rubbed by the hand	*Africa*
232.121.3 Friction drums with free stick	The stick can be moved freely; it is not itself rubbed, but is employed to rub the membrane	*Venezuela*
232.2 *Rotating friction drums*	The drum is whirled on a cord which rubs on a [resined] notch in the holding stick	*Europe, West Africa*
24 Singing membranes (Kazoos)[31]	The membrane is made to vibrate by speaking or singing into it; the membrane does not yield a note of its own but merely modifies the voice	*Europe, West Africa*
241 Free kazoos	The membrane is incited directly, without the wind first passing through a chamber	*Comb-and-paper*
242 Tube- or vessel-kazoos	The membrane is placed inside a tube or box	*Africa; while also, East Asian flutes with a lateral hole sealed by a membrane, exhibit an adulteration with the principle of the tube kazoo*

Suffixes for use with any division of this class (membranophones)

-2 mechanically driven
-3 with snare
-4 struck by hammers or beaters
-5 struck by hands
-6 with membrane glued to drum

29. Further subdivision, like percussion drums: in each drum, in fact, the membrane might be systematically or temporarily rubbed by the player's hands, according to different playing techniques: by a single finger (usually the thumb or middle finger), by more than one finger held together, by the outstretched hand or by the base of the hand.

30. As already explained, Picken [1975, 160-161] has introduced *taxon* 232.3 «Single-skin stationary drums with friction-cord and rotated stick or cylinder». It refers to drums structured like the rotating ones, having a cord and a stick that rotate inside the loop of the cord, where the stick also works as a handle. However, in these instruments the relationship between the fixed part and the moving part, where friction is produced, are inverted: the stick is rotated to produce the friction of the cord, which is transmitted to the membrane to produce the sound. However, this new entry produces better results if it is part of a reorganisation of subclass 23, «Friction drums», as it is proposed in the table.

31. The subclass of kazoos certainly deserves to be unified, and this was done when the systematics was conceived, when idiophonic mirlitons (here classed as 15) were unknown. In kazoos, the concept of stretched membrane as the key element of all membranophones seems not to be fulfilled if one considers the morphological and analytical aspects of these instruments carefully. Many of them, in fact, have a membrane simply placed on the support, as in the case of the comb-and-paper, or a membrane inserted in a slot that keeps it in the ideal position to receive the sounding wave's impulse from the primary signal, but it is barely fixed to a frame along its outer edge (as in the modern kazoo). The membrane (which we can continue to call with this name for its uniform thickness, reduced to its minimum when compared with the other two dimensions) reacts to the stimulus of the primary generator for its lightness and not for being stretched and, therefore, is more apt to react to external impulses. It is the same material as the vibrating device that sounds, because of its elasticity and rigidity, without the need of stretching a membrane, which is typical of idiophones. Even if a deviation from the taxonomic principles is allowed in case of similar behaviour, of similar mechanical or acoustical process, or of a strict, historically grounded relationship, it is also true that one of the main objectives of classification is to distinguish items responding to different criteria, even if that means breaking with convention or contradicting appearances. Therefore, it would be reasonable to rethink the membranophonic mirlitons, partly dislocating them into the subclass of the idiophonic ones. Here we are simply raising the issue, without proposing a different solution.

-7 with membrane nailed to drum		
-8 with membrane laced to drum		
-81 cord- (ribbon-) bracing	The cords are stretched from membrane to membrane or arranged in the form of a net, without employing any of the devices described below	
-811 without special devices for stretching		*Everywhere*
-812 with tension ligature	Cross ribbons or cords are tied round the middle of the lacing to increase its tension	*Ceylon*
-813 with tension loops	The cords are laced in a zigzag; every pair of strings is caught together with a small ring or loop	*India*
-814 with wedge-bracing	Wedges are inserted between the wall of the drum and the cords of the lacing; by adjusting the position of the wedges it is possible to control the tension	*India, Indonesia, Africa*
-82 cord-and-hide bracing[32]	The cords are laced at the lower end to a non-sonorous piece of hide	*Africa*
-83 cord-and-board bracing	The cords are laced to an auxiliary board at the lower end	*Sumatra*
-84 cord-and-flange bracing	The cords are laced at the lower end to a flange carved from the solid	*Africa*
-85 cord-and-belt bracing	The cords are laced at the lower end to a belt of different material	*India*
-86 cord-and-peg bracing	The cords are laced at the lower end to pegs stuck into the wall of the drum	*Africa*
-9 with membrane lapped on	A ring is slipped over the edge of the membrane	
-91 with membrane lapped on by ring of cord		*Africa*
-92 with membrane lapped on by a hoop		
-921 without mechanism		*European drum*
-922 with mechanism		
-9221 without pedal		*Machine timpani*
-9222 with pedals		*Pedal timpani*

32. -82 to -86 are sub-divided as -81 above.

Classification	Characteristics	Examples
3 Chordophones	One or more strings are stretched between fixed points	
31 Simple chordophones or zithers	The instrument consists solely of a string bearer, or of a string bearer with a resonator which is not integral and can be detached without destroying the sound-producing apparatus	
311 Bar zithers	The string bearer is bar-shaped; it may be a board placed edgewise	
311.1 *Musical bows*	The string bearer is flexible (and curved)	
311.11 Idiochord musical bows	The string is cut from the bark of the cane, remaining attached at each end	
311.111 Mono-idiochord musical bows	The bow has one idiochord string only	*New Guinea (Sepik River), Togo*
311.112 Poly-idiochord musical bows or harp-bows	The bow has several idiochord strings which pass over a toothed stick or bridge	*West Africa (Fan)*
311.12 Heterochord musical bows	The string is of separate material from the bearer	
311.121 Mono-heterochord musical bows	The bow has one heterochord string only	
311.121.1 Without resonator	N.B. If a separate, unattached resonator is used, the specimen belongs to 311.121.21. The human mouth is not to be taken into account as a resonator	
311.121.11 Without tuning noose		*Africa (ganza, samuius, to)*
311.121.12 With tuning noose	A fibre noose is passed round the string, dividing it into two sections	*South-equatorial Africa (n'kungo, uta)*
311.121.2 With resonator		
311.121.21 With independent resonator		*Borneo (busoi)*
311.121.22 With resonator attached		
311.121.221 With free string[33]	The string is not divided by any nooses or any rigid elements	

33. The original version contains 311.121.221 and 311.121.222 pertaining to mono-heterochord bows with attached resonator (therefore not organically or permanently connected). In the first case, there is no noose dividing the string into two parts and obtaining a specific tuning, in the second case, there is a tuning noose. The research carried

311.121.222 With divided string	The string is divided into segments	
311.121.222.1 With tuning noose	The string is divided by a noose	*South Africa, Madagascar (gubo, hungo, bobre)*
311.121.222.2 With rigid tuning element	The string is divided by a rigid element, for example by a stick functioning as a pressure-bar	*Two-strings bows of Aka and Baka Pygmy* [Campagnoli 2010].
311.122 Poly-heterochord musical bows	The bow has several hetero-chord strings	
311.122.1 Without tuning noose		*Oceania (kalove)*
311.122.2 With tuning noose		*Oceania (pagolo)*
311.2 *Stick zithers*	The string carrier is rigid	
311.21 Musical bow cum stick	The string bearer has one flexible, curved end. N.B. Stick zithers with both ends flexible and curved, like the Basuto bow, are counted as musical bows	*India*

out by Mauro Campagnoli [2010] on the instruments of the Baka and Aka Pygmies of Camerun and Gabon has shed light on the existence of a musical bow where the string, which is only one, is passed twice around the ends of the curved stick, in order to obtain two different segments. These instruments may be either musical bows with an independent resonator (311.121.21) or with an attached resonator (311.121.22). In the first case, the resonator is obtained from a hollow vessel or from a metallic plaque (like the cover of a pot) on which the instrument is placed, in the second case, the resonator is a leaf also serving as a free bridge. Campagnoli [*ibidem*] considers the bow that has a string passing twice through the arms a monochord, because the string is unique and it is the stringer's carrier that divides the string into two segments, like the noose in other instruments. However, another interpretation is possible: the instrument is provided with two strings, even if they are obtained from two segments of the same vibrating body. The main argument in favour of this interpretation is based on the fact that in the second passage around the bow's arm, the string is fastened to its carrier, therefore, from this point, it acquires its own specific tension. In this way, it creates another primary device, even if it is separated from the rest of its length, and the instrument would be considered a two-string bow. However, if one wants to follow the author's point of view, it is necessary to separate the free-string bows from the divided-string bows. The latter should be subdivided between the bows with a tuning noose and those where the string is divided by a rigid element. I believe that in the taxonomy it is necessary to ignore if the second string is effectively used in performance or not, in compliance with Hornbostel and Sachs's suggestion not to consider, in chordophones, the way in which the strings are put into vibration. That is why I do not accept Campagnoli's proposition of a further subdivision into 'monophonic' and 'polyphonic': it evidently does not depend exclusively on morphology, it depends on the effective (and probably occasional) realization of a performance practice. However, Mauro Campagnoli's proposition is extremely interesting because it opens to the possibility of a further morphological specification among musical bows: in fact, the bows where a rigid element divides the strings may be represented by instruments in which the rigid element is a bridge or the very resonator which is inserted between the stick and the string, holding the latter permanently raised. A further study on musical bows is necessary, since the changes proposed here are the result of fieldwork research and are restricted to the concrete case of Aka and Baka instruments. The same specifications may also be applied to other subdivisions, for example to poly-heterochord musical bows (311.122), where, by an act of logic and formal projection, the same characteristics may be potentially assumed.

311.22 (True) stick zithers	N.B. Round sticks which happen to be hollow by chance do not belong on this account to the tube zithers, but are round-bar zithers; however, instruments in which a tubular cavity is employed as a true resonator, like the modem Mexican *harpa*, are tube zithers	
311.221 With one resonator gourd		*India (tuila), Celebes (suleppe)*
311.222 With several resonator gourds		*India (vina)*
312 Tube zithers	The string bearer is a vaulted surface	
312.1 *Whole-tube zithers*	The string carrier is a complete tube	
312.11 Idiochord (true) tube zithers		*Africa and Indonesia (gonra, togo, valiha)*
312.12 Heterochord (true) tube zithers		
312.121 Without extra resonator		*South-East Asia (alligator)*
312.122 With extra resonator	An internode length of bamboo is placed inside a palm leaf tied in the shape of a bowl	*Timor*
312.2 *Half-tube zithers*	The strings are stretched along the convex surface of a gutter	
312.21 Idiochord half-tube zithers		*Flores*
312.22 Heterochord half-tube zithers		*East Asia (k'in, koto)*
313 Raft zithers	The string bearer is composed of canes tied together in the manner of a raft	
313.1 *Idiochord raft zithers*		*India, Upper Guinea, Central Congo*
313.2 *Heterochord raft zithers*		*North Nyasa region*
314 Board zithers	The string bearer is a board; the ground too is to be counted as such	
314.1 *True board zithers*	The plane of the strings is parallel with that of the string bearer	
314.11 Without resonator		*Borneo*
314.12 With resonator		
314.121 With resonator bowl	The resonator is a fruit shell or similar object, or an artificially carved equivalent	*Nyasa region*

314.122 With resonator box (box zither)	The resonator is made from slats	*Zither, Hackbrett, pianoforte*
314.2 *Board zither variations*	The plane of the strings is at right angles to the string bearer	
314.21 Ground zithers	The ground is the string bearer; there is only one string	*Malacca, Madagascar*
314.22 Harp zithers	A board serves as string bearer; there are several strings and a notched bridge	*Borneo*
315 Trough zithers[34]	The strings are stretched across the mouth of a trough	*Tanganyika*
315.1 *Without resonator*		
315.2 *With resonator*	The trough has a gourd or a similar object attached to it	
316 Frame zithers	The strings are stretched across an open frame	
316.1 *Without resonator*		*Perhaps amongst Medieval psalteries*
316.2 *With resonator*		*West Africa, amongst the Kru (kani)*
32 Composite chordophones	A string bearer and a resonator are organically united and cannot be separated without destroying the instrument	
321 Lutes	The plane of the strings runs parallel with the sound-table	
321.1 *Bow lutes [pluriarc]*	Each string has its own flexible carrier	*Africa (akam, kalangu, wambi)*
321.2 *Yoke lutes or lyres*	The strings are attached to a yoke which lies in the same plane as the sound-table and consists of two arms and a cross-bar	
321.21 Bowl lyres	A natural or carved-out bowl serves as the resonator	*Lyra, East African lyre*
321.22 Box lyres	A built-up wooden box serves as the resonator	*Cithara, crwth*

34. The original German word is *Schale*, which is used both for hollow bodies used as containers (bowls, dishes, basins, saucers, etc.) and natural hollow bodies (shells). The same word is also mentioned above (*taxon* 314.121 [Eigentliche Brettzithern] «mit Resonanzschale» = true board zithers with resonator bowl, literally 'shell of resonance'). The description of the characteristics explains that it is a natural fruit/vegetable shell or an artificially carved bowl. *Schale* is used again for *Schalenleiern* (= 321.21 «Bowl lyres»), and for lutes («Spike bowl lutes» = 321.311 *Schalen-Spießlauten* and «Necked bowl lutes» = 321.321 *Schalen-Halslauten*). Therefore, it is a string bearer which is shaped in order to create a hollow under the plane of the strings. In reality, these zithers, spread in Central-East Africa, are generally made of a bearer in the shape of a deep-set tray or of a long and tight bowl, which is why the English translators preferred to call them trough zithers. In Italian we have chosen *guscio* [Guizzi 2002, 445] for the sufficient metaphorical simplicity of this word.

321.3 *Handle lutes*	The string bearer is a plain handle. Subsidiary necks, as e.g. in the Indian *prasarini vina* are disregarded, as are also lutes with strings distributed over several necks, like the *harpolyre*, and those like the lyre-guitars, in which the yoke is merely ornamental	
321.31 Spike lutes	The handle passes diametrically through the resonator	
321.311 Spike bowl lutes[35]		*Persia, India, Indonesia*
321.311.1 Bowl lutes with internal spike	The handle is inserted inside the box, however, it does not cross it entirely, it comes out from an opening in the sound-table and its end serves as a string bearer	*Morocco (gnbri), Niger (halam)*
321.311.2 Bowl lutes with external spike	The handle comes out from the opposite part of the bowl	
321.312 Spike box lutes or spike guitars	The resonator is built up from wood	*Egypt (rebab)*
321.313 Spike tube lutes	The handle passes diametrically through the walls of a tube	*China, Indochina*
321.32 Necked lutes	The handle is attached to or carved from the resonator, like a neck	
321.321 Necked bowl lutes		*Mandoline, theorbo, balalaika*
321.322 Necked box lutes or necked guitars	N.B. Lutes whose body is built up in the shape of a bowl are classified as bowl lutes	*Violin, viol, guitar*
322 Harps	The plane of the strings lies at right angles to the sound-table; a line joining the lower ends of the strings would point towards the neck	
322.1 *Open harps*	The harp has no pillar	
322.11 Arched harps	The neck curves away from the resonator	*Burma and Africa*

35. This group should be further subdivided still:
321.311.1 «Bowl lutes with internal spike»
321.311.2 «Bowl lutes with external spike»
In the former, the spike is inserted in the bowl, but it does not go entirely through it, instead it comes out from an opening in the sound-table, and its end becomes the binding for the strings. In the latter, the spike comes out from the opposite part of the bowl. This distinction could work in abstract for all spike lutes, independently from the shape of the box, therefore, it could be proposed after 321.31 «Spike lutes». However, this would force us to modify the notation in a more complicated way, moreover, I do not know of any internal spike lutes that do not have a bowl resonator (in Africa, *halam*, *gnbri*, etc.).

322.12 Angular harps	The neck makes a sharp angle with the resonator	*Assyria, Ancient Egypt, Ancient Korea*
322.2 *Frame harps*	The harp has a pillar	
322.21 Without tuning action		*All medieval harps*
322.211 Diatonic frame harps		
322.212 Chromatic frame harps		
322.212.1 With the strings in one plane		*Most of the older chromatic harps*
322.212.2 With the strings in two planes crossing one another		*The Lyon chromatic harp*
322.22 With tuning action	The strings can be shortened by mechanical action	
322.221 With manual action	The tuning can be altered by hand-levers	*Hook harp, dital harp, harpinella*
322.222 With pedal action	The tuning can be altered by pedals	
323 Harp lutes	The plane of the strings lies at right angles to the sound-table; a line joining the lower ends of the strings would be perpendicular to the neck. Notched bridge	*West Africa (kasso, etc.)*
Suffixes for use with any division of this class (chordophones)		
-3 provided with resonance strings or sympathetic strings		
-4 sounded by hammers or beaters		
-5 sounded with the bare fingers		
-6 sounded by plectrum		
-7 sounded by bowing		
-71 with a bow		
-72 by a wheel		
-73 by a ribbon		
-8 with keyboard		
-9 with mechanical drive		

Classification	Characteristics	Examples
4 Aerophones	The air itself is the vibrator in the primary sense	
41 Free aerophones	The vibrating air is not confined by the instrument	
411[36] Non-interruptive or displacement free aerophones	The air-stream meets a sharp edge, or a sharp edge is moved through the air. In either case, according to more recent views, a periodic displacement of air occurs to alternate flanks of the edge	*Whip, sword-blade*
411.1 *Displacement aerophones*		
411.2 *Deflective aerophones*	Irregularities in a disk or in another object throw off pressure waves in directions that sweep round the axis of rotation as the object rotates. These reach a stationary listener as periodic fluctuations in pressure, the frequency of which is determined by the speed of rotation. Disks or rhombs or other centrosymmetric objects are rotated, either in the plane of the disk or rhomb, or in the plane of the longer axis or diameter of the object, round a central point. The rotation is subject to rapid reversal in direction, necessarily linked with phases of acceleration and deceleration [Picken 1975, 343-344]	*Whirring disc*

36. Hornbostel and Sachs distinguish three main groups within free aerophones: displacement aerophones, interruptive aerophones and plosive aerophones. This arrangement has been questioned by Picken [1975, 343-346] who proposed to subdivide free aerophones (except for the group of plosive aerophones, which remains unchanged) into two contrasting groups, depending on the presence or absence of the interruptive effect of the air-stream. Therefore: 411 «Deflection or non-interruptive free aerophones» and 412 «Interruptive free aerophones». The concept that synthetizes the definition of 'displacement' is the presence of an air-stream which is moved directionally while maintaining its dynamics uninterrupted. The concept at the base of interruptive aerophones (which for Hornbostel and Sachs have this characteristic: «the air-stream is interrupted periodically») is defined by the behaviour of the air-stream that is interrupted by the action of a mechanical device. According to Picken, displacement aerophones should be divided in: 411.1 «Displacement aerophones» and 411.2 «Deflective aerophones properly». The latter are described as follows: «Irregularities in a disk or other object throw off pressure waves in directions that sweep round the axis of rotation as the object rotates. These reach a stationary listener as periodic fluctuations in pressure, the frequency of which is determined by the speed of rotation. Disks or rhombs or other centrosymmetric objects are rotated, either in the plane of the disk or rhomb, or in the plane of the longer axis or diameter of the object, round a central point. The rotation is subject to rapid reversal in direction, necessarily linked with phases of acceleration and deceleration» [*ibidem*, 343-344]. Picken is right when he claims that «although rotation, in some sense, is common to both whirring disks and bull-roarers, the former are not 'interruptive' devices. The plane of rotation, in which an air-stream may be thought to exist, is not intercepted by the device, which appears to operate by deflecting air successively in different directions as a result of 'wobble', in the case of whirring disks or other objects» [*ibidem*, 344]. Here Pickens' suggestions are taken into account in the classification.

412 Interruptive aerophones	The air-stream is interrupted periodically	
412.1 *Autophonic*[37] *interruptive aerophones or reeds*	The air-stream is directed against a lamella, setting it in periodic vibration – only by virtue of the air pressure itself – to interrupt the stream intermittently. In this group also belong reeds with a 'cover', i.e. a tube in which the air vibrates only in a secondary sense, not producing the sound but simply adding roundness and timbre to the sound made by the reed's vibration; generally recognizable by the absence of fingerholes	*Organ reed stops*

37. The original German term employed by Hornbostel and Sachs is *selbstklingende*, which literally means 'being able to sound by itself'. It is the same adjective used in their introduction to translate into German Mahillon's concept of *[instrument] autophones*, which they radically criticize when used as the name of a class, to the point that it has been replaced with 'idiophonic'. In this point of the classification, which deals with reeds conceived as free aerophones, a complicated semantic and conceptual problem concerning this adjective arises again: should we interpret *selbstklingende* as a synonym and a strengthening of 'free' (*freie*), referred to aerophones and their surrounding air, which need to be stressed for reeds, since they are listed contemporarily both in free aerophones and in wind instruments proper? Or did the author consciously refer here to the 'idiophonic' nature of reeds, being the sound produced also by the vibration of the rigid matter of which they are made, as if this were a kind of sub-determination of the vibratory element produced by air when it is set in motion? One would think that the English translators Baines and Wachsmann had agreed with this interpretation, since they translated *selbstkingende* with 'idiophonic'. On the contrary, Carlos Vega in his 1946 Spanish translation opted for *autófonos*. As already said, Vega was a pupil of Sachs and, what is most important, he submitted his translation to Sachs's personal supervision. From this situation, which we have only touched upon in its main implications here, a number of problems arise: first among others the chance of a radical and in depth revision/integration of the classification of reeds, which is a difficult task on which we are working. One of its problematic points is just the relationship between the vibration of the periodically interrupted air-stream (which obviously remains the generative moment of sound) and the material of which a reed is made. The latter determines analogies in turns with idiophones, membranophones and chordophones. In this sense, I believe that this attribute [idiophonic] should be maintained in order to allow the expansion of interruptive aerophones by including the case records of devices based on a membranophonic valve, which would constitute a 'new' category, and those with a chordophonic structure, like ribbon reeds. Taking into consideration the terminology used by the authors in 1914 from a 'philological' point of view, my idea is that *selbskingende* was referred to systems where the interruptive effect was generated 'by itself', without recurring to the muscular force (or to an engine) of somebody turning a handle or rotating an object attached to a string or similar. Given the existence of an air-stream and its proper direction and pressure, it is the air motion itself, according to aerodynamics, which activates alternate motion in the mechanic device. This happens in all reeds that are activated by the pressure and depression of air. It does not happen exactly 'by itself' since an external intervention is needed, however this is limited to the production of air-stream, which gives impulse to the whole system. Therefore, the cases of 'idiophonic' reeds, in correspondence with the 'chordophonic' and 'membranophonic' ones do not mean that the sound is 'produced' by the solid body, but that the solid body moves when it acts as an intermittent valve, so it vibrates as well (which distinguishes the reeds from other aerophones). The presence of a mobile solid body is thus strengthened and its properties are distinguished (rigidness, elasticity and flexibility in idiophonic reeds, elasticity submitted to tension in membranophonic and chordophonic reeds). However, since 'idiophonic', 'membranophonic' and 'chordophonic' include the word *phoné* (= sound) – the component that may generate misinterpretation in the use here considered – in order to avoid mistakes, I propose to adopt other compound terms based on ancient Greek, that is 'idiokinetic', 'membranokinetic' and 'chordokinetic', incorporating the word *kinesis* (movement), referring to the material whose alternate motion produces the interruption of the air-stream. Consequently, according to the formal asset (not the acoustical one) of the instrument, one could propose the terms 'idiomorphic', 'membranomorphic' and 'chordomorphic', which are obviously based on *morphé* (form). The sequence of *taxa* should start from 'idiokinetic' concussion reeds and among them from those made of rigid matter, in order to respect the original structure of the 1914 classification. In reality, a more coherent arrangement should be arranged from the 'simple' to the 'complex', or from the 'marginal' to the 'mainstream', therefore, the sequence of *taxa* should be largely reversed.

412.11 Reeds made of rigid and flexible matter or 'idiokinetic' reeds	The material of which reeds are made is endowed with its own elasticity, as in lamellae or in elastically dislocated devices	
412.111 Symmetrical concussion reeds	Two or more symmetrical bodies which may be elastically dislocated, are fixed at one end, while the other is free. They create a gap which closes periodically, in relationship with their vibration	
412.111.1 Rigid and elastic concussion reeds proper	The two separated and juxtaposed mobile parts, which create an apical gap, are obtained from rigid and elastic matter	
412.111.11 Double concussion reeds	The two symmetrical parts are obtained by a strip of cane or of synthetic material which is gauged at the centre. From this narrowed strip, the two parts are separated and juxtaposed	
412.111.111 Double concussion reeds with single lamellae	The two symmetrical parts are made each of one single element	
412.111.112 Double concussion reeds with multi-layered lamellae	The two symmetrical parts are made each of multi-layered bodies, they move jointly in a symmetric and concussive motion	*The reeds made of palm leaves in South-Central Asia (Tibet, Nepal, India, Birmania); the foglia verde arrotolata ('rolled green leaf') from Calabria* [La Vena 1996, 73-74]
412.111.12 Tubular concussion reeds with terminal vibration[38]	An internode of cane is cut at the closed end, in order to offer the air-stream two or more mobile symmetrical parts which open and close jointly or alternatively	

38. According to Francis W. Galpin [1902-1903], who was the first to dedicate an important study to many rare aerophones from the New Continent – among them we find many reeds: these devices should be considered terminal specimens of the kind of reeds that he called 'retreating reeds' [*ibidem,* 128]. However, I believe that there is a contradiction here. Retreating reeds are described as the opposite of concussion double reeds, because in the latter the two lamellae, in a position of rest, are separated, and the air-stream creates a periodical valve motion when they dilate them. On the contrary, in retreating reeds the mobile parts produced by the cut are perfectly in contact, therefore, the air-stream must force this closed position in order to generate a valve periodical motion. In the reeds that I know of where a terminal cut was applied, the elasticity of the cane, weakened by the cut (simple or double, that is cross-shaped), leaves the two ends slightly moved away, providing a space for the air-stream to move inside them. This behaviour is comparable to that of concussion reeds. It is true that the sequence of the mechanical movements of the turbulence is more complex than one can imagine, therefore the movement of the mobile elements is not only the effect of a 'push from inside' but also of the rarefaction outside the mobile parts, that raise themselves; however, it is very important that the air-stream should find a way between the two symmetrical stoppings. This double action occurs in symmetrical reeds blown from their apical end, when they are made both of

412.111.121 Double, or with simple symmetry	The cane is cut in two symmetrical parts	*Calabria*
412.111.122 Four-part or pluri-symmetrical	A cross cut divides the cane in four symmetrical parts or slices	*Calabria, Sardegna (ischéliu)* [Dore 1976, 115-119; Spanu 2014, 192-193]
412.111.13 Retreating reeds: concussion reeds by retreating, with lateral or median cut, blown coplanarily[39]	Two symmetrical parts are obtained by a longitudinal cut, made laterally on a natural hollow cane. An air-stream is directed against them, temporarily retreating them and causing a periodical series of opening and closing. Coplanarity refers to the fact that air expands outside the external surface of the cylinder	
412.111.131 Single	The mobile device is obtained from only one slit	*Calabria, Turkey, Lapland (fadno), North America (West Coast)*
412.111.132 Sets of retreating reeds	More than one slit determine the contemporary vibratory action	*Madagascar, East Africa, The Horn of Africa, Turkey*
412.111.2 Elastic concussion reeds made of flexible material which is flattened	The mobile parts, separated and juxtaposed, are obtained from pliable material	
412.111.21 Soft flattened reeds	A soft cylinder is flattened at one end in order to leave a tight opening between the two symmetrical juxtaposed sides, where the air-stream is forced. The flattened wall remains relatively soft	*The reeds obtained from the corolla of the flowers or from hollow cylindrical stems, like the stems of taraxacum officinalis or of an onion which are flattened at one end, the reeds made of green bark and the reeds made of phragmites australis*

a couple of lamellae and of the quarters of a cylinder. Retreating reeds, instead, are inserted in the mouth from their closed end: the air-stream expands outside the cylinder, causing a turbulence that determines the opening of the duct and it does not pass inside the tube. That is why I prefer to class reeds obtained from a terminal cut together with those made of concussion lamellae.

39. Here again we have to call to mind Galpin in order to clarify a problem: Galpin [1902-1903, 128] recognizes what he considers a variant in the terminal blown retreating reeds in a Salish (bella bella) instrument described by E. H. Hawley, made not from a natural pipe, but from two cedar halves that are cut and juxtaposed in order to leave a «little channel cut in them for an air passage» at the proximal end. Thanks to this construction «where the breath is forced in at the mouthpiece it causes the free ends both to open and close, producing a harsh sound». I believe that it is reasonable to consider this case analogous to concussion reeds, even if in this version the two mobile parts are probably thicker than the normal lamellae made of thinned cane. This would exclude, in this case, words like 'artificial (because they are made of two wooden halves that have been cut and shaped) retreating reeds', instead of 'natural' (made of natural cylinders, like cane or vegetal stems). In conclusion, I believe that the cut that allows the retreating action should be located in a lateral, middle position and should not be extended to the apical position.

412.111.22 Rigid flattened reeds	An originally soft cylinder or cone is flattened at one end, in order to leave a tight opening between the two symmetrical juxtaposed sides, where the air-stream is forced. The reed is then left to dry, thus acquiring the consistency of a rigid elastic body	*The reeds of the cylindrical oboes that according to Baines* [1991, 202-203] *derive from the monaulos: mey (Turkey), duduk (Armenia), duduki (Georgia), balaban (Azerbaijan, Kurdistan-Iraq), guan zu (China), hichirichi (Japan)*
412.112 Asymmetrical (simple) percussion reeds	Only one mobile part acts as a valve by opening and closing a gap striking against a frame at each cycle	
412.112.1 Simple (single) percussion reeds		*British Columbia*
412.112.2 Sets of simple percussion reeds		*The earlier reed stops of organs*
412.12 Free reeds	The lamella acting as a valve moves from the rest position with no obstacles interrupting its dislocation	
412.121 Free reeds with elastic and rigid lamella with bilateral movement	The air is directed against a rigid lamella, striking it longitudinally, i.e. the plane of the lamella at a position of rest is parallel to the air-stream. Beyond a threshold, the pressure makes the lamella oscillate, thanks to a lateral push, until the movement is repeated in the opposite direction. Thus, the air passage is alternatively opened and closed at the two sides of the lamella	
412.121.1 Open and simply framed reeds	The lamella is inserted inside a frame consisting of two prongs and open at one end	*Dried bay leaf (oro) Monti Lepini, Lazio* [Di Fazio 1997, 58-61], *Sardinia (chigula); the duck call*

412.121.2 Capped free reeds	The lamella is inserted into a hollow body, where it can oscillate on both sides, according to the changes of the internal air pressure[40]	*British Columbia* [Galpin 1902-1903], *Monti Lepini, Lazio (pifaretta a cifolitto with tubular resonator)* [Di Fazio 1997, 62-66][41]
412.122 Free reeds with elastic and rigid lamella, coplanar with the frame	The lamella is cut from the same matter of which the frame is made, therefore, it can move through the opening in response to an air-stream both in entrance and in exit. This permits the sound to be produced both while inspiring and expiring	
412.122.1 Single		*Reed shaman horns from South-East Asia*
412.122.2 Sets		*Mouthorgans from South-East Asia*
412.123 Free reeds with elastic and rigid lamella, not coplanar with the frame	The lamella is fixed to its frame, therefore, it only moves in response to a mono-directional air-stream	
412.123.1 Single		
412.123.2 Sets		*Harmonium*
412.2 *Interruptive membranokinetic aerophones or reeds made of a tensible membranaceous material*	The air-stream is directed against a stretched membrane which partly or entirely covers an opening. The membrane vibrates interrupting periodically the air-stream	
412.21 Beating membrane reeds	The membrane presses against the edge of an opening, therefore, at each interruptive cycle the air passage closes periodically, according to the vibrations	*The tornado reed*[42]

40. This device still requires a more precise definition of its acoustical behaviour and of the relative morphological applications to concrete instruments. These are difficult to define because of the rarefaction of the living cultural uses of the known instruments, which are extinct or extremely marginalized. The central problematic issue is its different possibility of location in relation to the two subclasses of aerophones, which is among the interruptive free aerophones or among musical instruments proper, where the reed is coupled with a tubular resonator putting into vibration the air inside it. The same mirror-like problem occurs for *taxon* 422.311.

41. The research carried out by Emilio Di Fazio [1997, 62-66] in the Monti Lepini (Southern Lazio) has not demonstrated the use of this device as a free aerophone, instead it has documented its use as a capped reed, applied to a cylindrical pipe with finger holes. However, a hint of a possible existence of a reed separated by the resonator is given by the name itself, where it is specified that the *pifaretta* (the name of this sound device) in this case is coupled with a tube similar to a recorder (*cifolitto*), as if the reed alone was called with the name *pifaretta*.

42. An aerophone instrument with a membranokinetic reed which is stretched on a circular frame whose diameter is slightly larger than the diameter of an internal concentric tube. The membrane is stretched on the larger tube and presses against the edge of the internal concentric tube. Blowing from a lateral hole opened in the larger tube that carries the membrane, the air is forced in the narrow space between the internal and the external cylinders. The

412.22 Free membrane reeds	The membrane is stretched against a bearing. The air-stream, which is directed against the membrane, determines its movement in one direction, then, thanks to the elasticity of its material, in the opposite direction	
412.221 Uncapped free membrane reeds	The artificial or natural membrane is blown directly	*The ivy leaf* [Di Fazio 1997, 58] *or the birch bark blown outside the mouth. The ribbon elastomers (made of rubber or polyethylene) from Calabria* [La Vena 1996, 67-68; 72-73]
412.222 Capped free membrane reeds	The artificial or natural membrane is blown inside a cavity, whose variations modify the sound parameters	*Palatal birds chirping whistle*
412.3 *Interruptive chordokinetic aerophones, or reeds made from a tensible ribbon-like material (ribbon reeds)*	The air-stream is forced edgeways against a tight strip stretched at the centre of a long and tight opening. The pressure of the air flux determines the movement of the strip first in one direction, then thanks to the elasticity of its material, in the opposite one, allowing an interruptive and periodical movement of the flux itself	
412.31 Ribbon reeds temporarily stretched	The ribbon is held between the thumbs and the base of the player's two hands, leaving a tight opening where the ribbon is temporarily stretched by the grip	*The blade of grass held between the hands in a vertical position*

pressure temporarily moves the membrane away and the air passes through the opening created, being interrupted an instant later by the fall of the membrane against the edge of the internal cylinder. The concrete realisation of the instrument described apparently discards the possibility of considering it as a free aerophone, since the presence of the cylinder carrying the membrane puts it among reedpipes (wind instruments proper). However, if the tubular part is reduced to the minimum necessary to allow the existence of an interstice between the two tubes for the air-stream, one obtains a device which does not need a resonator, at least not differently from the resonators which are always present in single and double idiokinetic reeds.

412.32 Ribbon reeds permanently stretched	The ribbon is stretched inside an opening in the proximal end of spiral twisted vegetal blades flattened at one end or in the opening between two symmetrically cut wooden valves fastened together. We do not know the precise acoustic behaviour of these devices because of their rarity. In particular, we do not know the role of the support for the reed when it has a tubular shape. Therefore, we cannot say if it has the function of a mere amplifier or if it is a true resonator. If the latter hypothesis is true, these instruments would not be free aerophones, but wind instruments proper	*Southern America (the waikoko of Chóco children, the adjulona of the Carajá and Šavajé)* [Izikowitz 1935, 252-254]; *Northern America (Cree, Naskapé, Penobscot* [ibidem]; *Tsimshian and other peoples from the North-West Coast* [Galpin 1902-1903, 129-130]
412.4 *Non-autophonic interruptive instruments*	The interruptive device does not move thanks to an air-stream, but its movement is caused by a muscular impulse or by an impulse determined by a mechanism	
412.41 Rotating aerophones	The interruptive agent rotates in its own	*Sirens*
412.42 Whirling aerophones	The interruptive agent turns on its axis	*Bull-roarer, ventilating fan*
413 Plosive aerophones[45]	The air is made to vibrate by a single density stimulus condensation shock	

43. Some doubts may arise about the legitimacy of including plosive aerophones in the sub-class of free aerophones. We are all aware of the effect produced while striking with your palm one of the two ends of an open pipe: a typical, slightly glissando sound is obtained, which is caused by the compression of the air where the tube is stroked, and by the rapid transmission of the compression inside the tube. The pressure wave loses its energy outside, through the opposite open end, thus causing a periodical movement of the surrounding air, which produces waves that the ear perceives as sound. The doubt arises when thinking of the air confined in the tube, which receives the compression and releases it externally: since tubes of different dimensions (containing, therefore, different air masses, shaped as columns) produce sounds of different pitch, one should ask oneself if the air contained inside the tube has a crucial role in the generation of the vibration, which is typical of instruments with confined air, that is wind instruments proper. However, if one uses a non-cylindrical tube, or a tube with openings of a different diameter, when striking alternatively the two ends, sounds of different pitch are produced, even if the internal mass of the air is the same. This seems to support the hypothesis that they act as free aerophones. The dimension of the opening is in relation to the acoustic resistance: when the mass is the same, the acoustic resistance changes in relation to the width of the 'surface' of the hole opposite to the opening which is struck, where the internal air makes contact with the external air. The larger the zone, the lower the resistance against the mass of air which is pressed inside the tube when it is discharged outside, therefore, the sound produced is higher. Also when striking the holes of a flute with one's fingers, without blowing into it, the sounds produced are of different pitch, according to a scale which seems to correspond to the scale of the flute when it is blown (or better, they seem to share the same interval relations of the flute's scale). In reality, the different pitch is not determined by the vibration of air columns of different length, but by the same mass of air which finds different resistance in releasing the pressure caused by the percussion outside. The resistance is in relation to the sum of the openings through which the pressure is transmitted to the surrounding air [Picken 1975, 374-376].

413.1 *Compressed air instruments*	The instantaneous impulse is caused by an accumulation of compression by the air	
413.11 Free air	A portion of air not confined to a container is compressed	*The leaf which is broken by a strong percussive stroke with the hand*
413.12 Confined air	The compressed air is inside a closed container, an end of which is suddenly opened	*Pop guns (schioppetto), the paper bag which is inflated and then struck*
413.2 *Deflagration instruments*	The instantaneous compression is caused by a sudden deflagration that follows a chemical reaction	
42 Wind instruments proper	The vibrating air is confined within the instrument itself	
421 Edge instruments	A narrow stream of air is directed against an edge	
421.1 *Flutes without duct (with no blowing devices)*	The player himself creates a ribbon-shaped stream of air with his lips. The air-stream is not forced or directed by any canalisation devices	
421.11 Edge-tone instruments that are not flutes, or wind instruments orthogonally blown	The air-stream created by the player breaks on the edge of a hole opened in a surface at a right angle to the direction of the flux	
421.111 With closed and fixed chamber	The instrument has an internal chamber shaped as a low cylinder or as an ellipsoid. At the centre of each one of its two juxtaposed faces, there is a hole for the passage of air	*The hunting call made by two cartridge bottoms, the whistle obtained by an apricot stone and similar: Europe, Turkey* [Picken 1975, 376-378], *Brazil* [Izikowitz 1935, 284-285]
421.112 With open and variable chamber	The body of the instruments is open at one side. The player's tongue creates a temporary extension of the body of the instrument which contributes to the determination of the sound's parameters	*The stone whistle from Milena (Sicily)* [Guizzi 2002, 159-160], *from Turkey* [Picken 1975, 378-380] *and South America* [Izikowitz 1935, 284-285]. *The whistles made from flattened tin bottle-tops: Calabria* [La Vena 1996, 76-78, 97], *Turkey* [Picken 1975, 377-380]
421.12 Edge instruments not orthogonally blown	The air-stream created by the player breaks on a sharp-edged border which is not at a right angle with the direction of the flux	

421.121 Tubular flutes	The sharp-edged border is part of a tubular flute	
421.121.1 End-blown flutes	The player blows against the upper opening of the pipe	
421.121.11 End-blown flutes with no sharp-edged device	The air-stream breaks on the edge of the opening of the flute	
421.121.111 End-blown flutes	The air-stream is directed against the sharp rim at the upper end of a tube	
421.121.111.1 Single		
421.121.111.11 With no fingerholes		
421.121.111.111 Open		
421.121.111.112 Closed		*The hollow key*
421.121.111.12 With fingerholes		
421.121.111.121 Open		
421.121.111.121 Closed		*Particularly in New Guinea*
421.121.111.2 Sets of flutes or panpipes[44]	A series of straight flutes with different pitch are assembled in a unique instrument	*Panpipes*
421.121.111.21 Open panpipes		
421.121.111.211 Open (raft) panpipes	The pipes are tied together in the form of a board, or they are made by drilling tubes in a board	*China, Oceania, Central and Southern America*
421.121.111.212 Open bundle (pan-) pipes	The pipes are tied together in a round bundle	*Solomon Islands, Bismarck Archipelago*
421.121.111.22 Stopped panpipes		*China, South-East Asia, Oceania, Central and Southern America, Africa, Europe*
421.121.111.23 Mixed open and stopped panpipes		*Solomon Islands, South America*

44. The panpipes of many areas of the world (European as well, as the case of instruments from the Volga basin in Russia or from the Baltic countries demonstrate), but especially from the Andean Mountains around Lake Titicaca and from Melanesia ('Are'are, Malaita, Solomon Islands) are characterised by a specific feature concerning not only performance practices, but also their structure. Normally a single instrument alone is never played, at least one counterpart is needed, which provides half of the scale needed to play a melody, according to an arrangement of the notes which are subdivided between the two components of the couple. This deserves a careful extension of the taxonomy, since the case records collected during fieldwork have documented complex combinations of flutes with only one row of pipes or with two superimposed rows, with only stopped pipes or composed of a mix of open and stopped pipes.

421.121.112 Side-blown flutes	The air-stream is directed laterally towards the opening of the flute	
421.121.112.1 Indirectly side-blown	The flute orbits around its own axis and the surrounding air breaks against the edge of an opening. The vibrating air is contained inside the instrument's tubular structure	*Parücia (Piedmont)*
421.121.112.2 Directly side-blown	The player blows laterally against the edge of an opening. This *taxon* deals more with a playing technique than with a structural characteristic	*Some bundle panpipes*
421.121.12 End-blown flutes with sharp-edged device	The air-stream breaks against a device in the opening of the flute	
421.121.121 With notched device	The air-stream breaks against a notch cut in the opening of the flute	*Quena (Andes), Eastern Africa*
421.121.122 With bevelled device	The air-stream breaks against a bevel on the edge of the flute's opening	*Shakuachi (Japan)*
421.121.2 Transverse flute	The player blows against the sharp rim of a hole in the side of the tube	
421.121.21 Single transverse flutes		
421.121.211 Open transverse flutes		
421.121.211.1 Without fingerholes		*South-West Timor*
421.121.211.2 With fingerholes		*European flute*
421.121.212 Partly-stopped transverse flutes	The lower end of the tube is a natural node of the pipe pierced by a small hole	*North West Borneo*
421.121.213 Stopped transverse flutes		
421.121.213.1 Without fingerholes		
421.121.213.11 With fixed stopped lower end		*Apparently non-existent*
421.121.213.12 With adjustable stopped lower end (piston flutes)		*Malacca, New Guinea*
421.121.213.2 With fingerholes		*Eastern Bengal, Malacca*

421.121.22 Sets of transverse flutes		
421.121.221 Sets of open transverse flutes		*Chamber flute-orum*
421.121.222 Sets of stopped transverse flutes		*North West Brazil (among the Siusi)*
421.122 Vessel flutes[45]	The body of the pipe is not tubular but vessel-shaped	
421.122.1 Freely blown vessel flutes	The air-stream is directed by the player against the opening of the flute without using any devices	
421.122.11 Indirectly side-blown	The flute turns with a circular movement or around its axis and collides with the surrounding air which breaks laterally against the rim of an opening	*Europe, Southern America, Asia, hollow spinning top*
421.122.12 Directly side-blown	The player blows laterally against the rim of an opening	
421.122.121 Without fingerholes		*America, Oceania, Africa, Europe (the whistle obtained from a dried orange skin)* [La Vena 1996, 97-98]
421.122.122 With fingerholes		
421.122.2 Guided blown vessel flutes	The air-stream is directed by the player against the opening of the flute with the help of a special slide	
421.122.21 With no edge-devices	The slide does not include any edge-devices	
421.122.22 With edge-device	The slide includes an edge-device	
421.2 *Channelled flutes (with blowing device)*	A channel directs the air-stream against the sharp edge of a hole	
421.21 With orthogonal edge-device[46]	The air-stream is directed against the rim of a hole by a channel	

45. In the original taxonomy the group of vessel flutes without internal ducts is limited to one *taxon* only. Like other multiple cases of diversification among flutes, for example the transverse flutes, this is a lacuna in the economy of the system invented by Hornbostel and Sachs in 1914, a gap which cannot be easily filled by appealing to the criteria expressed by the authors in the introduction, where they assert the flexible and adjustable nature of their system. In other words, one faces the relative imbalance in the overall consideration of the importance of the subclass of flutes and of its internal articulations. The many cases that allow a series of subdivisions of the group defined by this *taxon* (421.13) are particularly represented in the musical cultures of the pre-Columbian peoples, having probably experienced all the possible combinations of the constitutive elements of vessel flutes, with or without internal duct or distinct beak. I have attempted a preliminary exploration of this world, of which I have proposed a systematisation [Guizzi 1992].

46. Since this *taxon* refers mainly to hunting calls, the outflow of the air-stream is not perfectly orthogonal to the

421.211 With external chamber	The air-stream is directed, by a slightly oblique channel, to the rim of a hole. The device is contained inside a hollowed body with some openings that may be opened or closed with one's hands. The primary vibration is therefore coupled with the vibration of the air inside the chamber and the sound may be variated by controlling the external outflow	
421.211.1 With a central hole on the wall of a vessel chamber	Inside an enveloping chamber a device like *taxon* 421.111 is contained. It is provided with only one hole, where the air-stream, directed by the channel, breaks	*Hunting call for partridges*
421.211.2 The hole is obtained by the upper end of a tube	The edge where the air-stream breaks is the rim of a tube which is juxtaposed with the channel	
421.22 Flutes with external duct	The duct is outside the wall of the flute	
421.221 Tubular		
421.221.1 End-blown	The duct is placed along the longitudinal axis of the tube	
421.221.11 Chamfered flutes with a ring-like sleeve	The duct is chamfered in the wall under a ring-like sleeve	*Indonesia (suling)*
421.221.111 Single		
421.221.111.1 Open		
421.221.111.11 Without fingerholes		*China, Borneo*
421.221.111.12 With fingerholes		
421.221.111.2 Partly-opened		*Malacca*
421.221.111.3 Closed		
421.221.112 Sets of end-blown flutes with external duct		

plane of the hole where the air-stream breaks, because these instruments are not made to produce a 'clear' timbre. The harmonics are determined by a slight shift of the tube carrying the air-stream with respect to the rim where the air-stream is forced, therefore, these instruments produce a particularly 'blown' timbre, which characterises the voice of the birds to be imitated.

421.221.12 With internal channel, which is deviated against an external cover[47]	The air is directed inside the tube, where it meets a deflector which forces the air to deviate outside the tube, where a rigid or flexible cover directs it against a rim below the deflector	*Northern America (flutes of the natives), Southern America (flutes from Amazonia)*
421.221.2 Transverse	The duct is perpendicular to the longitudinal axis of the tube.	*Atuñsa from the Motilon Indians, Sierra Perijá, Venezuela* [Izikowitz 1935, 375]
421.222 Vessel flutes with external duct	The duct is attached to the outer part of a vessel: the air-stream breaks against an opening	*Pre-Columbian America*
421.222.1 With single duct	The duct is composed of a unique channel	
421.222.2 With double duct	The air-stream is directed to the two openings of the instrument by two channels	*South America (nazca), Central America (chiriqui)*
421.23 Flutes with internal duct	The duct is inside the tube	
421.231 Tubular		
421.231.1 End-blown		
421.231.11 With applied duct	The duct maintains an autonomous shape and is juxtaposed with the blowing hole, or it creates a path which facilitates the introduction of air inside the duct	*Europe (baritone or bass recorder, fujara in Slovakia). Southern America, Peru and Bolivia (bass mohoceno)*
421.231.12 (Single flutes) with duct and window	The duct is created inside the body of the flute and it is shaped like a longitudinal slot, leading to a window	
421.231.121 Open		
421.231.121.1 Without fingerholes		
421.231.121.2 With fingerholes		
421.231.122 Closed		
421.231.122.1 Without fingerholes		
421.231.122.11 With fixed stopped lower end		*European signalling whistle*
421.231.122.12 With adjustable lower end		*Piston pipes (swannee whistle)*

47. Further subdivisions like 421.221.11.

421.231.122.2 With fingerholes		
421.231.13 Sets of flutes with duct and window[48]		
421.231.131 Open		
421.231.131.1 Without fingerholes		*Open flute stops of the organ*
421.231.131.2 With fingerholes		*Double flageolet*
421.231.132 Partly stopped		*Rohrflöte stops of the organ*
421.231.133 Stopped		*Stopped flute stops of the organ*
421.231.2 Transverse	The air enters a lateral hole through a duct	
421.231.21 With applied duct	A duct directs the air through the lateral hole of a tube. The duct is permanently fixed at right angle	*Fifes provided with duct, transverse flute Nazca, made of bone, blown with a perpendicular duct*
421.231.22 With duct and window	The air is blown inside a lateral duct, then it reaches the window along the instrument's longitudinal axis	*Europe (the harmonic transverse flutes made of bark or wood); Italy (tituella from Monti Lepini)* [Di Fazio 1997, 54-57], *Calabria* [La Vena 1996, 112-118], *Tuscany; Norway (seljefløyte)*
421.232 Vessel flutes with duct		
421.232.1 With applied duct	The duct maintains an autonomous shape and is juxtaposed with the blowing hole, or it creates a path which facilitates the introduction of air inside the duct	*Central America (Maya) and Southern America (Apinayé, Canella, Pre-Columbian cultures of Ecuador, Peru and Bolivia)*
421.232.2 With a chambered duct	The duct is composed of one or more hollow bodies	*Pre-Columbian America (whistling jars)*
421.232.3 With duct and window		
421.232.31 Without fingerholes		*Zoomorphic pottery whistles, Europe, Asia*
421.232.32 With fingerholes		*Ocarina*
421.233 Mixed	The flute presents the characteristics of both tubular and vessel flutes	

48. *Taxa* referring to internal duct flutes should be integrated, at least by taking into account the hypothesis of 'sets of vessel duct flutes'. It is not merely theoretical, since it is documented by instruments that have actually existed, particularly in pre-Columbian cultures, where instruments made of two devices are known.

422 Reedpipes	The air-stream has, through means of lamellae placed at the head of the instrument, intermittent access to the column of air which is to be made to vibrate	
422.1 *Reedpipes with retreating reeds or reeds with lateral/middle cut*	The pipe is provided with a reed like the one described in *taxon* 412.111.13	
422.11 Without lateral holes		
422.111 With fixed tube		
422.112 With changeable tube	The length of the air column is modified by the player: the final portion of the tube in fact is made of two jointed parts that may be temporarily separated or joined to the first one	*Southern Sweden (netterpipa)* [Emsheimer 1989]
422.12 With lateral holes		
422.2 *Oboes*	The pipe has a [double] reed of concussion lamellae (usually a flattened stem)	
422.21 Single oboes		
422.211 With cylindrical bore		*British Columbia*
422.211.1 Without fingerholes		*Aulos, cromorno*
422.211.2 With fingerholes		*The European oboe*
422.212 With conical bore		
422.22 Sets of oboes		
422.221 With cylindrical bore		*Double aulos*
422.222 With conical bore		*India*
422.3 *Clarinets*	The pipe has a [single] reed consisting of a percussion lamella	
422.31 Single clarinets		
422.311 With cylindrical bore		
422.311.1 Without fingerholes		*British Columbia*
422.311.2 With fingerholes		*The European clarinet*
422.312 With conical bore		*Saxophone*
422.32 Sets of clarinets		*Egypt (zummára)*
422.4 *Reedpipes with free reeds*	The reed vibrates through [at] a closely-fitted frame. There must be fingerholes, otherwise the instrument belongs to the free reeds 412.12	
422.41 Single reedpipes with free reeds		

422.411 With free reeds with elastic and rigid lamella with bilateral movement	The interruptive device is a lamella like the one described in *taxon* 412.121.2. It is inserted in the proximal end of the tube, its interruptive function determines periodical vibrations in the air contained inside the tube	*Monti Lepini (pifaretta a cifolitto)* [Di Fazio 1997, 62-66][49]
422.42 Sets of reedpipes with free reeds		
422.5 *Reedpipes with membranokinetic reed*	The interruptive device is made of an elastomeric membrane which is stretched and coupled with a resonating tube	
422.51 Without fingerholes		*Tornado*
422.52 With fingerholes		
421.521 Single		*Calabria* [La Vena 1996, 157-158]
421.522 Sets		
422.6 *Reedpipes with chordokinetic reed*	The interruptive device is a stretched strip, coupled with a resonating tube	
422.61 Without fingerholes[50]		
422.62 With fingerholes		*British Columbia* [Galpin 1902-1903]
423 Trumpets	The air-stream passes through the player's vibrating lips, so gaining intermittent access to the air column which is to be made to vibrate	
423.1 *Natural trumpets*	Without extra devices to alter pitch	
423.11 Conches	A conch shell serves as trumpet	
423.111 End-blown		
423.111.1 Without mouthpiece		*India*
423.111.2 With mouthpiece		*Japan (rappakai)*
423.112 Side-blown		*Oceania*
423.12 Vessel trumpets	The vibrating air is confined inside a vessel	

49. See footnote 41 about *taxon* 412.121.2.

50. This *taxon* is inserted here for the sake of completeness of the taxonomic scheme, since its definition still requires further in-depth analysis. In general terms, besides considering the single case studies in literature or in museums, one has first to take into account what Hornbostel and Sachs pointed out about *taxon* 422.4 «Reedpipes with free reeds»: «the reed vibrates through [at] a closely-fitted frame. There must be fingerholes, otherwise the instrument belongs to the free reeds», especially concerning the specification in the final part of the description.

423.121 End-blown	The player's lips are placed in the more longitudinally distant point to the distal opening	*Trumpets with clay vessels as resonators, Rio Negro* [Izikowitz 1935, 236-237]; *polyglobular trumpets from Guiana* [Izikowitz 1935, 239-241]
423.122 Side-blown		*Vessel trumpets from South America (Buzina 'Masen'), Matis Atalaya, Javaru Valley; south of Rio Amazonas (tucurima)*
423.13 Tubular trumpets		
423.131 End-blown trumpets	The mouth-hole faces the axis of the trumpet	
423.131.1 End-blown straight trumpets	The tube is neither curved nor folded	
423.131.11 Without mouthpiece		*Some alphorns*
423.131.111 Single		
423.131.112 Sets[51]		*The bark trumpets in different sizes, like panpipes, and played in couples during Christian rites in Bolivia*
423.131.12 With mouthpiece		*Almost world-wide*
423.131.2 End-blown horns	The tube is curved or folded	
423.131.21 Without mouthpiece		*Asia*
423.131.22 With mouthpiece		
423.132 Side-blown trumpets[52]	The embouchure is in the side of the tube	
423.132.1 Side-blown straight trumpets		*South America*
423.132.2 Side-blown horns		*Africa*
423.2 *Chromatic trumpets*	With extra devices to modify the pitch	
423.21 Trumpets with fingerholes		*Cornetti, key bugles*
423.22 Slide trumpets	The tube can be lengthened by extending a telescopic section of the instrument	*European trombone*
423.23 Trumpets with valves	The tube is lengthened or shortened by connecting or disconnecting auxiliary lengths of tube	*Europe*
423.231 Valve bugles	The tube is conical throughout	
423.232 Valve horns	The tube is predominantly conical	
423.233 Valve trumpets	The tube is predominantly cylindrical	

Suffixes for use with any division of this class (aerophones)

-5 with further holes not for fingers
-6 with air reservoir
-61 with rigid air reservoir
-62 with flexible air reservoir
-7 with fingerhole stopping
-71 with keys
-72 *Bandmechanik*
-8 with keyboard
-9 mechanically driven

51. This *taxon* refers specifically to instruments made of tubes of different sizes. It does not refer to the plurality of trumpets (and horns) played by groups of people, in which each instrument pertains to a player and the musicians play all together simultaneously, according to a *hoquetus* playing technique. There are remarkable examples in Central Africa, particularly famous is the case of the Banda Linda.

52. This group would benefit from a further distinction depending on the presence or absence of a mouthpiece. If the mouthpiece is intended as a cavity inside a depression of the surface of the instrument where the lips of the player are placed when playing, which communicates with the internal bore through a tight passage, also side-blown horns often have a similar mouthpiece, which is integral with the body of the instrument, and is in relief in the external surface.

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Erich M. von Hornbostel - Curt Sachs

Sistematica degli strumenti musicali

traduzione italiana, aggiunte e revisioni di Febo Guizzi[1]

1. Le imprese classificatorie sono generalmente qualcosa di incerto. Ciò che deve essere ordinato e sistematizzato nasce sempre in assenza di un sistema, e cresce e si modifica senza riguardo a schemi concettuali. L'oggetto della classificazione è sempre qualcosa di vivo, dinamico, che non conosce confini netti e non conosce forme invariabili. Al contrario il sistema è statico, dotato di linee di separazione e di categorie ben definite.

2. Da questi contrasti derivano per il sistematico particolari difficoltà, ma anche particolari stimoli al suo lavoro. Lo scopo che egli si impone è quello di formare e affinare i concetti in modo tale che essi si adattino sempre più alla realtà della sua materia, acuiscano la sua percezione e lo rendano capace di collocare in modo rapido e sicuro un caso specifico entro lo schema.

3. Sono interessati a un ordinamento sistematico degli strumenti musicali in primo luogo gli storici della musica, gli etnologi e i curatori di raccolte etnografiche e storico-culturali. Ma un ordinamento e una nomenclatura sistematici costituiscono una necessità urgente non solo ai fini della raccolta di oggetti, ma anche per la loro osservazione e interpretazione. Chi fa riferimento a uno strumento musicale in base al senso comune, o ne dà una descrizione senza cognizione delle implicazioni che lo riguardano, causa maggiore confusione che non se lo avesse lasciato del tutto inosservato. Nel linguaggio comune i termini tecnici vengono largamente confusi. Lo stesso strumento può essere denominato liuto, chitarra, mandolino, banjo; l'inesperto può essere fuorviato da nomi gergali o da etimologie popolari; così, il tedesco *Maultrommel* non è un tamburo, l'inglese *Jew's* (più propriamente *jaw's*, 'mandibolare') *harp* non ha nulla a che vedere con l'arpa, come lo svedese *mungiga* con il violino (*Geige*), né il fiammingo *tromp* con la tromba, e soltanto i russi non sbagliano, nel momento in cui chiamano il medesimo strumento, una lamella pizzicata, con il nome non compromesso di *vargan*

1. Gli emendamenti proposti dal traduttore sono in blu. Una prima bozza di questo testo è stata messa a disposizione dei partecipanti delle giornate di studio internazionale *Reflecting on Hornbostel-Sachs's Versuch a century later*, organizzate dalla Fondazione Levi, Venezia, 3-4 luglio 2015 [ndc].

(dal greco ὀργανον = strumento). I casi di omonimia non sono meno rischiosi di quelli di sinonimia. Il termine *marimba* nella regione del Congo designa lo strumento a lamelle generalmente definito s*ansa*, ma altrove esso designa uno xilofono. La letteratura etnologica pullula di definizioni di strumenti musicali fuorvianti o fraintese, e nei musei, dove alle relazioni dei raccoglitori si attribuisce il valore di istanza suprema, i termini più insensati si trasferiscono sino ai cartellini. Descrizioni e nomenclature corrette presuppongono la conoscenza degli elementi distintivi più importanti di ciascun tipo. Una visita a caso di qualsiasi museo dimostra che tale presupposto è raramente realizzato a sufficienza. Si potrà constatare con assoluta ripetitività che, ad esempio, gli oboi, che pure potrebbero essere identificati senza equivoci in base all'ancia doppia di cui sono dotati, vengono catalogati come flauti o, nel migliore dei casi, come clarinetti; e dal momento che l'oboe può avere un padiglione di ottone, si può esser certi dell'identificazione come tromba.

4. Un sistema classificatorio comporta vantaggi non solo per i teorici, ma anche per i pratici. Oggetti che altrimenti mostrerebbero di per sé pochi punti di contatto spesso possono essere accomunati ed essere ricondotti con l'osservazione a nuove connessioni genetiche e storico-culturali. Qui si colloca la pietra di paragone più rilevante per la validità dei criteri distintivi, di cui la classificazione si serve.

5. Le difficoltà che un accettabile sistema di classificazione degli strumenti musicali deve superare sono molto grandi; ciò che può andare bene per gli strumenti di una determinata epoca o di un determinato popolo può dimostrarsi inutilizzabile se lo si pone a fondamento degli strumenti di ogni popolo e di ogni epoca. Gli antichi cinesi, ad esempio, avevano assunto quale principio distintivo quello della materia. Essi distinguevano tra strumenti di pietra, di metallo, di legno, di zucca, di bambù, di pelle e di seta. Le trombe e i gong erano accorpati, così come i litofoni e i flauti di marmo, o gli oboi e le castagnette.

6. Non ottiene risultati migliori la nostra pratica attuale. Essa divide gli utensili sonori in tre grandi categorie, strumenti a corda, strumenti a fiato, strumenti a percussione. A favore di questa suddivisione non si può nemmeno addurre che essa corrisponda alle esigenze della vita quotidiana, poiché una grande quantità di strumenti non può essere compresa in alcuno dei gruppi, se non a costo di subire innaturali forzature, come è nel caso, ad esempio, della celesta, che dovrebbe essere annoverata tra gli strumenti a percussione, come i tamburi, ecc. Ci si aiuta con una quarta categoria, penosamente intitolata 'miscellanea', la cui presenza in un qualsivoglia sistema di suddivisione

testimonia da sola della povertà dello stesso. Ma la classificazione di uso corrente è non soltanto povera, è anche e soprattutto illogica. Il primo requisito da soddisfare riguarda il criterio fondamentale della suddivisione, che deve restare sempre lo stesso. In questo caso invece la suddivisione si basa su due diversi principi: essa ha a che fare, per gli strumenti a corda, con la natura del corpo vibrante, per gli strumenti a fiato e a percussione, con il modo di produzione del suono, senza contare che esistono anche strumenti a corda che funzionano in quanto vengono sottoposti al flusso dell'aria o alla percussione, come è nel caso dell'arpa eolia e del pianoforte. Le ulteriori suddivisioni di uso comune non sono migliori. Gli strumenti a fiato si distinguono in legni e ottoni, e in questa suddivisione si attribuisce un rilievo del tutto ingiustificato a un principio secondario di differenziazione, quello cioè basato sul materiale con cui essi sono costruiti, e si sottovaluta il fatto che molti 'ottoni', come i cornetti, i serpentoni, i corni di bassetto, sono o sono stati fatti di legno, e, soprattutto, che molti 'legni', come i flauti, i clarinetti, i saxofoni, i sarrusofoni, i tritonicons, ecc., sono costruiti occasionalmente o di regola in metallo.

7. Le perplessità derivanti dalla rozzezza delle suddivisioni usuali non sono ignote all'organologia, tanto che negli ultimi decenni gli studiosi hanno fatto più di un tentativo di arrivare a proficui risultati. Accanto a ogni sorta di classificazione che risulti dalla consistenza casuale di una o dell'altra raccolta, nei cataloghi più recenti ha preso piede quasi dappertutto la suddivisione che Victor Mahillon pose a fondamento, a partire dal 1888, del suo vasto catalogo degli strumenti del Museo del Conservatorio di Bruxelles.

8. Mahillon prende come primo principio di divisione la natura del corpo vibrante e opera una distinzione tra gli strumenti 1) il cui materiale è abbastanza rigido ed elastico per vibrare periodicamente, cui conferì il nome di «strumenti autosuonanti» (*Instruments autophones*[2]), 2) gli strumenti il cui generatore di suoni è costituito da una membrana sottoposta a tensione, 3) quelli il cui generatore è costituito da corde e infine 4) quelli il cui generatore

2. Preferiamo la definizione 'idiofoni' per i motivi che Sachs [1913, 195a] ha esposto nel suo *Reallexikon der Musikinstrumente*. Se ne fornisce qui di seguito la traduzione: «Idiofoni strumenti. V. Mahillon ha il grande merito di aver raggruppato in una classe sotto il nome di 'strumenti autofoni' tutti gli attrezzi sonori che in base alla loro natura sono in grado di emettere suono, il cui materiale cioè è in sé sufficientemente elastico per essere posto in vibrazione per mezzo della percussione, del pizzico, dello sfregamento o anche sotto impulso dell'aria, in contrapposizione a quelli la cui sostanza primaria vibrante deve essere sottoposta a tensione in modo artificiale, come negli strumenti a membrana e a corda. La sistematica organologica dovrà sempre misurarsi con una classe così definita, tuttavia non potrà mantenerne nel tempo il nome perché il profano potrebbe capire che si intende uno strumento automatico, cioè che suona da solo. Proponiamo di dare a questa classe la denominazione di 'idiofoni', cioè 'che suonano in virtù della loro natura'. Cfr. per quelli a percussione: cimbali, campana, gong, *harmonika*, castagnette, litofono, crepitacolo, piastra a battente, bastone a battente, raschiatoio, tubo percosso, triangolo. Per quelli a pizzico: *huan t'u*, scacciapensieri, scatola musicale, *sansa*. Per quelli a sfregamento: strumenti a frizione. Per quelli ad aria: *Äolsklavier*, *ku tang*, *Piano chanteur*».

di suoni è una colonna d'aria. Perciò egli distingue quattro categorie: autofoni, strumenti a membrana, a corda e a vento. Oltre all'unitarietà del principio di suddivisione, questo sistema ha il grande pregio di comprendere quasi tutta la massa di strumenti, nuovi e antichi, europei ed esotici che siano.

9. Il sistema a quattro classi di Mahillon merita il più alto riconoscimento perché non solo risponde alle esigenze della logica, ma anche perché esso mette a disposizione di chiunque voglia servirsene un mezzo semplice e sottratto all'arbitrio soggettivo; in più esso non si discosta dalle suddivisioni precedentemente in uso così marcatamente da offendere le abitudini ben consolidate.

10. Ci è parso tuttavia che l'ulteriore ampliamento del sistema a quattro classi reclamasse un impellente rinnovamento. Mahillon parte dagli strumenti dell'orchestra moderna; egli infatti, da costruttore di strumenti e da musicista, mostra una maggiore sensibilità nei confronti di questi, che gli hanno fornito il primo spunto per la sua sistematica. Egli poi nel suo incessante lavoro pluridecennale ha dominato l'infinitamente vasto territorio dell'organologia europea ed esotica, mano a mano che sotto la sua esemplare guida cresceva il patrimonio del Museo di Bruxelles. Non si è potuto peraltro evitare che, innanzitutto, qualche esemplare di nuova acquisizione non si lasciasse inserire nel sistema, e poi che alcuni criteri di suddivisione, che svolgono un importante ruolo nello strumentario europeo – strumenti a tastiera o a movimento meccanico – occupassero un posto ingiustificatamente importante. In effetti, per amore verso gli strumenti europei, Mahillon si è lasciato andare a mettere insieme categorie che dal punto di vista logico non fondano concetti coordinabili. Egli suddivide gli strumenti a fiato in quattro rami, e cioè: 1) strumenti ad ancia; 2) strumenti a imboccatura; 3) strumenti polifonici con riserva d'aria; 4) strumenti a bocchino. Oppure suddivide i tamburi in tamburi a cornice, tamburi a recipiente e tamburi bipelli. Perciò suddivide i tamburi a membrana, corrispondenti al nostro tamburo militare e al timpano, così come gli strumenti autofonici, in strumenti a intonazione indeterminata (*instruments bruyants*) e strumenti a intonazione determinata (*à intonation determinée*). Questa è una suddivisione infelice, perché tra i rumori puri e le note prive di rumore si dà tutta una serie di possibili passaggi e non esistono generatori di suoni, a parte pochi strumenti da laboratorio, che producano rumori veramente puri o note pure; piuttosto, i suoni di tutti gli strumenti musicali in uso sono sempre più o meno velati da rumore. Mahillon stesso sembra essersene accorto, poiché di recente ha contrapposto agli strumenti 'rumorosi' quelli *à intonation nettement o intentionellement déterminée*. Questo però è un criterio soggettivo e di regola non verificabile.

11. In generale Mahillon era nel giusto nel suddividere direttamente le quattro classi principali in 'rami' ordinati in base al modo in cui gli strumenti vengono suonati. Tuttavia per gli strumenti a corda ciò è molto dubbio: un violino resta un violino, indipendentemente dal fatto che esso sia sfregato con l'arco, o pizzicato con le dita o percosso *col legno*.[3] Ciò può sembrare un argomento zoppicante, dal momento che il violino è predisposto ad essere suonato specificamente con l'arco. Ma vi sono altri esempi: si pensi infatti a strumenti la cui forma è rimasta costante, mentre il modo in cui essi vengono suonati è mutato nel corso del tempo. Questo è il caso, tra gli altri, dell'antico *crowd* dei Celti, il quale nel periodo più antico è documentato che fosse uno strumento a pizzico e poi nel corso dell'alto medio evo passò ad essere suonato con l'arco. Un'eventuale storia degli strumenti musicali dovrebbe perciò descrivere uno strumento che è assolutamente lo stesso, per metà collocandolo nel capitolo degli strumenti a pizzico e per l'altra metà in quello degli strumenti ad arco? Ovvero si consideri il caso del salterio, il quale, per il fatto che il suonatore impugna le bacchette, diventa uno *Hackbrett*: in una collezione di strumenti, i salteri, tra loro non altrimenti distinguibili, dovrebbero essere suddivisi in due gruppi solamente per il fatto che nel paese da cui provengono vengono usati gli uni con la tecnica del pizzico e gli altri con quella della percussione? Dovremmo mettere insieme il clavicordo e il pianoforte, ma poi accorpare il clavicembalo con le chitarre, per il fatto che le sue corde sono pizzicate?

12. Tutte queste riflessioni ci hanno indotto a intraprendere un nuovo tentativo di classificazione degli strumenti musicali. Noi ci siamo peraltro trovati nella felice situazione di disporre, come base già oggi consolidata, della conoscenza degli innumerevoli oggetti, esaurientemente descritti, della raccolta di Bruxelles, a partire dalla quale è stato fondato e sviluppato il sistema di Mahillon. Non si può nemmeno ignorare che, con la continua espansione delle conoscenze, soprattutto delle forme extraeuropee, sempre nuove complicazioni si presentano a una classificazione coerente.
Appare perciò escluso che si possa oggi pubblicare un sistema che non richieda sviluppi e correzioni.

13. In accordo con Mahillon, anche noi abbiamo accettato il processo fisico di produzione del suono quale principale criterio di suddivisione; ma già a questo livello ne conseguono difficoltà non irrilevanti, per il fatto che la fisica acustica ha portato a termine solo una piccola parte dei suoi compiti preliminari. Così sono ancora del tutto insufficientemente esplorati la produzione del suono del rombo, il modo di vibrazione delle ancie a nastro dell'America nord-occidentale,

3. In italiano nel testo.

il comportamento vibratorio delle campane, dei gong, dei timpani, dei tamburi a pizzico, degli strumenti a fiato ad ancia libera muniti di fori digitali. Altre difficoltà, derivanti dalla morfologia degli strumenti, si aggiungono a queste. Così è difficilmente risolvibile il problema del confine entro cui vale in modo totalmente soddisfacente il concetto di tamburo a cornice (*tamburin* = tamburello). Indubbiamente il tamburo a cornice più rispondente al tipo fornisce un concetto ben definito, che un sistema classificatorio non può fare a meno di prendere in considerazione. La transizione tra un tamburo a cornice ben definito e un ben definito tamburo tubolare si compie tuttavia senza soluzione di continuità, e spesso è impossibile stabilire se si tratti dell'uno o dell'altro sulla base della forma.

14. La croce del sistematico è poi rappresentata dalle contaminazioni. In quanto tali esse devono essere considerate inserendole in due (o più) gruppi. Nelle raccolte e nei cataloghi esse saranno ordinate in base alla caratteristica di maggiore importanza; ma non dovrebbero essere omessi i riferimenti negli altri gruppi. Così, ad esempio, gli strumenti di tutte le classi possono essere dotati di dispositivi del tipo crepitacolo, che vanno inventariati tra gli idiofoni, sebbene non debbano essere considerati nella classificazione. Quando tuttavia la contaminazione ha generato un'unità morfologica permanente – come nel caso del liuto a spiedo derivato dall'unione del timpano e dell'arco musicale – è necessario trovare la sua specifica collocazione all'interno del sistema.

15. Ci dobbiamo esimere dal giustificare in dettaglio la nostra suddivisione. Chi la analizza criticamente o la prova sul piano pratico probabilmente ripeterà egli stesso con variazioni irrilevanti le nostre riflessioni non esplicitate.

16. Nei sistemi di classificazione si usa spesso designare l'ordine gerarchico dei gruppi all'interno del sistema per mezzo di appositi titoli. Ciò avviene soprattutto in zoologia e in botanica per mezzo di espressioni quali classe, ordine, famiglia, genere, specie, varietà. In campo organologico già Mahillon sentì questa esigenza e la soddisfece per mezzo delle definizioni di *classe*, *branche*, *section*, *sous-section*. Su consiglio di Gevaert egli rinunziò ad introdurre il termine 'famiglia', dal momento che esso si trova applicato in organologia come ben nota denominazione collettiva degli strumenti di uguale struttura, ma di diversa dimensione e intonazione.

17. Abbiamo ritenuto inattuabile l'adozione di una titolazione unitaria per tutte le rubriche sulla base delle seguenti considerazioni. Troppo vasto è il numero delle suddivisioni, per venirne a capo senza una pignola gestione dei titoli; inoltre in ogni sistema deve essere preservata la possibilità di

compiere un'ulteriore o più ampia ripartizione in rapporto con le necessità del singolo caso, in modo che il numero delle sottoripartizioni possa ancora crescere. Nel sistema i gruppi di rango uguale non sempre sono coordinati, dal momento che intenzionalmente non abbiamo suddiviso i vari gruppi sulla base di un principio unitario, ma abbiamo adattato il criterio di suddivisione alla caratteristica del gruppo. Avviene perciò che espressioni come 'specie' vengano a volte applicate a un concetto molto generale e altre volte a un concetto molto particolare. Desideriamo pertanto proporre di limitare i titoli generali di categoria ai gruppi superiori. Si possono definire classi (*classes*), come fa Mahillon, i quattro gruppi principali, e i successivi gruppi sottoclassi (*subclasses*) quelli a due cifre, ordini (*ordines*) quelli a tre cifre e sotto-ordini (*subordines*) quelli a quattro cifre.

18. Abbiamo rinunciato a indicare suddivisioni che non siano già popolate da tipi esistenti ad eccezione dei casi in cui un tipo più complesso presupponga necessariamente un tipo precedente più semplice ma estinto. Pertanto, in base all'analogia con numerosi altri tipi, si deve ritenere che un blocco di legno pieno e levigato sia stato sottoposto a sfregamento con la mano umida prima che da esso sia stata ricavata con un lavoro di intaglio una serie di lamelle differentemente intonate, come avviene nel caso del blocco di legno a sfregamento del Nuovo Mecklemburgo.[4] Anche i crepitacoli presentano una ricchezza di forme talmente varia che possono essere forniti solo criteri ordinatori del tutto generali, i quali certamente necessitano di un'ampia integrazione.

19. In generale abbiamo tentato di utilizzare solamente principi classificatori che possano essere individuati già sulla base della mera forma esteriore degli strumenti, senza arbitri soggettivi e senza dover smontare gli strumenti stessi. Era necessario prendere in considerazione sia le esigenze dei conservatori dei musei, sia quelle dei ricercatori sul campo e degli etnologi. Con le suddivisioni ci siamo spinti sino al punto da soddisfare una rilevazione dei dettagli soddisfacente dal punto di vista storico-culturale. Lo sviluppo dell'insieme consente l'applicazione della classificazione ai materiali oggetto di studio, sia in termini sommari, sia nella sua interezza; si può utilizzare la nostra classificazione per trattati generali e piccole raccolte senza spingersi sino alle ultime conseguenze, mentre monografie specializzate e i cataloghi di grandi musei possono facilmente procedere sino ai dettagli più spinti.

4. L'arcipelago del Nuovo Mecklemburgo era così chiamato nel 1914, sotto il dominio coloniale tedesco. Dopo la guerra 1914-1918 la perdita dei possedimenti coloniali da parte della Germania sconfitta provocò il mutamento di molti nomi geografici. Oggi quelle isole sono denominate Nuova Irlanda, avendo mantenuto il nome imposto dai geografi dell'impero britannico. Si è preferito mantenere i nomi originari dell'edizione del 1914, eventualmente integrandoli, a chiarimento, con i nomi attualmente correnti.

20. L'uso dei nostri dati ai fini della catalogazione e della descrizione può essere facilitato dall'adozione del sistema numerico Dewey.[5] Qualora i responsabili delle collezioni, che in futuro dovessero intraprendere la catalogazione, convenissero di adottare il nostro sistema numerico, sarà possibile ricercare un tipo accertando a prima vista se esso sia rappresentato nella collezione.
La geniale idea di Dewey consiste nell'utilizzare esclusivamente cifre, e cioè elementi di una serie decimale, in luogo degli abituali agglomerati di numeri, lettere, doppie lettere, in modo che ogni ulteriore suddivisione viene segnalata per mezzo dell'aggiunta di una nuova cifra all'estremità destra della stringa; lo zero che precede la serie decimale viene invariabilmente omesso. In questo modo si rende possibile non solo approfondire come meglio aggrada la specificazione senza trovarsi in difficoltà con la numerazione, ma si riconosce anche immediatamente, in base al valore posizionale dell'ultima cifra, la logica collocazione gerarchica nel sistema del concetto espresso. Possono essere inoltre ascritte a ogni gruppo tutte le posizioni che si vogliono con l'ausilio di punti inframmezzati all'interno della stessa serie di cifre. Un esempio: si deve definire e classificare un concerto di campane. Secondo il nostro sistema si tratta di un idiofono, per cui la prima cifra attribuita è 1. Poiché esso viene percosso, la sua sottoclasse di appartenenza è la prima, per cui a quell'1 si aggiunge un altro 1 (Idiofoni a percussione = 11). Dal momento che si tratta di una percussione non mediata, con l'ulteriore aggiunta di una cifra ordinatoria significativa si ottiene la posizione gerarchica 111. In quanto idiofono a battente esso ottiene la quarta cifra 2 (1112 = idiofoni a battente). Ulteriori specificazioni conducono alla numerazione 11124 (Corpi concavi a battente), 111242 (Campane), 1112422 (Campane in serie), 11124222 (Campane in serie sospese), 111242222 (Campane in serie a batacchio). Chiaramente, ognuno può decidere sino a dove spingersi di volta in volta. Dal momento che il numero cui siamo arrivati è ingestibile, lo facciamo diventare 111.242.222. Il primo gruppo di cifre dice che si tratta di un idiofono a percussione non mediata, e il primo e il secondo insieme dicono che si sta parlando di campane.

22. Per mezzo di altre cifre numeriche, da aggiungersi per il tramite di un trattino in coda al vero e proprio numero sistematico, possono essere annotate caratteristiche comuni che possono entrare in gioco per tutti gli strumenti di una classe, come ad esempio nel caso dei membranofoni quella che riguarda il modo di fissaggio della membrana o per i cordofoni il sistema di eccitazione delle corde; così il nostro pianoforte otterrà il numero sistematico 314.122-4-8, il clavicembalo il numero 314.122-6-8, ove 8 designa la tastiera, 4 il sistema

5. Poiché il sistema di numerazione degli strumenti musicali della Bibliographie Internationale può essere applicato solo alle moderne forme europee e anche per queste è inadeguato per quanto può esserlo, abbiamo elaborato la nostra numerazione in modo totalmente indipendente.

di suono per mezzo di martelletti, 6 il sistema di suono per mezzo di plettri, mentre i numeri sistematici principali indicano una cetra a tavola con cassa di risonanza.

23. Si può presentare, per ragioni particolari, l'opportunità di far assumere il ruolo di concetto principale a uno dei criteri secondari di suddivisione, il che può essere ottenuto semplicemente cambiando la disposizione delle cifre. Così, una zampogna, in cui sia il chanter sia i bordoni siano costituiti tutti da clarinetti, dovrebbe essere individuata come 422.22-62,[6] cioè una serie di clarinetti munita di serbatoio d'aria flessibile. Se tuttavia, in una ipotetica monografia sulle zampogne, si volessero distinguere le canne le une dalle altre, si potrebbe scrivere: 422-62:22, e cioè uno strumento costituito da tubi ad ancia con serbatoio d'aria flessibile (= zampogna), le cui canne sono esclusivamente clarinetti.

24. Si potrà peraltro far assumere la posizione di criterio subordinato a uno principale, nel caso in cui si vogliano accorpare più strettamente gruppi che il sistema separa, senza con ciò stravolgere il sistema stesso. Basta semplicemente sostituire al codice numerico in questione un punto e farlo seguire da una] (parentesi quadra chiusa). In tal modo, nell'esempio precedente, poiché le zampogne sono sempre strumenti poliorganici, ma a volte costituiti da clarinetti, a volte da oboi, invece di: 422-62 : 22 = strumento ad ancia, munito di serbatoio d'aria flessibile, poliorganico,[7] costituito da clarinetti – si può scrivere: 422-62 : . 2 = serie di tubi ad ancia con serbatoio d'aria flessibile = zampogna, e poi differenziare ciò in 422-62 : . 2]1 = zampogna fatta di oboi e 422-62 : . 2]2 = zampogna fatta di clarinetti.[8]

25. Ulteriori specificazioni operate su un concetto subordinato andranno connesse al codice numerico di quest'ultimo: 422-62 : . 2]212 = zampogna costituita da clarinetti con canneggio cilindrico e fori digitali.

26. Nelle numerose occasioni in cui gli strumenti sono composti da singoli elementi che di per sé appartengono a diversi gruppi del sistema, ciò può essere indicato legando i rispettivi codici numerici per mezzo di un segno

6. In realtà, nella revisione di Febo Guizzi, i clarinetti corrispondono non al *taxon* 422.2 ma a 422.3 [ndc].

7. 'Poliorganico' significa costituito da molteplici strumenti singoli.

8. I segni - :] qui hanno subito una leggera modifica rispetto l'uso che se ne fa nella Classification Bibliographique Décimale, anche se non si discostano dal senso proprio di questo sistema. Queste sono le regole: il trattino viene usato soltanto in connessione con le cifre dei suffissi elencati in calce a ciascuna tavola; per le ulteriori suddivisioni dopo le cifre dei suffissi queste sono seguite dai due punti (così 422-62 = strumento ad ancia con serbatoio d'aria flessibile, ma 422-6 : 2 = 422.2-6 clarinetto con serbatoio d'aria!); per le ulteriori suddivisioni dopo un'omissione segue la parentesi quadra chiusa] .

'più'. Si può anche isolare il gruppo numerico comune a entrambi i codici per mezzo di un punto e scriverlo una sola volta; in tal modo possiamo definire un moderno trombone munito di coulisse e pistoni con 4232.2+3 invece di 423.22+423.23. Analogamente nell'esempio delle zampogne di cui sopra, si potrà simbolizzare lo strumento composto in parte di oboi e in parte di clarinetti con 422-62 : . 2]1+2.[9]

27. In qualche caso può rendersi necessario non solo riordinare la disposizione gerarchica dei concetti, non solo creare nuove suddivisioni, ma anche inserire nei più alti livelli di classificazione un criterio che non era stato deliberatamente preso in considerazione all'interno del sistema. Non vi è motivo per non farlo. Ciò è quanto vorremmo dimostrare con un ultimo esempio, indicando nello stesso tempo come noi abbiamo concepito lo sviluppo del nostro sistema per scopi particolari. Ipotizziamo il caso di una monografia sugli xilofoni. Il sistema suddivide gli idiofoni a battente (111.2) in base alla forma del corpo percosso in barre a battente (111.21), piastre (111.22), tubi (111.23), e corpi concavi (111.24). Gli xilofoni possono far parte dei primi tre di questi gruppi, tuttavia nel loro caso la forma del corpo sonoro è poco rilevante – essendo tra l'altro la transizione dalle barre alle piastre impercettibile –, così possiamo rimuovere la quinta cifra e aggiungerla facoltativamente alla fine]2. Nei casi in cui la descrizione abbia a che fare con strumenti politonali, immettiamo come sesta cifra un 2. Si ottiene: 1112. .2 = serie di strumenti a battente. A questo punto devono essere esclusi i corpi sonori di metallo, pietra, vetro, ecc.; dobbiamo così creare una suddivisione ad hoc in base ai materiali, che nel sistema non è contemplata, qualcosa come:

1112. .21	= xilofoni	corpo sonoro di legno
1112. .22	= metallofoni	corpo sonoro di metallo
1112. .23	= litofoni	corpo sonoro di pietra
1112. .24	= cristallofoni	corpo sonoro di vetro

L'ulteriore classificazione degli xilofoni dovrebbe adottare qualche criterio morfologico significativo anche in prospettiva etnologica:

9. Nell'originale tedesco del 1914 compare qui un'incongruenza che è molto probabilmente frutto di un errore di stampa: l'esempio riportato appare infatti così espresso: 422.62 : . 2]1 + 2, mentre dovrebbe più correttamente essere scritto nel seguente modo (che è quello leggibile nel testo della presente versione italiana): 422-62 : . 2]1 + 2. Il secondo gruppo di cifre è infatti composto da 62, che essendo un suffisso comune alla classe degli aerofoni che indica la presenza di un serbatoio d'aria flessibile, deve essere preceduto dal trattino: -62. Il trattino a sua volta elide il punto dopo il primo gruppo di cifre 422 che, non essendo seguito dal secondo gruppo gerarchicamente subordinato, non ha più ragione di esistere in quella posizione. Si vedano a conferma i riferimenti ai codici numerici Dewey relativi alle zampogne nei paragrafi precedenti e, soprattutto, le direttive sull'uso dei simboli dettate dagli autori. Il refuso è passato anche nella traduzione inglese del testo di Hornbostel e Sachs pubblicata nel 1961 da A. Baines e K. Wachsmann.

1112. .21.1	**Xilofoni coricati**	I corpi sonori riposano su un sostegno elastico
1112. .21.11	**Xilofoni a stanghe**	Il sostegno è costituito da stanghe separate. (N.B. Al di sotto dei corpi sonori si apre di solito una buca nel terreno) *Oceania, Indonesia, Africa orientale e occidentale*
1112. .21.12	**Xilofoni a cornice**	I supporti sono connessi per mezzo di barre o di tavole trasversali.
1112. .21.121[10]	**Xilofoni ad arco**	Il telaio è appeso al collo del suonatore per mezzo di una tracolla ed è tenuto scostato dal corpo per mezzo di un arco. *Africa occidentale, orientale e sudorientale*
1112. .21.122	**Xilofoni a tavolino**	Il telaio è sorretto da una struttura. *Senegambia*
1112. .21.13	**Xilofoni a slitta**	I corpi sonori poggino sugli spigoli di due tavole disposte verticalmente. *Africa centrale*
1112. .21.14	**Xilofoni (coricati) su una mangiatoia**	I corpi sonori poggiano sull'apertura superiore di un recipiente a forma di mangiatoia o di cassa. *Giappone*
1112. .21.2	**Xilofoni sospesi**	I corpi sonori sono assicurati a due corde, senza sostegni. *Cocincina*
1112. .21.21	**Xilofoni a sospensione libera**	Privi di cassa. *Cocincina*
1112. .21.22	**Xilofoni sospesi a mangiatoia**	Con cassa a forma di mangiatoia. *India posteriore*,[11] *Giava*

10. Ulteriormente suddivisibili in:
1 Privi di risuonatore
2 Con risuonatore
21 Risuonatori sospesi singolarmente
22 Risuonatori fissati a una tavola comune.
N.B. I risuonatori, costituiti frequentemente da zucche, sono spesso dotati di fori chiusi da membrane: in questi casi si tratta di una contaminazione con 242 (mirliton vascolari). Il sistema di montaggio della membrana (diretto o per mezzo di un cono) può dare eventualmente vita a un'ulteriore suddivisione. Si può peraltro soprassedere dall'aggiungere un'altra cifra dal momento che non sono noti esempi di xilofoni a telaio privi di risuonatori.

11. Nell'originale *Hinterindien*, denominazione geo-politica che nel 1914 identificava la parte orientale della regione indiana appartenente all'impero britannico; comprende sino all'attuale Birmania. Si contrappone a India anteriore (*Vorderindien*) che è la parte più vicina all'Europa comprendente l'odierno Pakistan, il Kashmir e i territori occidentali dell'India continentale e peninsulare.

29. Il seguente quadro sistematico degli strumenti musicali è proposto in forma di tabella, ma è pensato contemporaneamente come una tavola definitoria. Nella colonna delle caratteristiche tipologiche si forniscono pertanto di quando in quando avvertenze su equivoci probabili o su possibili confusioni. I chiarimenti e gli esempi sono limitati allo stretto necessario; i primi non intendono proporsi come descrizioni, i secondi non pretendono di avere il valore di note storico-culturali. Nemmeno descrizioni lunghe intere pagine possono sostituire la visione diretta. L'esperto saprà di che cosa si tratta, e l'inesperto potrà essere orientato solo da una visita a un museo.

Classificazione	Caratteristiche	Esempi
1 Idiofoni	Il materiale di cui lo strumento è fatto emette suono in virtù della sua stessa elasticità e rigidità senza dover ricorrere alla messa in tensione di membrane o corde	
11 Idiofoni a percussione	Lo strumento è messo in vibrazione per mezzo della percussione	
111 Idiofoni a percussione non mediata	Il gesto percussivo è direttamente prodotto dal suonatore in quanto tale: non vanno presi in considerazione eventuali intermediari meccanici, mazzuoli, tastiere, funi campanarie e simili; è determinante che il suonatore sia in grado di produrre singoli colpi nettamente definiti, e che lo strumento sia predisposto per questa forma di percussione	
111.1 *Idiofoni a percussione reciproca ovvero crotali*[12]	Due o più parti sonore coordinate sono percosse l'una contro l'altra	
111.11 Bacchette[13] a percussione reciproca o crotali a bacchetta		*Annam, India,*[14] *Isole Marshall*
111.12 Piastre a percussione reciproca o crotali a piastra		*Cina, India*
111.13 Tegole a percussione reciproca o crotali a tegola		*Burma*

12. Hornbostel e Sachs usano il termine specifico *Klappern* per sintetizzare la definizione generale di 'idiofoni a percussione reciproca'. Il termine esiste anche nella lingua inglese (*clappers*), e si suppone sia di origine onomatopeica, tanto che il verbo *to clap* significa applaudire (cioè percuotere reciprocamente le mani, per eccellenza simmetriche, l'una contro l'altra). L'italiano non possiede una parola con le stesse caratteristiche di onomatopea universalmente diffusa. Tuttavia il significante storicamente stabilizzatosi ad indicare questa particolarità della percussione reciproca nella lingua colta è 'crotalo', dal latino a sua volta derivato dal greco. Esso è altrettanto univoco dei corrispettivi linguistici tedesco e inglese, anche se circoscritto all'uso letterario (si veda Battaglia [1964], alla voce *Crotalo*). Si è evitato di dare spazio al sostantivo 'concussione' per esprimere la percussione reciproca, nonostante una sua sufficiente pertinenza etimologica, per il fatto che esiste un uso specialistico in ambito giuridico di questo termine, molto lontano anche in sede analogica da quello musicale, che è prevalso da molto tempo nell'uso scritto e parlato, ormai anche non specialistico.

13. Bacchetta o barra (vedi 111.21): può essere a sezione cilindrica o poligonale (con spigoli); può essere inoltre piena o cava (tubolare); può avere forma lineare o essere a forma di anello (il che costituisce una variante morfologica significativa, collocabile poco al di sotto del livello distintivo di 'bacchette / piastre / tegole / corpo concavo'). Va segnalato il fatto che, mentre più avanti si prevede espressamente il *taxon* relativo ai «tubi a battente» (111.23), i tubi in quanto tali non sono autonomamente considerati tra i crotali. Tuttavia è semplice integrare la sistematica con l'ulteriore *taxon* 111.15 Tubi a percussione reciproca o crotali tubolari.

14. *Vorderindien*, denominazione geopolitica che nel 1914 identificava la parte occidentale della regione indiana appartenente all'impero britannico; comprende l'odierno Pakistan, il Kashmir e i territori occidentali dell'India continentale e peninsulare. Si contrappone a India posteriore (*Hinterindien*), che è la parte orientale comprendente sino all'attuale Birmania.

111.14 Corpi concavi a percussione reciproca o crotali vascolari	Per corpo concavo si intende anche una tavola con un piccolo incavo	
111.141 Castagnette	Crotali concavi naturali o scavati	
111.142 Cimbali	Crotali concavi a cupola	
111.15 Tubi a percussione reciproca o crotali tubolari	Bacchette cave	
111.2 *Idiofoni a battente*	Lo strumento subisce la percussione per mezzo di un dispositivo non risuonante (mano, mazza, batacchio) ovvero se ne produce l'urto contro un dispositivo di tal fatta (corpo, suolo)	
111.21 Barre a battente		
111.211 Barre a battente (singole)		*Giappone, Annam, Balcani; appartiene a questo gruppo anche il triangolo*
111.212 Barre a battente in serie	Varie barre a battente di differente intonazione sono riunite a formare un unico strumento	*Tutti gli xilofoni, esclusi quelli le cui parti sonore non siano disposte su due piani*[15]
111.22 Piastre a battente		
111.221 Piastre a battente (singole)		*Nella Chiesa cristiana d'oriente*

15. In un primo tempo questa espressione problematica, nella sua sinteticità, mi aveva indotto a ritenere che la bidimensionalità fosse qui da intendersi in senso virtuale, e cioè come forma geometrica nella quale prevalgano di gran lunga la lunghezza e la larghezza in confronto con l'altezza (o spessore): qualcosa però che porta troppo direttamente al caso specifico previsto subito dopo delle piastre: l'idea, cioè, era che altrimenti, le parti sonore di uno xilofono non rispondenti a tale forma dovessero essere comprese nel *taxon* 111.222 Piastre a battente in serie: la distinzione opera comunque a proposito della diversa morfologia delle barre, da un lato, e delle piastre, dall'altro, che si completa con la previsione autonoma delle forme costituite da tubi in serie (111.232) e corpi concavi in serie (111.241.2 gong o 111.242.2 campane che siano). Il termine tedesco nell'originale è *biplan*, e cioè 'biplanare'; che tale aggettivo, di radice latina e scarsissimamente usato nella lingua tedesca, debba essere preferibilmente tradotto in modo letterale può apparire ovvio, ma in realtà una tale opzione porta a un esito non facilmente spiegabile: non si comprende infatti che cosa voglia dire uno xilofono con le parti sonore 'disposte su due piani', né, soprattutto, si comprende perché siffatti xilofoni non debbano essere riferiti al *taxon* delle barre a battente in serie. Questa è comunque l'opzione di Baines e Wachsmann nella traduzione inglese: «as long as their sounding components are not in two different planes». Che anche i due illustri organologi inglesi non fossero del tutto convinti è segnalato dal fatto che alla suddetta traduzione segue, prudentemente, il richiamo tra parentesi dell'espressione originale tedesca [*nicht biplan*]. Carlos Vega, da parte sua, mantiene il termine originale senza elaborazioni né interpretazioni («si sus componentes sonoros no son biplanos»). Si noti che Vega è stato allievo di Sachs e, ciò che più conta, sottopose la sua traduzione alla verifica personale dello stesso Sachs. Alla luce di tutto ciò, il punto pare essere quello della disposizione degli elementi sonori (da riferirsi quindi a tutte le ipotesi previste), per cui uno xilofono si caratterizza per avere una pluralità di dispositivi a battente disposti tutti in modo allineato, cioè 'sullo stesso piano': questa scriminante peraltro non va intesa nel senso stretto della planarità, poiché numerosi xilofoni (in Africa come in moltissimi casi del Sud Est asiatico) prevedono che la serie di elementi sonori sia sospesa in modo da tracciare una curva, con gli estremi in alto e il centro verso il basso. Una disposizione su due piani quindi rinvia all'ipotesi in cui vi siano elementi sonori di diversa misura disposti contemporaneamente sia sul piano orizzontale che su quello verticale o su piani intermedi tra i due.

111.222 Piastre a battente in serie		*Litofono (Cina), nonché la maggior parte dei metallofoni*
111.23 Tubi a battente		
111.231 Tubi a battente (singoli)[16]		*Tamburi a fessura, campane tubolari*
111.232 Tubi a battente in serie		*Tubaphon, xilofono tubolare*
111.24 Corpi concavi a battente		
111.241 Gong		
111.241.1 Gong (singoli)		*Asia meridionale e orientale; appartengono a questo gruppo anche i cosiddetti tamburi di metallo, o meglio i gong a caldaia*
111.242.2 Gong in serie		*Asia sud-orientale*
111.242 Campane	Le vibrazioni aumentano quanto più ci si allontana dal centro	
111.242.1 Campane (singole)		
111.242.11 Campane fisse	Il corpo cavo riposa nella mano o su un cuscino; l'apertura è rivolta verso l'alto	*Cina, Indocina, Giappone*
111.242.12 Campane appese	La campana è sospesa per il centro[17]	
111.242.121 Campane appese a martello	Invece di un batacchio attaccato, si ha un martello separato[18]	

16. Qui il concetto di tubo comprende i corpi allungati, cilindrici o poliedrici, con l'interno cavo o scavato, che sia o no comunicante con l'esterno nel senso della lunghezza; ciò giustifica la convivenza di campane tubolari e di tamburi a fessura. Questi ultimi peraltro potrebbero essere facilmente confusi con i corpi concavi; la distinzione sul piano morfologico e funzionale è piuttosto difficile soprattutto nel caso delle campane di legno a battente separato (campane appese a martello), che non di rado sono scavate in forma poligonale molto simile a quella di molti tamburi a fessura di legno: per risolvere il problema occorre rifarsi al contesto d'uso e alla diversa destinazione.

17. È opportuno specificare che tra le campane «sospese per il centro» deve essere compreso il caso delle *handbells*, e cioè delle campane munite di manico. Il principio tassonomico infatti raggruppa in un solo campo tutte le campane il cui funzionamento dipenda dall'esistenza di un sostegno centrale, che può pertanto essere anche costituito da un manico.

18. I dispositivi percussivi esterni sono di regola separati dalla campana; ciò vale non tanto e non solo per l'aspetto strutturale della connessione meccanica, quanto per quello funzionale: il martello separato di solito è messo in movimento contro la campana ferma, mentre il batacchio attaccato, che è di regola interno, si muove anche (ma non solo) per effetto dell'oscillazione della campana stessa. Esistono tuttavia anche campane appese a martello non separato, nel senso che esso è posto all'esterno ma è connesso con il dispositivo cui la campana è sospesa e compie la percussione per effetto del moto della campana stessa: un esempio è costituito dalle campane indocinesi per animali, fatte di legno o di bambù ma anche di metallo, a doppio martello esterno. Qualche equivoco insorge qua e là tra gli inesperti, che sono portati a classificare le campane, così come le tabelle o le traccole a martelli, tra gli idiofoni a percussione mediata, sotto specie di idiofoni a scuotimento. In realtà, la possibilità di regolare con precisione il singolo colpo percussivo, assicurata dalla struttura di questi strumenti al suonatore esperto, spazza via ogni equivoco.

111.242.122 Campane a batacchio	La campana è dotata di un batacchio attaccato[19]	
111.242.2 Campane in serie (con la rispettiva suddivisione)		
112 Idiofoni a percussione mediata	Il suonatore in quanto tale non esegue alcuna azione percussiva; la percussione risulta solo indirettamente come conseguenza di movimenti di altra natura da parte del suonatore; per definizione lo strumento è in condizione di far udire suoni o rumori complessi, ma non singoli colpi	
112.1 *Idiofoni a scuotimento o crepitacoli*	Il suonatore esegue un movimento scotitorio	
112.11 Crepitacoli in filze	Singoli corpi sonori attraversati da un foro sono infilati tutti insieme e si urtano reciprocamente in forza di scuotimenti	
112.111 Crepitacoli su corda	I corpi crepitanti sono infilati su una corda	*Collane di conchiglie infilzate*
112.112 Crepitacoli su bastone[20]	I corpi crepitanti sono infilzati su una verga (o su un anello)[21]	*Sistro ad anelli*
112.12 Crepitacoli su supporto[22]	I corpi crepitanti sono fissati ad un oggetto e battono contro di esso	
112.121 Crepitacoli a pendaglio	I corpi crepitanti sono appesi liberamente al supporto	*Scudo da danza con sonagliere ad anelli*

19. Possono essere sostituiti al verbo 'attaccare' i numerosi sinonimi che, oltre a esprimere con altre parole lo stesso concetto, possono di volta in volta adattarsi più strettamente, ciascuno con la propria microvarianza semantica, a diversi casi episodici in cui si concretizza la situazione dell'essere 'attaccato', espressa nell'originale dal verbo *festen*: accoppiare, congiungere, connettere, collegare, unire, applicare, ecc.

20. Possono essere sostituiti al sostantivo 'bastone' i vari sinonimi che, oltre a descrivere con altre parole lo stesso oggetto, possono di volta in volta adattarsi più strettamente, ciascuno con la propria microvarianza semantica, a diversi casi episodici in cui si concretizza la forma di 'bastone', espressa nell'originale dal sostantivo *Stab*: asta, pertica, verga, barra, tubo, manico (= in quest'ultimo caso si può parlare di crepitacoli immanicati), ecc.

21. Se l'aspetto fondamentale è quello della relativa libertà di scorrimento lungo un tratto lineare o anulare, non è facile distinguere i crepitacoli in filze su bastone da quelli su supporto a scorrimento. La differenza sta tutta nell'essere i primi forati e attraversati dalla verga, mentre i secondi sono a loro volta costituiti da elementi mobili inseriti entro fessure che li ospitano. Perciò appartiene ai primi il cosiddetto sistro apulo (con tubi scorrevoli su una bacchetta), e ai secondi il sistro dell'antico Egitto (con bacchette scorrevoli entro fori del supporto).

22. Qui compare nell'originale tedesco il termine *Rahmen* che tornerà più volte in relazione a diversi strumenti. Esso si può tradurre con diversi concetti, ovviamente contigui ma non sempre equivalenti, quali 'telaio', 'intelaiatura', 'armatura', 'struttura', 'cornice', alcuni dei quali di volta in volta potranno essere prescelti in relazione agli oggetti cui fa riferimento il rispettivo *taxon*. In questo caso il termine più adatto è 'supporto'; 'cornice' non funziona altrettanto bene di quanto avviene con i *Rahmentrommeln*, i tamburelli, nei quali in effetti il supporto della membrana è un vero 'telaio' esterno chiuso.

112.122 Crepitacoli a scorrimento	Corpi non risuonanti scorrono avanti e indietro entro fessure di un corpo sonoro e lo pongono in vibrazione, oppure corpi sonori scorrono avanti e indietro entro fessure di un corpo non risuonante e sono posti in vibrazione da parte di quest'ultimo ad ogni scorrimento	*Ankłung (tipo più recente), sistro a barre*
112.13 Crepitacoli globulari[25]	I corpi crepitanti sono racchiusi in un recipiente cavo e battono gli uni contro gli altri, contro le pareti del recipiente o di regola in entrambi i modi. N.B. Il crepitacolo eventualmente ricavato da una zucca con manico, nel quale i corpi crepitanti non siano racchiusi all'interno, ma siano annodati ad una rete posta all'esterno, va considerato quale variante dei crepitacoli globulari	*Gusci di frutto con semi, 'bubboli' con sonagli a sfera racchiusi e liberi di muoversi*
112.2 *Idiofoni a raschiamento*	Il suonatore compie direttamente o indirettamente un movimento di raschiamento: un corpo non risuonante passa su un corpo sonoro corrugato e viene alternativamente sollevato lungo i rilievi e rilasciato contro la superficie, oppure un corpo sonoro elastico passa su un corpo non risuonante corrugato e produce allo stesso modo una serie di percussioni. Questo gruppo non deve essere confuso con quello degli idiofoni a frizione	
112.21 Barre a raschiamento	Un bastone corrugato è raschiato per mezzo di una bacchetta	
112.211 Barre a raschiamento prive di risuonatore		*Sudamerica, India anteriore (arco musicale a tacche), Congo*

23. Nell'originale tedesco il termine usato è *Gefaß*, vale a dire 'recipiente'; per estensione si deve intendere 'corpo cavo'. Si è scelto di tradurre con 'globulare' per economia (evita l'uso di due parole) e per coerenza con quanto si è fatto a proposito di analoghe definizioni che compaiono più avanti in altre parti della classificazione, che riconducono più direttamente a usi terminologici già da tempo stabilizzati (è il caso dei flauti). Per 'globulare' si deve pertanto intendere anche un corpo cavo che abbia forma diversa da quella propriamente sferica o sferoidale: si vedano i crepitacoli ricavati da canne, e che dunque hanno forma cilindrica, o quelli formati da scatole, come certe sanze che contengono anche corpi crepitanti, o ancora da corpi cavi a zattera, ricavati da due facce di giunco intrecciato o di cannette giustapposte.

112.212 Barre a raschiamento con risuonatore		*Usambara*[24] *e Asia orientale (Tigre)*
112.22 Raschiatoi tubolari		*India meridionale*
112.23 Raschiatoi globulari	Un recipiente cavo con superficie scanalata è sottoposto a raschiamento	*Sudamerica e regione del Congo*
112.24 Raschiatoi a ruota o raganelle[25]	Una ruota dentata, il cui asse funge da manico, ed una tavoletta flessibile all'interno di un telaio liberamente ruotante attorno allo stesso manico; in virtù di movimenti rotatori la tavoletta batte contro i denti della ruota	*Europa, India anteriore*
112.3 *Idiofoni a strappo*	Strumenti a forma di compasso elastico, le cui punte siano reciprocamente a contatto; esse vengono separate con un movimento a strappo per mezzo di una bacchetta, per poi tornare a percuotersi in virtù della loro elasticità	*Cina (Huan t'u), Malacca, Persia (qâsik), Balcani, Calabria* [La Vena 1996, 89-90]
12 Idiofoni a dislocazione elastica[26]	Sottili elementi elastici, di regola piastre metalliche piccole o grandi, estese o lineari, fisse da un lato e libere dall'altro, subiscono uno spostamento dalla loro posizione di riposo, cui tornano in virtù della loro elasticità con movimento oscillatorio o sussultorio	
121 A dislocazione diretta o a pizzico	Lamine, cioè piccole piastre elastiche fissate ad una sola estremità, vengono incurvate, fino a scattare nuovamente indietro in posizione di riposo, grazie alla loro elasticità	
121.1 *In forma intelaiata*	La lamina vibra all'interno di un telaio o di una gruccia	

24. Montagne nell'odierna Tanzania, ex Tanganika.

25. In analogia con quanto è previsto più avanti per i tamburi a frizione a corda (232), suddivisi tra statici (232.1) e rotanti (232.2), è opportuno prevedere la suddivisione ulteriore di questo *taxon* tra raganelle statiche (112.241) e raganelle rotanti (112.242). Le prime sono quelle in cui la ruota è messa in movimento per mezzo di una manovella, mentre il telaio, in genere di dimensioni medie o grandi, resta fermo; le seconde rispondono più precisamente alla descrizione proposta da Hornbostel e Sachs, e cioè comportano un telaio incorporante la piastra flessibile fatto ruotare per forza centrifuga attorno alla ruota, che resta ferma in solido con il manico impugnato dal suonatore.

26. L'esistenza di piastre metalliche scosse, che producono suono in virtù del dislocamento che la loro struttura elastica consente come effetto di questa azione, induce a proporre un emendamento della tassonomia degli idiofoni che interessa il presente *taxon* 12 «Idiofoni a pizzico», secondo la successione inserita nella tabella, composta sia di nuovi inserimenti, sia di diversa collocazione di quelli già esistenti.

121.11 Cricri	La lamina è escissa da un guscio, in modo da servirsene come risuonatore	*Melanesia*
121.12 Scacciapensieri	La lamina è situata all'interno di un telaio costituito da una barra o da una piastra e utilizza il cavo orale come risuonatore	
121.121 Scacciapensieri idioglotti	La lamina è escissa dallo stesso telaio e resta unita ad esso ad un'estremità	*India posteriore, Indonesia, Melanesia*
121.122 Scacciapensieri eteroglotti	La lamina è applicata[27] al telaio	
121.122.1 Scacciapensieri eteroglotti (singoli)		*Europa, India, Cina*
121.122.2 Scacciapensieri eteroglotti in serie	Alcuni scacciapensieri eteroglotti di diversa intonazione sono raggruppati in un solo strumento	*Aura*
121.2 *In forma di tastiera o di pettine*	Le lamine sono fissate con legature ad una tavola o sono ritagliate da una piastra come denti di un pettine	
121.21 Con lamine fissate con legature		
121.211 Privi di risuonatore		*Tutte le sansa su semplice tavola*
121.212 Muniti di risuonatore		*Tutte le sansa a cassa o con un guscio posto sotto la tavola*
121.22 Con lamine ritagliate (scatole musicali)	Un rullo dentato pizzica le lamine	*Europa*

27. Possono essere sostituiti al verbo 'applicare' i numerosi sinonimi che, oltre a esprimere con altre parole lo stesso concetto, possono di volta in volta adattarsi più strettamente, ciascuno con la propria microvarianza semantica, a diversi casi episodici in cui si concretizza la situazione dell'essere 'applicato', espressa nell'originale dal verbo *festen*: accoppiare a, essere attaccato a, congiungere, connettere, collegare, unire, ecc.

122 A dislocazione indiretta o a scuotimento	Piastre elastiche estese, fissate ad una sola estremità, vengono scosse in modo da produrre uno o più spostamenti, anche contemporanei e distribuiti nell'ambito della superficie complessiva, che, grazie all'elasticità della piastra stessa, vi inducono una serie indeterminata di movimenti ondulatori o sussultori. Il suonatore in quanto tale esegue solo indirettamente un'azione dislocatoria, che è conseguenza di movimenti di altra natura, di regola di carattere scotitorio; per definizione lo strumento è in condizione di far udire suoni o rumori complessi, ma non singoli impulsi controllati	
122.1 *Sospesi a un supporto*	La piastra, di solito di grandi dimensioni, è sospesa a un supporto verticale che lascia libera l'estremità opposta, su cui agisce il suonatore	*La thunder sheet per gli effetti di tuono delle orchestre sinfoniche*
122.2 *Impugnati liberamente*	La piastra, di solito di dimensioni medio-piccole, è tenuta con le mani dal suonatore che ne fa oscillare la superficie scuotendola di regola con movimento orizzontale	*La piastra per chiamare gli sciami di api o quella usata in Calabria per gli strepiti della Settimana Santa*
13 Idiofoni a frizione	Lo strumento è posto in vibrazione per mezzo dello sfregamento	
131 Barre a frizione	Il corpo sottoposto a sfregamento è una barra	
131.1 *Barre a frizione [singole]*	Una barra singola è sottoposta a sfregamento	
131.11 A sfregamento diretto	La barra stessa è sottoposta a sfregamento per mezzo di un dispositivo rigido	*Il richiamo per allodole costituito da un cilindretto di legno sfregato all'interno da un dispositivo rotante di piombo*
131.12 A sfregamento indiretto	La barra è collegata ad altri dispositivi, sottoposti a sfregamento, che trasferiscono la vibrazione alla prima	
131.2 *Barre a frizione in serie*		
131.21 A sfregamento diretto	Le barre stesse sono sottoposte a sfregamento	*Nagelgeige, Nagelklavier, Stockspiel*

131.22 A sfregamento indiretto	Le barre sono collegate ad altre, le quali sono sottoposte a sfregamento, in modo da trasferire le vibrazioni alle prime in senso trasversale, per mezzo delle proprie escursioni vibratorie longitudinali	*Euphon di Chladni*
132 Piastre a frizione		
132.1 *Piastre a frizione [singole]*[28]	Una piastra metallica è sottoposta a sfregamento	
132.11 Piastre a frizione [singole] rigide o piastre sfregate propriamente dette	La piastra è rigida	*La piastra quadrangolare di Chladni sfregata con un archetto lungo un bordo, allo scopo di visualizzare per mezzo della limatura di ferro il 'disegno' delle onde vibratorie*
132.12 Piastre a frizione [singole] flessibili o lamine	La piastra è flessibile	*Sega armonica*
132.2 *Piastre a frizione in serie [livika]*	Due o più piastre separate o ricavate da un unico supporto, sono sottoposte a sfregamento	*Nuovo Mecklemburgo (Nuova Irlanda)*
133 Corpi concavi a sfregamento[29]		

28. Tra le piastre a frizione Hornbostel e Sachs hanno inserito solamente quelle in serie, esemplificate dal *livika* o *lunet* usato nelle cerimonie funebri malagan della Nuova Irlanda; di ciò gli autori parlano anche nell'introduzione, ove richiamano questo caso come uno di quelli in cui, pur avendo «rinunciato a indicare suddivisioni che non siano già popolate da tipi esistenti», ritennero opportuno fare eccezione a tale regola, trattandosi di uno dei «casi in cui un tipo più complesso presupponga necessariamente un tipo precedente più semplice ma estinto». Pertanto per le piastre a frizione singole si afferma che esse siano sconosciute. In realtà è sfuggito agli autori che esiste uno strumento costituito da una piastra singola sottoposta a sfregamento per mezzo di un archetto da violino, che è la cosiddetta 'sega armonica', ovvero la lunga sega da falegname (in realtà costruita appositamente a scopo musicale con acciaio di particolare qualità) sfregata con l'arco e inarcata con diversa accentuazione per ottenere note di altezza diversa. Può tuttavia nascere un ulteriore problema, a proposito dell'inquadramento di tale strumento: esso è basato su una forma più propriamente riferibile alle lamine, ovvero, come Hornbostel e Sachs dettano a proposito degli idiofoni a pizzico (*taxon* 12), «piccole piastre elastiche fissate ad una sola estremità» di cui si sfrutta l'elasticità per incurvarle e subito dopo rilasciarle. Perciò, essendo comunque le lamine una specie di piastre, piuttosto che lasciare le cose come stanno, inserendo la sega armonica quale esempio generico di piastra a frizione singola, si può accentuare non solo la peculiarità delle lamine in quanto tali, ma contrapporle alle piastre rigide, di cui almeno il dispositivo 'da laboratorio' ideato da Chladni per i suoi esperimenti costituisce un esempio non trascurabile. È opportuno anche ricordare che in realtà le piastre a frizione in serie dello strumento della Nuova Irlanda sono costituite da una serie di superfici piane e assottigliate, differentemente intonate, ricavate dall'intaglio di un massiccio blocco di legno pieno e levigato, e dunque che i due strumenti sono morfologicamente molto distanti. Un'ipotesi alternativa sarebbe dunque quella che induca ad optare per l'inserimento di un nuovo ordine, costituito dalle lamine a frizione, con il *taxon* 134. Chi scrive tuttavia propende per la prima soluzione, dal momento che le differenze morfologiche non dovrebbero prevalere su comuni criteri di funzionamento di base.

29. L'esistenza di alcuni interessanti strumenti giocattolo in diverse tradizioni italiane (ma anche altrove potrebbero essere presenti e ancora non individuati) induce a integrare la sistematica con alcune non secondarie specificazioni: tra gli idiofoni a frizione, infatti, sono presenti anche corpi concavi (assimilabili per forma e forse anche per comportamento acustico ai gong) sottoposti a sfregamento non per mezzo delle mani (come è nel caso del carapace di tartaruga del Brasile e della *glass harmonica*), bensì con sistemi analoghi a quelli registrati nella classe dei membranofoni per i *taxa* 232.1 «Tamburi a frizione a corda statici» e 232.2 «Tamburi a frizione a corda rotanti». In Calabria Vincenzo La Vena [1996, 51-52] ha documentato l'uso di 'tamburi' a frizione rotanti (ma usati

133.1 *Corpi concavi a sfregamento [singoli]*		
133.11 Corpi concavi a sfregamento diretto [a mano]	L'atto dello sfregamento è esercitato direttamente dalla mano del suonatore sul corpo dello strumento	*Brasile: carapace di tartaruga, bicchiere singolo di cristallo*
133.12 Corpi concavi a sfregamento indiretto	Il suonatore compie un gesto diverso da quello dello sfregamento diretto, o sfrega un oggetto diverso dal corpo dello strumento, dal che consegue la trasmissione dell'impulso determinato dalla frizione al corpo dello strumento	
133.121 A sfregamento statici	Il corpo dello strumento è fisso	
133.121.1 A bacchetta	Una bacchetta rotante sfrega contro il corpo dello strumento	*Giranoci (Italia)* [Guizzi 2002, 351]
133.121.2 A corda	Una corda è sottoposta a sfregamento	
133.121.21 A corda sfregata dalla mano	L'impulso è determinato dallo sfregamento della corda fissata al corpo dello strumento operato dalla mano	*Calabria: rùocciola usata con lo sfregamento diretto della corda* [La Vena 1996, 49-52]
133.121.22 A corda sfregata dalla bacchetta	L'impulso è determinato dallo sfregamento della corda connessa al corpo dello strumento operato da una bacchetta	*Mitraglia (Emilia)*

anche come statici) con la cassa e la 'membrana' ricavate da un barattolo di latta riciclato. A questi si apparenta la *mitraglia* dell'Appennino Permense (presente presso il Museo Guatelli di Ozzano Taro [Ghirardini 2006, 275-276]), per l'uso di un grosso barattolo di latta, tenuto fermo mentre la corda viene sfregata dalla bacchetta fatta ruotare entro il cappio della corda. In entrambi i casi ritengo oggi di poter concludere che si tratta in realtà di idiofoni con il corpo concavo, anche se la contiguità tra piastre e membrane è molto stretta e virtualmente priva di soluzione di continuità (si veda su questo Picken [1975, 160-161], il quale introduce anche il *taxon* 232.3 «Single-skin stationary drums with friction-cord and rotated stick or cylinder», ovvero distingue i tamburi a frizione rotanti da quelli tenuti fermi e in cui la bacchetta ruota all'interno del cappio della corda). Laurence Picken optò per l'inserimento dei 'telefoni' giocattolo costruiti in Turchia con scatolette per fiammiferi di cartone nella classe dei membranofoni: la sua opzione si basava sulla sopra richiamata considerazione della continuità tra idiofoni, nel caso delle piastre, e membranofoni. La sua argomentazione peraltro non mancava di stabilire un 'confine' tra le due diverse fonti sonore, collocato nel punto in cui le membrane cessano di essere elastomeri. Questo limite è di rilievo tale, pur nella contiguità dei due gruppi, da non poter autorizzare l'assimilazione di piastre rigide non tensibili a membrane, che sono per l'appunto ricavate da elastomeri e non solo possono essere sottoposte a tensione, ma, per funzionare come membrane sonore, debbono essere sottoposte a tensione. Anche se vi possono essere strette analogie tra piastre circolari di spessore minimo e membrane vere e proprie nel rispettivo comportamento acustico, non è facilmente dimostrabile, credo, che vi sia coincidenza in relazione ai rispettivi modi secondari di vibrazione e alle conseguenti serie di parziali, armonici o non armonici, che ne derivano. Comunque, argomentazioni esclusivamente acustiche, ancorché di grande rilevanza, non bastano per sfuggire ai criteri generali di inquadramento sistematico elaborati da Hornbostel e Sachs, ove i caratteri morfologici e funzionali spesso fondano in modo primario la discrezione tra le classi principali. Si propone pertanto l'integrazione alla sistematica riportata in tabella.

133.122 A sfregamento rotanti	Il corpo dello strumento è sottoposto a rotazione in modo che la corda ad esso connessa sfreghi contro un intaglio della bacchetta che funge da impugnatura	*Calabria: rùocciola usata con lo sfregamento della corda attorno la bacchetta* [La Vena 1996, 49-52]
133.2 *Corpi concavi a sfregamento in serie*		
133.21 Corpi concavi in serie a sfregamento diretto [a mano]		
133.121 A sfregamento statici		*Glass harmonica a bicchieri fissi*
133.122 A sfregamento rotanti		*Glass harmonica con movimento a pedale*
133.22 Corpi concavi in serie a sfregamento indiretto		
133.221 A sfregamento statici		*Sconosciuti*
133.222 A sfregamento rotanti	Una bacchetta rotante sfrega contro un corpo concavo dello strumento, il quale a sua volta è sfregato da uno o due altri corpi concavi analoghi e risuonanti, anch'essi coinvolti reciprocamente nello sfregamento	*Il giranoci (Italia) con più di un corpo cavo sfregato dalla bacchetta* [Guizzi 2002, 351]
14 Idiofoni ad aria	Lo strumento è messo in vibrazione per mezzo di soffi d'aria	
141 Barre ad aria		
141.1 *Barre ad aria [singole]*		*Sconosciute*
141.2 *Barre ad aria in serie*		*Aeolsklavier*
142 Piastre ad aria		
142.1 *Piastre ad aria [singole]*		*Sconosciute*
142.2 *Piastre ad aria in serie*		*Piano chanteur*
15 Idiofoni a pressione di onde sonore (Mirliton idiofonici)[30]	Lo strumento è messo in vibrazione per mezzo del suono della parola o del canto immesso all'interno del corpo cavo costituito da due valve simmetriche poste una sull'altra; il movimento vibratorio delle due valve non produce un suono proprio, ma si limita a modificare il timbro della voce	*Ravi (Monferrato, Piemonte), cusa (Riva presso Chieri e astigiano, Piemonte), sücchetta (Ponente ligure)*

30. Questa sottoclasse non è presente nell'originale tedesco, dal momento che all'epoca della sua scrittura (ma anche per lungo tempo dopo) non si conoscevano esempi di strumenti modificatori della voce che non facessero uso di membrane, né si era ipotizzata la potenziale presenza di tali strumenti musicali. È stato lo studio dei *ravi* del Monferrato e delle *sücchette* liguri a consentire la scoperta di questa ulteriore partizione nel campo degli idiofoni. Molte altre scoperte sono state fatte dal 1914 in campo musicale strumentale; non per questo è sempre plausibile integrare il testo di Hornbostel e Sachs con la previsione di ciascuna di esse, soprattutto considerando che si tratta in grandissima parte di strumenti comunque inquadrabili nei *taxa* già previsti, eventualmente con la sola necessità

Suffissi comuni[31]
-5 percossi con le mani
-6 percossi con martelletti o mazzuoli
-7 con dispositivo di eccitazione a sfregamento
-8 con tastiera
-9 con movimento meccanico

di integrare le suddivisioni nei livelli distintivi più minuziosi; credo invece che sia giusto fare eccezione quando, come in questo caso, la scoperta incide a un livello di così alta generalità nella gerarchia tassonomica. Su questo si veda Guizzi [1985].

31. È importante notare che i suffissi comuni per gli idiofoni sono ridotti al minimo, il che può sorprendere se si pensa che questa è la classe più numerosa. Tuttavia è proprio la natura di queste ulteriori specificazioni a rendere conto di questa solo apparente stranezza: i suffissi sono concepiti come ulteriori determinazioni identificative che valgono indipendentemente dal criterio distintivo posto alla base, per ciascuna classe o sottoclasse, della tassonomia. Non si riferiscono pertanto a specificazioni secondarie o facoltative, ma nemmeno avrebbero senso se li si concepisse come fonti di criteri alternativi a quelli già codificati, o come occasioni di ripetizione tautologica di ciò che la sistematica ha già prescelto come ossatura del suo ordinamento. Poiché pertanto gli idiofoni si distinguono in prima istanza in base al modo in cui si produce il suono, e cioè in base ad azioni umane fondamentali, gli unici suffissi comuni presi in considerazione sono proprio quelli che integrano l'azione umana con la vistosa mediazione dell'uso di una tastiera o differiscono una volta per tutte nel tempo l'azione umana, spesa nella 'programmazione', rinviandola al momento dell'esecuzione, affidandone la riproduzione ai movimenti meccanici previamente programmati. Già nel testo inserito nella colonna esplicativa delle 'caratteristiche' si dichiara, a proposito della distinzione fondamentale tra percussione non mediata e percussione mediata, che «non vanno presi in considerazione eventuali intermediari meccanici come mazzuoli, tastiere, funi campanarie e simili» (né quindi, implicitamente, il 'non-uso' di intermediari, e cioè la percussione a mani nude). Ciò spiega perché Hornbostel e Sachs non abbiano preso in considerazione, tra i suffissi comuni, il campo variegato dei metodi di attivazione del suono, già contemplati nello specifico, o già considerati ininfluenti per quanto riguarda l'uso di intermediari. Tuttavia credo non sia vietato dare particolare enfasi alla natura trasversale dei suffissi (comuni proprio in quanto non dipendenti né da un segmento tipologico né da una 'zona' gerarchica specifica) scegliendo un'integrazione ridondante degli stessi e quindi introducendo ipotesi non contemplate in origine anche per non compromettere la logica con la quale gli autori avevano dichiarato ininfluenti alcuni aspetti operativi della manipolazione, in particolare in relazione all'uso delle mani nude o di intermediari tecnici, veicoli del gesto prodotto dagli arti umani. Per questo si è deciso di integrare la tabella dei suffissi comuni di ciascuna classe con altre indicazioni, a partire da quella degli idiofoni che viene così integrata con le ipotesi dell'uso a mani nude, o per mezzo di percussori, o con l'utilizzo di un archetto a frizione. Su come elaborare la classificazione al fine di renderla più adatta a scopi di approfondimento di casi specifici, e dunque in particolare sul modo di 'promuovere' un suffisso comune a criterio di generalità che incorpori le varianti tipologiche e oppositive, si vedano le istruzioni indicate nell'introduzione, con le quali Hornbostel e Sachs hanno esemplificato l'uso 'duttile' della numerazione Dewey. Credo sia interessante chiedersi in base a quale criterio la numerazione dei suffissi comuni di tutte le classi sia stata concepita, dal momento che, da una parte, gli autori non hanno fornito spiegazioni in tal senso e, dall'altra, i suffissi si mostrano a prima vista 'irrazionali' per apparente mancanza di omogeneità e di coordinamento tra le quattro classi. Ciò naturalmente ha a che fare essenzialmente con la formulazione degli equivalenti numerici dei suffissi stessi, i quali, nella loro espressione verbale, non presentano particolari problemi interpretativi. La mia ipotesi è che Hornbostel e Sachs abbiano applicato la numerazione Dewey (che, come è noto, si basa sulla serie decimale da 0 a 9) partendo dal numero più alto (per l'appunto il 9) e poi applicando a decremento le cifre seguenti sino a colmare il fabbisogno per ciascuna classe. È comunque pacifico che non si dà alcun valore gerarchico alla serie numerica quando ci si muove tra livelli equivalenti: la funzione è solo distintiva, perciò è irrilevante la collocazione così come non ha alcun significato concepire una serie in ordine crescente o decrescente. Poiché pertanto la previsione dei suffissi comuni tra gli idiofoni è limitata a due soli casi, abbiamo solo i suffissi -9 e -8; essendo il gruppo più numeroso quello della classe dei cordofoni (contando solo le determinazioni più generali, quelle cioè che richiedono una sola cifra), formato da sei voci, abbiamo i suffissi in successione da -9 a -4. Il fatto che in due casi a parità di cifra si trovi (tre volte su quattro: è il caso di -8 con tastiera e -9 con movimento meccanico) la stessa definizione del suffisso è una mera coincidenza. A sua volta, il fatto che la stessa cifra indichi caratteristiche ben diverse in ciascuna delle classi in cui compare non è fonte di alcuna confusione: i suffissi, in quanto tali, sono ovviamente apposti in coda a stringhe che si caratterizzano invariabilmente per l'insieme dei loro componenti, per il senso che ogni componente esprime in relazione alla posizione che esso stesso occupa nell'ambito della stringa, ma che sono, in primo luogo, identificate dalla prima cifra che indica la classe; individuato il trattino che segnala la natura di suffisso della cifra ad esso immediatamente seguente, si è in grado senza possibilità di equivoci di individuare anche il contenuto descrittivo 'nascosto' sotto la formulazione numerica.

Classificazione	**Caratteristiche**	**Esempi**
2 Membranofoni	I corpi vibranti sono membrane sottoposte a tensione	
21 Tamburi a percussione	Le membrane sono percosse	
211 Tamburi a percussione non mediata	Il suonatore in quanto tale compie l'azione della percussione; non vanno presi in considerazione eventuali intermediari meccanici, come mazzuoli, tastiere, ecc.; gli unici tamburi non compresi in questo gruppo sono quelli a scuotimento[32]	
211.1 *Tamburi a caldaia (timpani)*	La cassa è a forma di caldaia o di guscio	
211.11 Tamburi a caldaia [singoli]		*I timpani europei*
211.12 Tamburi a caldaia in serie		*Le coppie di timpani dell'Asia occidentale connessi in modo permanente*
211.2 *Tamburi tubolari*	La cassa è a forma di tubo	
211.21 Tamburi cilindrici	I diametri estremi e quello mediano sono di eguali dimensioni; non vanno prese in considerazione eventuali rastremature delle estremità, né tanto meno eventuali modanature circolari	
211.211 Tamburi cilindrici monopelli	Il tamburo è munito di una sola pelle praticabile; non si tiene conto di una eventuale seconda pelle rinvenibile in alcuni tamburi africani, che fa parte del dispositivo di tensione, e che non può essere percossa	
211.211.1 Tamburi cilindrici monopelli [singoli]		*Malacca*
211.211.11 Tamburi cilindrici monopelli singoli aperti	L'estremità opposta alla pelle è aperta	*Indie occidentali*
211.211.12 Tamburi cilindrici monopelli singoli chiusi	L'estremità opposta alla pelle è chiusa	

32. Questa avvertenza, che ripete in modo integrale quanto già specificato a proposito degli idiofoni a percussione non mediata, giustifica il fatto che da parte di Hornbostel e Sachs non siano stati presi in considerazione tra i suffissi comuni dei membranofoni i diversi modi in cui avviene la percussione, vale a dire se si faccia uso o no di mazzuoli, se la percussione avvenga per mezzo delle mani nude o, ancora, se siano in gioco entrambi queste tecniche (un mazzuolo e una mano). Anche i membranofoni, infatti, si distinguono in prima istanza in base al modo in cui si produce il suono, e cioè in base ad azioni umane fondamentali, e poi in base alla forma del supporto e della membrana, al numero delle membrane, alla natura e forma dei dispositivi di eccitazione. Poiché peraltro le tecniche di suono costituiscono indubbiamente un utile complemento per approfondire la classificazione, esse possono essere prese in considerazione in sede di più approfondita elaborazione tassonomica del gruppo dei tamburi a percussione non mediata secondo i criteri generali dettati da Hornbostel e Sachs nell'introduzione.

211.211.2 Tamburi cilindrici monopelli in serie		
211.211.21 Tamburi cilindrici monopelli in serie aperti		
211.211.22 Tamburi cilindrici monopelli in serie chiusi		
211.212 Tamburi cilindrici bipelli	Il tamburo ha due membrane praticabili	
211.212.1 Tamburi cilindrici (singoli)[33]		*Europa (side drum)*
211.212.2 Tamburi cilindrici in serie		
211.22 Tamburi a barile[34]	Il diametro mediano è maggiore di quelli delle estremità; la cassa è convessa	*Asia, Africa, Antico Messico*
211.23 Tamburi a doppio cono	Il diametro mediano è maggiore di quelli estremi; la cassa è rastremata con profilo lineare	*India anteriore (mṛdaṅga, banya, pakhavaja)*
211.24 Tamburi a clessidra	I diametri estremi sono maggiori di quello mediano	*Asia, Melanesia, Africa orientale*
211.25 Tamburi conici	I diametri estremi sono notevolmente diversi; le differenze meno importanti, inevitabili, non vanno prese in considerazione	*India anteriore*
211.26 Tamburi a calice	La cassa è composta da una parte principale a forma di coppa o di cilindro, e da una appendice più stretta. Obliterazioni della forma base, quali si sono verificate soprattutto in Indonesia, non modificano il concetto, fino a quando non si giunga alla forma cilindrica	*Darabuka*
211.3 *Tamburi a cornice*	L'altezza della cassa è inferiore al raggio della pelle. N.B. Il tamburo militare europeo anche nei suoi esemplari più piatti è derivato dal tamburo cilindrico oblungo e quindi non deve essere annoverato tra i tamburi a cornice	

33. Questa parte della classificazione dei membranofoni mostra una incongruenza: la distinzione tamburi singoli / tamburi in serie pare essere riservata ai tamburi bipelli, ovvero, mentre nei tamburi cilindrici bipelli la distinzione singoli / in serie è posta subito dopo il *taxon* che indica i tamburi cilindrici bipelli tout court (211.212), nei tamburi cilindrici monopelli, dopo il *taxon* 211.211 compare la suddivisione tra aperti e chiusi e non quella tra singoli / in serie, come sarebbe giusto attendersi in base a criteri di simmetria. Anche i tamburi monopelli, infatti, possono essere sia singoli che in serie, sia aperti che chiusi. Per ristabilire la piena coerenza, la tabella, in questo punto, è stata perciò integrata considerando questa esigenza.

34. Ulteriori suddivisioni come sub 211.21.

211.31 Tamburi a cornice (privi di manico)		
211.311 Tamburi a cornice monopelli		*Tamburello*
211.312 Tamburi a cornice bipelli		*Nord Africa*
211.32 Tamburi immanicati	Alla cornice è applicato un manico nel senso del diametro	
211.321 Tamburi immanicati monopelli		*Eskimo*
211.322 Tamburi immanicati bipelli		*Tibet*
212 Tamburi crepitacolo (suddivisioni come per i tamburi a percussione non mediata, 211)	Il tamburo è sottoposto a scotimento; la percussione è causata dagli urti di palline, o simili, legate o racchiuse all'interno	*India, Tibet*
22 Tamburi a pizzico[35]	La membrana è messa in vibrazione attraverso l'azione del pizzicare	*India (gopi yantra, anandalahari)*

35. Questo gruppo ha suscitato e suscita alcune perplessità: il fatto che il suonatore agisca pizzicando una corda, infatti, induce immediatamente a rievocare la classe dei cordofoni, in cui questi strumenti potrebbero legittimamente essere collocati: si pensi infatti che il *gopi yantra* è costituito da una cassa cilindrica o a barile o troncoconica, chiusa in basso da una membrana tesa; dalla cassa si dipartono uno o due bracci verticali e perpendicolari al piano della membrana a cui è fissata un'estremità della corda; l'altra è connessa con il centro della membrana. Questo assetto morfologico richiama quello del *taxon* 322 «Arpe»: «il piano delle corde è perpendicolare alla tavola armonica [...]». Il richiamo peraltro non basta, poiché questi strumenti presentano anche l'angolo di incidenza della corda in relazione ortogonale con la membrana, mentre nelle arpe tale angolo è di regola acuto (e con l'angolo complementare ovviamente ottuso). Picken [1975, 154-155] ha notato che lo stesso Sachs avrebbe rivisto la primitiva definizione, nel momento in cui ha inserito, in *Geist und Werden* [1929, 61] e nella *History* [1940, 54-55] gli strumenti indiani (*gopi yantra* e *anandalahari*) tra gli *Erdbogen* (archi in terra) nel primo testo e tra i succedanei miniaturizzati della *ground harp* (arpa in terra) nel secondo e più recente testo. Lo stesso Picken peraltro ha contribuito a fare chiarezza sul punto: «In generale, tuttavia,» egli afferma [1975, 155 – mia traduzione] «tali strumenti potrebbero essere trasferiti nel gruppo dei cordofoni solo qualora si possa dimostrare che la corda manifesti una risonanza acuta a una frequenza immediatamente riferibile alla lunghezza d'onda del suo moto trasversale» («In general, such instruments should only be transferred to the group of chordophones, however, if it can be shown that the string is exhibiting sharp resonance at a frequency immediately related to the wavelength of its transverse motion.»). Si potrebbe obiettare che una tale argomentazione esuli dai criteri generali di inquadramento sistematico, dal momento che oltre un certo limite non è coerente con gli scopi e la struttura concettuale della classificazione stessa, e dunque non è giustificabile il ricorso all'analisi del comportamento acustico degli strumenti considerati; soprattutto se tale ricorso porti all'azzeramento di altre fondamentali caratteristiche, in primo luogo quelle morfologiche, poste alla base dei criteri fondamentali di individuazione tassonomica. Nel caso specifico non si corre un tale rischio; è tuttavia utile e non secondario aggiungere lo stesso un'argomentazione coerente con gli elementi morfologici imprescindibili della tassonomia, valida almeno per lo *anandalahari*: questo strumento, infatti consta di due tamburi, uno più grande, l'altro più piccolo, collegati da una corda che è posta in tensione temporaneamente e con effetto variato dal suonatore con la sua forza muscolare solo nell'atto di pizzicare la corda stessa; il che esclude che vi sia un supporto permanente sul quale la corda sia assicurata e sottoposta a tensione, come recita la descrizione più generale della classe dei cordofoni. La stessa situazione si trova nei 'telefoni' giocattolo costruiti con due barattoli collegati da un filo; se il *gopi yantra*, invece, possiede un supporto permanente e spesso è persino dotato di una caviglia per la tensione della corda, si può ritenere che tali caratteristiche non escludano che si consideri anche il *gopi yantra* tra i membranofoni, se non altro per la forza dell'analogia che connette tale strumento al suo omologo parente *anandalahari*. Il che non mette a sua volta in discussione la filiazione di questi strumenti dall'arco in terra o dall'arpa in terra: come ha dimostrato Schaeffner, questo è un altro discorso, e comunque, si può ulteriormente obiettare nel merito di queste relazioni, che, mentre il *gopi yantra* mostra nella sua struttura i segni della sua filiazione dall'arpa in terra, l'assenza di un supporto permanente per la corde nello *anandalahari* può suscitare qualche dubbio circa la sua discendenza diretta dalla stessa origine.

221 Tamburi pizzicati direttamente [a mano]	Una membrana naturale (metà del lembo di una foglia lanceolata) è sottoposta a tensione estemporanea dalle dita delle mani del suonatore che ne pizzica il bordo in corrispondenza della nervatura centrale	*Foglia pizzicata kpa-kpàpsɛlɛ dei Pigmei Baka del Gabon settentrionale* [Campagnoli 2010, 113-121]
222 Tamburi pizzicati indirettamente [a mezzo di una corda tesa]	Una corda è annodata al di sotto del centro della membrana; essa è pizzicata e trasmette le sue vibrazioni alla membrana	*India (gopi yantra, anandalahari)*
23 Tamburi a frizione		
231 Tamburi a sfregamento diretto [a mano][36]	L'atto dello sfregamento è esercitato direttamente dalla mano del suonatore sulla membrana dello strumento	
232 Tamburi a sfregamento indiretto	Il suonatore compie un gesto diverso da quello dello sfregamento diretto della membrana, la cui conseguenza è la trasmissione dell'impulso determinato dalla frizione alla membrana dello strumento	
232.1 *A sfregamento statici*[37]	Il corpo dello strumento è fisso. Il tamburo non è sottoposto a rotazione ma sono la corda o la bacchetta a essere mosse, eventualmente anche sfregando una corda per mezzo di una bacchetta, per produrre la vibrazione della membrana	
232.11 Tamburi a frizione a corda	Il dispositivo attraverso cui si esercita lo sfregamento è una corda	
232.111 Tamburi a frizione a corda monopelli		

36. Le divisioni ulteriori sono riferite alla morfologia dei tamburi a percussione: ogni tamburo, infatti, può essere sottoposto, sistematicamente od occasionalmente, allo sfregamento diretto della membrana effettuato con la mano dal suonatore, con tecniche che possono privilegiare l'utilizzo di un solo dito (più spesso il pollice o il medio) o di più dita raggruppate, o della mano distesa ovvero della base della stessa.

37. Come già detto a proposito degli idiofoni a sfregamento, Picken [1975: 160-161] ha introdotto anche il *taxon* 232.3 «Single-skin stationary drums with friction-cord and rotated stick or cylinder», vale a dire «Tamburi monopelli stazionari a corda sfregata con bacchetta o cilindro rotante». Si tratta di tamburi strutturati come quelli rotanti a corda munita di cappio entro cui è inserita la bacchetta che fa da impugnatura, ma che funzionalmente rovesciano i rapporti tra la parte fissa e quella che si muove per produrre lo sfregamento: è la bacchetta a essere fatta ruotare per produrre lo sfregamento della corda, a sua volta trasmesso alla membrana per produrre il suono da quest'ultima generato. Questo inserimento tuttavia produce più organici risultati se è inserito in una ristrutturazione della sottoclasse 23 «Tamburi a frizione» come proposta nella tabella.

232.111.1 A corda sfregata dalla mano	L'impulso è determinato dallo sfregamento della corda fissata alla membrana, operato dalla mano	
232.111.2 A corda mossa dalla mano	La mano trascina con moto alternato una corda che sfrega la membrana	*Pignata romagnola* [Lombardi 2000]
232.111.3 A corda sfregata da una bacchetta	L'impulso è determinato dallo sfregamento della corda connessa alla membrana operato da una bacchetta	
232.112 Tamburi a frizione a corda bipelli		
232.12 Tamburi a frizione a bacchetta	Il dispositivo attraverso cui si esercita lo sfregamento è una bacchetta	
232.121 Tamburi a frizione a bacchetta passante	La bacchetta attraversa la membrana	
232.121.1 Tamburi a frizione a bacchetta fissa	La bacchetta non può essere mossa; è solo la bacchetta ad essere sfregata	*Africa*
232.121.2 Tamburi a frizione a bacchetta semilibera	La bacchetta può essere mossa solo di poco; la mano sfrega la bacchetta, e questa la pelle	*Africa*
232.121.3 Tamburi a frizione a bacchetta libera	La bacchetta si muove liberamente; non è essa ad essere sfregata, ma è esclusivamente la membrana che è sfregata per suo tramite	*Venezuela*
232.2 *A sfregamento rotanti*	Il corpo dello strumento è sottoposto a rotazione in modo che la corda connessa alla membrana sfreghi contro intaglio della bacchetta che funge da impugnatura	*Europa, Africa occidentale*
24 Tamburi a pressione di onde sonore (Mirliton)[38]	La membrana è messa in vibrazione per mezzo del suono della parola o del canto; la membrana non produce un suono proprio, ma si limita a modificare il timbro della voce	*Europa, Africa occidentale*

38. La sottoclasse dei mirliton merita indubbiamente di essere il più possibile accorpata, e ciò è avvenuto all'epoca della redazione della tabella della Sistematica, in un periodo peraltro in cui l'esistenza dei mirliton idiofonici (di cui alla sottoclasse qui indicata come 15) non era nota. Tuttavia il concetto di membrana come elemento fondamentale di tutti i membranofoni, essendo di regola completato con l'attribuzione dell'essere sottoposta a tensione, non sempre soddisfa l'osservatore attento ai caratteri morfologici e funzionali analiticamente considerati. Molti tra questi strumenti, infatti, presentano membrane semplicemente appoggiate al supporto, come è il caso della carta velina in relazione con il pettine, o sono inserite in un alloggiamento che le tiene nella posizione ideale per ricevere l'impulso delle onde sonore del segnale primario, ma senza essere nemmeno fissate in qualche modo lungo il loro perimetro (come nel caso del moderno kazoo). In tal modo la membrana (che possiamo continuare a chiamare in questo modo essendo un corpo di spessore praticamente uniforme e ridotto al minimo in rapporto con le altre due dimensioni) risponde alle sollecitazioni del generatore primario solo per la sua leggerezza e non per il fatto di essere sottoposta

241 Mirliton liberi	La membrana è sottoposta allo stimolo in modo diretto, senza che l'aria sia raccolta in un contenitore	*Pettine e carta velina*
242 Mirliton tubolari e globulari	La membrana è posta all'interno di una canna o di un guscio	*Africa; palesano una contaminazione con il principio dei mirliton tubolari anche quei flauti dell'Asia orientale, nei quali un foro è coperto da una membrana*
Suffissi comuni		
-2 con movimento meccanico		
-3 muniti di cordiera		
-4 percossi con martelletti o mazzuoli		
-5 percossi con le mani		
-6 con pelle incollata		
-7 con pelle inchiodata		
-8 con pelle allacciata		
-81 allacciatura a corde (o stringhe)	Le stringhe corrono da pelle a pelle oppure formano un reticolo senza utilizzare alcuna delle disposizioni seguenti	
-811 senza disposizione particolare		*Ovunque*
-812 con legacci tensori	Legacci trasversali a nastro o a stringa sono disposti a metà dei dispositivi di allacciatura, per sottoporli a tensione	*Ceylon*
-813 con anelli tensori	Le stringhe sono disposte a zig-zag; due tratti alla volta sono riuniti per mezzo di un piccolo anello o di un cappio	*India anteriore*
-814 con cunei tensori	Tra la parete del tamburo e le stringhe sono inseriti alcuni cunei, per mezzo della posizione dei quali è possibile regolare il grado di tensione	*India, Indonesia, Africa*

a una tensione che ne accresca la capacità di rispondere agli impulsi esterni: è cioè la materia stessa di cui è fatto il dispositivo vibrante ad emettere suono in virtù della sua stessa elasticità e rigidità senza dover ricorrere alla messa in tensione della membrana. Il che è esattamente tipico degli idiofoni. Ora, se è vero che qualche deroga ai principi tassonomici è consentita sulla base di comportamenti contigui per analogo processo meccanico o acustico, o per via di una stretta relazione storicamente fondata, è anche vero che uno degli obiettivi fondamentali della classificazione è distinguere ciò che risponde a criteri diversi, anche rompendo le convenzioni o smentendo le apparenze. È dunque plausibile un ripensamento dei mirliton membranofonici, con la parziale dislocazione all'interno della sottoclasse di quelli idiofonici, anche se qui per ora ci limitiamo a segnalare il problema per proporre una diversa soluzione in un secondo momento.

-82 allacciatura a stringhe connesse a una pelle[39]	Le stringhe sono allacciate sul fondo ad una pelle non utilizzabile per la percussione	*Africa*
-83 allacciatura a stringhe connesse a una tavola	Le stringhe sono allacciate sul fondo ad una tavola supplementare	*Sumatra*
-84 allacciatura a stringhe connesse a una modanatura	Le stringhe sono allacciate sul fondo ad una modanatura scolpita	*Africa*
-85 allacciatura a stringhe connesse a una cinghia	Le stringhe sono allacciate sul fondo ad una cinghia di materiale diverso dal loro	*India anteriore*
-86 allacciatura a stringhe connesse a pioli	Le stringhe sono allacciate sul fondo a pioli infissi nella parete del tamburo	*Africa*
-9 con pelle strozzata	Un anello è serrato sopra la pelle	
-91 con strozzatura a corda		*Africa*
-92 con strozzatura a cerchio		
-921 privi di meccanica		*Tamburo europeo*
-922 dotati di meccanica		
-9221 privi di pedale		*Timpano a vite*
-9222 dotati di pedale		*Timpano a pedale*

39. Da -82 a -86 ulteriori suddivisioni come -81.

Classificazione	Caratteristiche	Esempi
3 Cordofoni	Una o più corde sono tese tra punti fissi	
31 Cordofoni semplici ovvero cetre	Lo strumento consiste solamente in un supporto per le corde o in supporto per le corde e un risuonatore, connessi in modo non organico, cioè separabili senza compromettere l'apparato sonoro	
311 Cetre a bastone	Il supporto per le corde è a forma di bastone o pertica; rientrano in questo gruppo anche le tavole messe di taglio	
311.1 *Archi musicali*	Il supporto per le corde è flessibile (e arcuato)	
311.11 Archi musicali idiocordi	La corda è escissa dalla corteccia dell'arco stesso ed è congiunta con esso alle due estremità	
311.111 Archi musicali mono-idiocordi	L'arco è munito di una sola corda ottenuta dal suo stesso bastone	*Fiume Sepik (Nuova Guinea), Togo*
311.112 Archi musicali poli-idiocordi ovvero archi-arpa	L'arco possiede più corde ottenute dal suo stesso bastone, disposte tutte su di un ponticello dentato	*Africa occidentale (Fang)*
311.12 Archi musicali eterocordi	La corda è di origine diversa dal bastone	
311.121 Archi musicali mono-eterocordi	L'arco è munito di una sola corda di origine diversa dal bastone	
311.121.1 Privi di risuonatore	N.B. Nel caso in cui un risuonatore sia in effetti previsto, ma non sia fissato allo strumento stesso, quest'ultimo rientrerebbe nel 311.121.21. Non si deve prendere in considerazione il cavo orale usato come risuonatore	
311.121.11 Privi di cappio d'accordatura		*Africa (ganza, samuius, to)*
311.121.12 Muniti di cappio d'accordatura	Un cappio di refe serra la corda e la divide in due parti	*Africa sudequatoriale (n'kungo, uta)*
311.121.2 Muniti di risuonatore		
311.121.21 Muniti di risuonatore non connesso		*Borneo (busoi)*
311.121.22 Muniti di risuonatore connesso		
311.121.221 Archi a corda libera[40]	L'unica corda non è suddivisa in segmenti da parte di cappi o di supporti rigidi	
311.121.222 Archi a corda suddivisa	La corda è suddivisa in segmenti	
311.121.222.1 Da una legatura a cappio	La divisione della corda è ottenuta da una legatura a cappio	*Sudafrica, Madagascar (gubo, hungo, bobre)*
311.121.222.2 Da un supporto rigido	La divisione della corda è ottenuta da un supporto rigido, ad esempio da un bastoncino con funzione di capotasto	*Arco bicorde dei Baka e Aka* [Campagnoli 2010]
311.122 Archi musicali poli-eterocordi		
311.122.1 Privi di cappio d'accordatura		*Oceania (kalove)*
311.122.2 Muniti di cappio d'accordatura		*Oceania (pagolo)*

40. La versione originaria contiene il *taxon* 311.121.221 come previsione del caso, duplicato in modo dicotomico dal seguente *taxon* 311.121.222, di archi mono-eterocordi con risuonatore applicato (cioè non organicamente o permanetemente connesso), nel primo caso senza che vi siano cappi che, dividendo in due segmenti la corda, ne consentono una specifica intonazione e, nel secono caso contrapposto, muniti invece di un cappio con tale funzione. La ricerca condotta da Mauro Campagnoli [2010] sugli strumenti dei Pigmei Baka e Aka di Camerun e Gabon ha messo in luce l'esistenza di un arco nel quale la corda, che rimane unica, è fatta passare due volte da un'estremità all'altra del bastone ricurvo, in modo da avere diversi segmenti di corda permanentemente disponibili. Questo caso compare sia nella versione con risuonatore non connesso (311.121.21), costituito di solito da un recipiente concavo o su una piastra metallica (come il coperchio di una pentola) su cui viene appoggiato lo strumento, sia in quella con risuonatore connesso (311.121.22), costituito da una foglia che funziona anche da 'ponticello' libero. Questa disposizione della corda che compie un doppio percorso tra i due bracci dell'arco è stata indicata da Campagnoli come riferibile al caso di strumento monocorde (poiché la corda è unica), in cui il supporto stesso della corda funge da dispositivo di diversa suddivisione della corda in due segmenti, analogamente a ciò che fa il cappio in altri casi. Resta aperto il problema di una possibile diversa interpretazione, che veda cioè lo strumento come di fatto costituito da due corde, anche se rappresentate da due segmenti praticabili dello stesso corpo vibrante: l'argomento principale a favore di questa posizione è basato sul fatto che nel secondo passaggio attorno al braccio dell'arco il tratto di corda viene ancorato al supporto, e quindi assume la sua specifica tensione nel tragitto a valle di questo punto di fissaggio: in tal modo verrebbe a costituire un altro dispositivo primario, ancorché virtualmente separato dal resto della sua lunghezza: e quindi avremmo a che fare con un arco a due corde libere. Se si vuole invece seguire il punto di vista dell'autore dello studio su questi strumenti, sarebbe opportuno suddividere in generale gli archi a corda libera da quelli a corda suddivisa, e questi ultimi in archi a corda suddivisa per mezzo di un cappio di accordatura e archi con corda suddivisa da un supporto rigido. In tal caso chi scrive crede sia opportuno lasciare fuori dalla tassonomia i diversi casi di effettivo utilizzo del secondo segmento da quelli in cui si constata che solo la corda 'principale' è usata nell'esecuzione: ciò in ottemperanza al principio enunciato da Hornbostel e Sachs di non considerare, per i cordofoni, gli elementi relativi al modo in cui le corde siano eccitate. Per questo non accolgo la sua ulteriore proposta di suddivisione di questi archi in 'monofonici' e 'polifonici': si tratta evidentemente di casi non definibili esclusivamente in base alla morfologia, bensì dipendenti dalla effettiva (e magari occasionale) messa in atto di una prassi performativa. Riteniamo comunque degna di forte interesse la proposta di Mauro Campagnoli, anche perché essa apre un ulteriore caso di specificazione morfologica negli archi musicali nel momento in cui, indicando in un supporto rigido il mezzo di una suddivisione in diversi segmenti della corda, si rinvia ai casi in cui tale supporto sia costituito da un ponticello o dallo stesso risuonatore inserito tra bastone e corda in modo da tenere permanentemente sollevata quest'ultima. Il che rinvia all'opportunità di un'ulteriore riflessione sugli archi musicali, anche in considerazione del fatto che le modifiche qui proposte sono il risultato di rilevazioni condotte nell'ambito della ricerca sul campo, e quindi sono per ora ristrette al caso concreto documentato presso gli Aka e i Baka. Nulla vieta che analoghe precisazioni possano essere applicate ad altri *taxa*, ad esempio a quelli relativi agli archi polieterocordi (311.122), in base alla proiezione logico-formale sul sistema dei casi empiricamente osservati, tradotti in forma di ipotesi potenziali.

311.2 *Cetre a bastone rigido*	Il supporto per le corde è rigido	
311.21 Archi a bastone rigido	Il supporto per le corde possiede un'estremità flessibile ed arcuata. N.B. Le cetre a bastone rigido con due estremità flessibili e incurvate – come gli archi Basuto – rientrano tra gli archi musicali	*Indocina*
311.22 Cetre a bastone rigido (propriamente dette)	N.B. I bastoni di canna, eventualmente cavi, non appartengono alle cetre tubolari, bensì alle cetre a bastone; al contrario gli strumenti in cui la cavità è sfruttata come vero e proprio risuonatore – come è il caso dell'*Harpa* del Messico moderno – sono cetre tubolari	
311.221 Con un unico risuonatore di zucca		*India (tuila), Celebes (suleppe)*
311.222 Con più risuonatori di zucca		*India (vina)*
312 Cetre tubolari	Il supporto per le corde è una tavola incurvata nel senso della larghezza	
312.1 *Cetre a tubo intero*	Il supporto per le corde è un tubo intero	
312.11 Cetre a tubo (intero) idiocordi		*Africa e Indonesia (gonra, togo, valiha)*
312.12 Cetre a tubo (intero) eterocordi		
312.121 Prive di risuonatore speciale		*Indocina (alligator)*
312.122 Munite di risuonatore speciale	L'internodio di bambù è avvolto da una foglia di palma modellata in forma concava	*Timor*
312.2 *Cetre a semi-tubo*	Le corde corrono sopra la parte convessa di una tegola	
312.21 Cetre a semi-tubo idiocordi		*Flores*
312.22 Cetre a semi-tubo eterocordi		*Asia orientale (k'in, koto)*
313 Cetre a zattera	Il supporto delle corde è costituito da un insieme di pezzi di canna legati in forma di zattera	
313.1 *Cetre a zattera idiocordi*		*India anteriore, Guinea settentrionale, Congo centrale*
313.2 *Cetre a zattera eterocordi*		*Territorio Nyassa settentrionale*

314 Cetre a tavola	Il supporto per le corde è una tavola; anche il suolo va considerato come tale	
314.1 *Cetre a tavola (propriamente dette)*	Il piano delle corde è parallelo al supporto delle corde	
314.11 Prive di risuonatore		*Borneo*
314.12 Munite di risuonatore		
314.121 Con risuonatore a guscio	Il risuonatore è un guscio vegetale o qualcosa di simile, dunque un prodotto naturale, oppure – se è un manufatto artificiale – un guscio scavato	*Territorio Nyassa*
314.122 Con cassa di risonanza (cetre a cassa)	Il risuonatore è il risultato dell'assemblaggio di tavole	*Zither, Hackbrett, pianoforte*
314.2 *Cetre a tavola improprie*	Il piano delle corde è perpendicolare al supporto per le corde	
314.21 Cetre costruite sul terreno	Il suolo costituisce il supporto per le corde; una sola corda	*Malacca, Madagascar*
314.22 Cetre-arpa	Una tavola costituisce il supporto per le corde; le corde sono più d'una; ponticello dentato	*Borneo*
315 Cetre a guscio[41]	Le corde sono disposte sopra l'apertura di un guscio	*Tanganyika*
315.1 *Prive di risuonatore*		
315.2 *Munite di risuonatore*	Il guscio è collegato ad una zucca o simili	
316 Cetre a cornice	Le corde sono tese liberamente entro una cornice	
316.1 *Prive di risuonatore*		*Rinvenibili forse tra i salteri del Medio Evo*
316.2 *Munite di risuonatore*		*Presso i Kru, Africa occidentale (kani)*

41. Il termine usato nell'originale è *Schale*, che indica sia corpi cavi usati come recipienti (ciotole, scodelle, bacinelle, catini, ecc.), sia corpi cavi naturali (gusci). Lo stesso termine compare poco sopra (*taxon* 314.121 *[Eigentliche Brettzithern] mit Resonanzschale* = [Cetre a tavola propriamente dette] munite di risuonatore a guscio – letteralmente, 'guscio di risonanza'); si chiarisce nella descrizione delle caratteristiche che si tratta o di un guscio naturale di un frutto o di un guscio scavato artificialmente. *Schale* torna poi per le *Schalenleiern* (= 321.21 «Lire a guscio»), e per i liuti («Liuti a spiedo a guscio» = 321.311 *Schalen-Spießlauten* e i «Liuti a manico a collo a guscio» = 321.321 *Schalen-Halslauten*). Si tratta pertanto in generale di un supporto per le corde sagomato in modo da prevedere una cavità al di sotto del piano delle corde. Nella realtà queste cetre, diffuse nell'Africa centro-orientale, sono costituite, nella maggior parte dei casi, da un supporto a forma di vassoio incavato o di bacinella stretta e lunga. Ciò ha indotto i traduttori inglesi a preferire *Trough zithers*, vale a dire 'Cetre a trogolo' o 'a mangiatoia'. Si è preferito optare per 'guscio' per la relativa semplicità metaforica che tale termine comporta. L'unico possibile bisticcio è quello che si può ravvisare nella descrizione delle caratteristiche di 315.2, ove si parla di una 'zucca' collegata a un 'guscio'; tuttavia la sequenza dei *taxa* dovrebbe rendere anche questa descrizione chiara e univoca.

32 Cordofoni compositi	Lo strumento consiste in un supporto per le corde e in un risuonatore connessi in modo organico e non separabili senza distruggere l'apparato sonoro	
321 Liuti	Il piano delle corde è disposto parallelamente al piano armonico	
321.1 *Liuti arcuati*	Ogni corda possiede un proprio supporto flessibile	*Africa (akam, kalangu, wambi)*
321.2 *Liuti a giogo ovvero Lire*	Il supporto per le corde è un giogo che congiunge due bracci a mo' di traversa, e che giace sullo stesso piano del piano armonico	
321.21 Lire a guscio	Un guscio naturale o scavato artificialmente funge da risuonatore	*Lyra, lira dell'Africa orientale*
321.22 Lire a cassa	Una cassa di tavole assemblate funge da risuonatore	*Cithara, crowd*
321.3 Liuti a manico	Il supporto per le corde è un semplice manico. Non vanno presi in considerazione manici supplementari come nella *prasarini vina* dell'India; rientrano inoltre in questo gruppo i liuti la cui incordatura è distribuita su più manici – come l'*harpolyre* – e i liuti – ad es. la lira-chitarra – nei quali il giogo ha solo un valore decorativo	
321.31 Liuti a spiedo	Il manico è conficcato diametralmente attraverso la cassa di risonanza	
321.311 Liuti a spiedo a guscio[42]		*Persia, India, Indonesia*
321.311.1 Liuti a spiedo [a guscio] interno	Il manico è conficcato nella cassa ma non la attraversa tutta, bensì fuoriesce da un'apertura nel piano armonico, e la sua estremità costituisce l'attacco delle corde	*Marocco (gnbri), Niger (halam)*

42. Questo gruppo necessita di un'ulteriore suddivisione:
321.311.1 Liuti a spiedo [a guscio] interno
321.311.2 Liuti a spiedo [a guscio] esterno
Nei primi il manico è conficcato nella cassa ma non la attraversa tutta, bensì fuoriesce da un'apertura nel piano armonico, e la sua estremità costituisce l'attacco delle corde. Nei secondi il manico fuoriesce dalla parte opposta del guscio. Tale suddivisione potrebbe funzionare in astratto per tutti i liuti a spiedo, indipendentemente dalla forma della cassa, e quindi potrebbe essere proposta più in generale dopo 321.31 «Liuti a spiedo». Ciò tuttavia costringerebbe a rimescolare la numerazione in modo più complicato, e comunque in realtà non mi risultano liuti a spiedo interni se non con la cassa a guscio (in Africa, *halam*, *gnbri*, ecc.).

321.311.2 Liuti a spiedo [a guscio] esterno	Il manico fuoriesce dalla parte opposta del guscio	
321.312 Liuti a spiedo a cassa ovvero chitarre a spiedo	Il risuonatore è una cassa di tavole assemblate	*Egitto (rebab)*
321.313 Liuti a spiedo tubolari	Il manico è conficcato diametralmente attraverso un tubo	*Cina, Indocina*
321.32 Liuti con manico a collo	Il manico a forma di collo è applicato al risuonatore o è ricavato dallo stesso blocco intagliato	
321.321 Liuti con manico a collo a guscio		*Mandolino, tiorba, balalaika*
321.322 Liuti con manico a collo a cassa ovvero chitarre con manico a collo	N.B. I liuti la cui cassa è composta da doghe che imitano un guscio vanno compresi tra i liuti a guscio	*Violino, viola da gamba, chitarra*
322 Arpe	Il piano delle corde è perpendicolare alla tavola armonica e le estremità delle corde sono disposte lungo una direttrice allineata con il manico	
322.1 *Arpe aperte*	L'arpa è priva di colonna anteriore	
322.11 Arpe arcuate	Il manico forma una curva a partire dalla cassa	*Birmania e Africa*
322.12 Arpe angolate	Il manico forma un angolo a partire dalla cassa	*Assiria, Antico Egitto, Antica Corea*
322.2 *Arpe a cornice*	L'arpa è munita di una colonna anteriore	
322.21 Prive di dispositivo di alterazione dell'accordatura		*Tutte le arpe medievali*
322.211 Arpe a cornice diatoniche		
322.212 Arpe a cornice cromatiche		
322.212.1 Con un solo ordine di corde		*La maggior parte delle arpe cromatiche più antiche*
322.212.2 Con due ordini di corde incrociati		*L'arpa cromatica di Gustave Lyon*
322.22 Arpe ad accordatura alterabile	Le corde possono essere accorciate per mezzo di un meccanismo	
322.221 Arpe manuali	L'intonazione delle corde può essere alterata per mezzo di capotasti manuali	*Arpa ad uncini, Harpe ditale, Harpinella*
322.222 Arpe a pedali	L'intonazione delle corde può essere alterata per mezzo di pedali	

323 Arpe-liuto[43]	Il piano delle corde è perpendicolare al piano armonico e le estremità inferiori delle corde sono allineate lungo una direttrice perpendicolare a quella del manico; è presente un ponticello dentato	*Africa occidentale (kasso, etc.)*
Suffissi comuni		
-3 muniti di corde di risonanza o di simpatia		
-4 suonati con martelletti o mazzuoli		
-5 suonati con le dita		
-6 suonati a plettro		
-7 con dispositivo di eccitazione a sfregamento		
-71 ad arco		
-72 a ruota		
-73 a nastro		
-8 con tastiera		
-9 con movimento meccanico		

43. O 'Arpa-liuti', se si vuole accentuare la componente costituita dalla struttura 'liuto'. Anche 'Arpe-liuti' non è improprio, anzi, riconosce nel nome pari peso alle due componenti contaminate. Chiaramente tali sottigliezze si giustificano solo nella composizione del plurale.

Classificazione	Caratteristiche	Esempi
4 Aerofoni	L'aria stessa è il mezzo primario messo in vibrazione	
41 Aerofoni liberi	L'aria vibrante non è confinata all'interno dello strumento	
411[44] Aerofoni non interruttivi o a deflessione	L'aria colpisce un corpo affilato, oppure un corpo affilato è fatto muovere attraverso l'aria; in entrambi i casi il moto relativo tra l'uno e l'altra genera onde di pressione, percepite come fluttuazioni periodiche nella pressione (e cioè come suono) da un ascoltatore stazionario, senza che vi sia alcuna interruzione del flusso d'aria	*Frusta, lama della sciabola*
411.1 *Aerofoni a spostamento*		

44. Hornbostel e Sachs distinguono tre ordini fondamentali all'interno degli aerofoni liberi: gli aerofoni a deviazione, gli aerofoni a interruzione e quelli a esplosione. Questa impostazione è stata rivista da Laurence Picken [1975] con la proposta di suddividere gli aerofoni liberi (oltre che nell'ordine di quelli a esplosione, che resta immutato) in due gruppi, contrapposti tra loro in base alla assenza/presenza dell'effetto interruttivo del flusso d'aria, e dunque indicando con il numero 411 gli «Aerofoni a deflessione» (o non interruttivi) e con il numero 412 gli «Aerofoni a interruzione». Il concetto in cui si sintetizza la definizione di 'deviazione' è quello di un flusso d'aria che subisca uno spostamento direzionale pur continuando nella sua ininterrotta dinamica. Quello degli strumenti interruttivi (che per Hornbostel e Sachs hanno la caratteristica seguente: «il flusso d'aria è interrotto in modo periodico») è a sua volta definito in base alla condotta del flusso d'aria che subisce anche un'interruzione a seguito dell'azione di un dispositivo meccanico Secondo Picken, poi, gli aerofoni a deflessione vanno distinti in due sottoordini: 411.1 «Aerofoni a spostamento» e 411.2 «Aerofoni a deflessione in senso proprio». Questi ultimi sono forniti della seguente descrizione: «Le irregolarità di un disco o di un altro oggetto scompaginano le onde di pressione che si estendono attorno all'asse di rotazione dell'oggetto rotante. Esse raggiungono l'ascoltatore stazionario sotto forma di periodiche fluttuazioni nella pressione, la frequenza delle quali è determinata dalla velocità di rotazione. I dischi o i rombi o gli altri oggetti a simmetria centrale subiscono la rotazione sia sul piano del disco o del rombo, sia sul piano dell'asse più lungo o del diametro dell'oggetto, all'incirca nel punto centrale. La rotazione è soggetta a rapidi rovesciamenti di direzione, necessariamente legati alle fasi di accelerazione e decelerazione» [*ibidem*, 343-344]. Picken pertanto sostiene, a ragione, che se è vero che la rotazione accomuna frulli e rombi, i primi non sono interruttivi, poiché il flusso d'aria relativo ipotizzabile nel piano di rotazione non viene intercettato dall'oggetto, che mostra invece di agire deflettendo l'aria alternativamente in una direzione e poi in un'altra, per effetto della sua oscillazione. Come detto, chi scrive condivide questo rilevante emendamento, e lo ha perciò inserito nell'ordinamento classificatorio.

411.2 *Aerofoni a deflessione*	Le irregolarità di un disco o di un altro oggetto scompaginano le onde di pressione che si estendono attorno all'asse di rotazione dell'oggetto ruotante. Esse raggiungono l'ascoltatore stazionario sotto forma di periodiche fluttuazioni nella pressione, la frequenza delle quali è determinata dalla velocità di rotazione. I dischi o i rombi o gli altri oggetti a simmetria centrale subiscono la rotazione sia sul piano del disco o del rombo, sia sul piano dell'asse più lungo o del diametro dell'oggetto, all'incirca nel punto centrale. La rotazione è soggetta a rapidi rovesciamenti di direzione, necessariamente legati alle fasi di accelerazione e decelerazione [Picken 1975, 343-344]	*Frullo*
412 Aerofoni a interruzione	Il flusso d'aria è interrotto in modo periodico	
412.1 *Aerofoni ad interruzione autofonici*[45] *ovvero ancie*	Il flusso d'aria è forzato contro una lamella; questa entra in vibrazione in virtù della sola pressione dell'aria ed interrompe il flusso in modo periodico. A questo gruppo appartengono anche le ancie con 'spolette', cioè i tubi in cui l'aria che vi è contenuta vibra non in modo primario, bensì in modo secondario, cosicché in luogo di produrre essa stessa il suono, si limita ad arricchirlo e a colorarlo: le spolette di regola vanno considerate prive di fori digitali	*Le canne ad ancia dell'organo*

45. Il termine originario tedesco usato da Hornbostel e Sachs è *selbstklingende*, che letteralmente è traducibile con 'capaci di suonare da sé'. Questo è lo stesso aggettivo da loro usato nell'introduzione per tradurre in tedesco il concetto elaborato da Mahillon di [*instruments*] *autophones*, criticato peraltro alla radice, in relazione alla denominazione della relativa classe, al punto da essere sostituito dal termine 'idiofonico'. In questo punto della classificazione, relativo alle ancie come aerofoni liberi, si ripropone un complicato problema semantico e concettuale attorno a questo aggettivo: dobbiamo intendere *selbstklingende* come sinonimo e rafforzativo di 'libero' (*freie*), riferito agli aerofoni ad aria ambiente, che nel caso delle ancie necessita di un ulteriore richiamo, essendo le stesse presenti contemporaneamente tra gli aerofoni liberi e tra gli strumenti a fiato propriamente detti? Oppure qui gli autori hanno fatto un richiamo consapevole all'elemento relativo alla natura anche 'idiofonica' delle ancie, in quanto il suono sarebbe prodotto anche dalla vibrazione della materia rigida di cui le ancie sono fatte, come se questa fosse una sorta di sub-determinazione dell'elemento vibratorio costituito dall'aria messa in moto? Si direbbe che i traduttori inglesi Baines e Wachsmann avessero sposato quest'ultima interpretazione, avendo scelto di tradurre *selbsklingende* con *idiophonic*; al contrario, Carlos Vega nel testo pubblicato nel 1946 tradusse in castigliano con *autófonos*; come già detto, Vega è stato allievo di

412.11 Ancie di materiale rigido flessibile ovvero ancie 'idiocinetiche'	Il materiale di cui sono composte le ancie è dotato di elasticità propria, come nelle lamine o dispositivi a dislocazione elastica
412.111 Ancie battenti simmetriche	Due o più corpi simmetrici a dislocazione elastica, fissi a un'estremità e liberi di muoversi all'estremità opposta, formano una fessura che si chiude in modo periodico in rapporto con le vibrazioni
412.111.1 Ancie battenti rigide elastiche propriamente dette	Le parti mobili separate e giustapposte in modo da fornire un'apertura apicale sono ricavate da materiale rigido ed elastico
412.111.11 Ancie battenti doppie	Le due parti simmetriche sono ricavate da una tegola di canna o di materiale sintetico cui si asporta parte dello spessore al centro per poi separare e giustapporre le due parti così assottigliate

Sachs e, ciò che più conta, sottopose la sua traduzione alla verifica personale dello stesso Sachs. Da questa situazione, qui solo accennata nei suoi risvolti principali, discendono numerosi problemi, primo fra tutti quello dell'opportunità di una radicale e comunque approfondita revisione/integrazione della classificazione delle ancie, che è compito complesso su cui si sta lavorando, uno dei nuclei problematici del quale è costituito proprio dai rapporti tra la vibrazione dell'aria sottoposta a interruzioni periodiche (che resta ovviamente il momento generativo del suono) e il materiale di cui l'ancia è composta: quest'ultimo riconduce di volta in volta ad analogie con gli idiofoni, i membranofoni e i cordofoni. In questo senso, dunque, chi scrive ritiene di dover riservare questo attributo per consentire che l'allargamento della considerazione degli aerofoni a interruzione si dilati inglobando la casistica dei dispositivi basati su un otturatore a membrana, che costituiscono una categoria 'nuova', e anche di quelli con struttura assimilabile a quella di una corda, categoria applicabile alle ancie a nastro. Ciò detto, dal punto di vista filologico relativo alla terminologia ideata dagli autori nel 1914, l'idea è che con *selbstklingende* si intendesse riferirsi ai sistemi in cui l'effetto interruttivo si mette in moto 'da sé' senza dover ricorrere alla forza muscolare (o a quella di un motore) di chi gira una manovella o fa roteare un corpo appeso a una corda o simili: data l'esistenza di un flusso d'aria e il suo orientamento e pressione adeguati, è il movimento stesso dell'aria secondo le leggi dell'aerodinamica ad attivare un moto alternato nel dispositivo meccanico. Il che è di tutte le ancie che si attivano in relazione a pressione e depressione dell'aria. Non è precisamente 'da sé', poiché c'è bisogno di un intervento esterno, ma questo si limita a generare una pressione dell'aria in entrata da cui poi tutto il sistema trae impulso. Quindi i casi di ancie 'idiofoniche', in corrispondenza anche con quelle 'cordofoniche' e 'membranofoniche', non indicano che il suono sia prodotto dal corpo solido, ma che quest'ultimo si muove nel momento stesso in cui funziona da valvola intermittente e dunque vibra anche esso stesso (il che distingue le ancie dagli altri aerofoni): dunque si marca la presenza di un corpo solido mobile, e se ne distinguono le proprietà (rigido, elastico e flessibile per le ancie idiofoniche, elastico sottoposto a tensione, per quelle membranofoniche e cordofoniche). Per evitare dubbi, però, poiché 'idiofonico', 'membranofonico' e 'cordofonico' inglobano la parola φωνή (*foné* = suono), che è la componente che nell'uso qui considerato induce in equivoco, la proposta è di usare un altro termine composto basato sul greco antico, e cioè 'idiocinetico', 'membranocinetico' e 'cordocinetico', inglobandovi il termine κινησις (*kinesis* = movimento), facendo riferimento al materiale che con il suo moto alternato produce l'interruzione del flusso d'aria. In via subordinata, badando all'assetto formale e non acustico dello strumento, potrebbero valere i termini 'idiomorfico', 'membranomorfico' e 'cordomorfico', che ovviamente si basano su μορφή (*morfé* = forma). La sequenza dei *taxa* parte dalle ancie battenti 'idiocinetiche', e tra queste da quelle simmetriche di materiale rigido, per mantenere una più vicina somiglianza con l'impianto originario della Classificazione del 1914. In realtà sarebbe più coerente una disposizione che sia almeno allusiva a percorsi che vadano dal semplice al complesso e/o dal marginale al mainstream e in cui quindi la successione dei *taxa* sia in buona parte ribaltata.

	412.111.111 Ancie battenti doppie a lamine singole	Le due parti simmetriche sono costituite ciascuna da un corpo singolo	
	412.111.112 Ancie battenti doppie a lamine pluristrato	Le due parti simmetriche sono costituite ciascuna da più corpi sovrapposti a strati, che si muovono solidalmente in modo simmetrico e concussivo	*Le ancie di foglia di palma dell'Asia centro-meridionale (Tibet, Nepal, India, Birmania), La foglia verde arrotolata della Calabria* [La Vena 1996, 73-74]
412.111.12 Ancie battenti tubolari a vibrazione apicale[46]		Un internodo di canna tagliato all'estremità chiusa in modo da proporre al flusso d'aria due o più parti mobili simmetriche che si aprono e si chiudono in modo coordinato o a moto alterno	
	412.111.121 Doppie o a simmetria semplice	La canna è spaccata in due parti simmetriche	*Calabria*
	412.111.122 Quadruple o plurisimmetriche	Con un taglio a croce la canna è spaccata in quattro parti simmetriche o spicchi	*Calabria, Sardegna (ischéliu)* [Dore 1976, 115-119; Spanu 2014, 192-193]

46. Secondo Francis W. Galpin [1902-1903], che per primo ha dedicato un importante studio a molti aerofoni del Nuovo Continente di rara fattura, tra cui diverse ancie, questi dispositivi andrebbero considerati quali forma apicale (*terminal*) delle ancie da lui definite 'ad allontanamento' (*retreating reeds* [*ibidem*, 128]). Tuttavia chi scrive ritiene che qui vi sia una contraddizione, poiché le *retreating reeds* sono da lui descritte come l'opposto delle ancie doppie a concussione, in quanto queste presentano a riposo uno scostamento tra le lamelle, che l'aria dilata innescando il moto periodico a valvola, mentre quelle ad allontanamento presentano le due parti mobili prodotte dall'intaglio a fessura come perfettamente coincidenti: qui dunque l'aria deve forzare questa posizione chiusa per dare inizio al moto periodico a valvola. Ora, gli strumenti a taglio apicale che noi conosciamo sono costruiti in modo che l'elasticità della canna, indebolita dal taglio apicale stesso (semplice o doppio a croce) lascia le due parti mobili leggermente scostate, quel tanto che serve per consentire al flusso d'aria di aprirsi una via al loro interno: un comportamento assimilabile a quello delle ancie a concussione. È poi vero che la sequenza dei momenti meccanici di turbolenza è più complessa di quanto si possa immaginare, per cui lo spostamento degli elementi mobili non avviene solo per 'spinta dall'interno' ma anche a causa della rarefazione indotta all'esterno delle parti mobili, che quindi si 'sollevano'; ma ciò non esclude che la possibilità dell'aria di insinuarsi anche tra i due otturatori simmetrici sia molto importante. E questa doppia azione è quanto avviene nel caso delle ancie simmetriche insufflate apicalmente, siano esse basate su una coppia di lamelle o su spicchi di un clindro. Le *retreating reeds*, invece, vanno inserite nel cavo orale dall'estremità chiusa: quindi il soffio si espande in modo complanare all'esterno del cilindro, provocando una turbolenza che induce l'apertura della fessura, e non passa dall'interno del tubo. Perciò preferiamo collocare le ancie ricavate da un cilindro con intaglio apicale accanto a quelle lamellari a concussione.

	412.111.13 Ancie battenti ad allontanamento ovvero a fessura laterale/mediana e ad insufflazione complanare (*retreating reeds*)[47]	Due parti simmetriche separate da un taglio longitudinale aperto lateralmente su un tubo naturale di canna, contro le quali è diretto un flusso d'aria che le separa temporaneamente innescando una serie periodica di aperture e chiusure. La complanarità si riferisce all'espansione del flusso d'aria lungo la superficie esterna del cilindro	
	412.111.131 Singole	Il dispositivo mobile si basa su una sola fessura	*Calabria, Turchia, Lapponia (fadno), America settentrionale (West Coast)*
	412.111.132 In serie	Più fessure determinano l'azione contemporanea di vibrazione	*Madagascar, Corno d'Africa, Turchia*
412.111.2 Ancie battenti elastiche di materiale flessibile sottoposto a schiacciamento		Le parti mobili separate e giustapposte sono ricavate da materiale in origine cedevole	
	412.111.21 Morbide a schiacciamento	Un cilindro cedevole schiacciato ad un'estremità in modo da lasciare una stretta fessura tra due pareti simmetriche contrapposte, contro la quale è forzato il passaggio dell'aria. La parte schiacciata resta relativamente morbida	*Le ancie ricavate da corolle di fiori o da steli cilindrici cavi, come lo scapo cavo appiattito a un'estremità (il fusto del taraxacum officinalis o della cipolla), le ancie di corteccia verde, le ancie di phragmites australis*
	412.111.22 Rigide a schiacciamento	Un cilindro o un cono in origine cedevole, schiacciato ad un'estremità in modo da lasciare una stretta fessura tra due pareti simmetriche contrapposte, contro la quale è forzato il passaggio dell'aria. L'ancia è poi fatta essiccare assumendo consitenza di corpo rigido elastico	*L'ancia degli oboi cilindrici secondo Baines* [1991, 202-203] *derivati dal monaulos: mey (Turchia), duduk (Armenia), duduki (Georgia), balaban (Azerbaijan, Kurdistan-Irak), guan zu (Cina), hichirichi (Giappone)*

47. Anche qui va richiamato l'articolo citato di Galpin [*ibidem*, 128], per puntualizzare un aspetto problematico: l'autore infatti segnala quella che egli ritiene sia una variante delle *retreating reeds* ad insufflazione apicale, individuato in uno strumento Salish (bella bella) descritto da E. H. Hawley e costruito non a partire da un tubo naturale bensì da due parti di legno di cedro intagliate e giustapposte in modo da lasciare tra le due estremità prossimali un «little channel cut in them for an air passage». Ciò determina che «where the breath is forced in at the mouthpiece it causes the free ends both to open and close, producing a harsh sound». Di nuovo chi scrive ritiene ragionevole ricondurre questo caso a quello analogo alle ancie battenti a concussione, sia pure in una versione in cui le due parti mobili sono forse più spesse di quanto non avvenga di solito con le lamelle di canna assottigliata. Il che dovrebbe escludere che questo caso possa far parlare di *retreating reeds* artificiali (in quanto costruite per mezzo dell'intaglio e sagomatura di parti di legno) invece che naturali (in quanto ricavate da cilindri naturali come canne o steli vegetali). Se ne deve concludere che l'intaglio che consente l'azione 'ad allontanamento' debba limitarsi alla posizione laterale, mediana e non possa essere esteso alla posizione apicale.

412.112 Ancie battenti asimmetriche (semplici)	Una sola parte mobile funge da otturatore aprendo e chiudendo un'apertura urtando ad ogni ciclo contro una cornice	
412.112.1 Ancie battenti semplici (singole)		*British Columbia*
412.112.2 Ancie battenti semplici in serie		*Gli antichi registri ad ancia dell'organo*
412.12 Ancie libere	L'otturatore a lamella si muove senza incontrare ostacoli che interrompano la sua dislocazione dalla posizione di riposo	
412.121 Ancie a lamella rigida elastica a movimento bilaterale	L'aria si dirige contro una lamella rigida colpendola di taglio in modo che il piano della lamella a riposo è parallelo al flusso d'aria. La pressione, superata una soglia, mette la lamella in moto oscillatorio per mezzo di una spinta laterale, sino a quando il moto si ripete in senso contrario. In tal modo si apre e si chiude alternativamente il passaggio dell'aria ai due lati della lamella	
412.121.1 Aperte e semplicemente intelaiate	La lamella è inserita entro un telaio a due rebbi aperto ad un'estremità ricavato da un bastone naturale o da un legno tornito con un taglio longitudinale	*Foglia di alloro secca (oro) Monti Lepini, Lazio* [Di Fazio 1997, 58-61]; *Sardegna (chigula); richiamo per anatre*
412.121.2 Incapsulate	La lamella è inserita all'interno di un corpo cavo, ove può oscillare da enrtrambi i lati in relazione con le alterazioni nella pressione dell'aria interna[48]	*British Columbia* [Galpin 1902-1903], *Monti Lepini, Lazio (pifaretta a cifolitto montata su un risuonatore tubolare)* [Di Fazio 1997, 62-66][49]

48. Questo dispositivo richiede ancora una più precisa definizione del suo comportamento acustico e delle sue applicazioni morfologiche a strumenti concreti, rese peraltro problematiche dalla rarefazione degli usi culturali attivi degli strumenti conosciuti, o estinti o estremamente marginalizzati. Il nodo problematico centrale è costituito dalla sua differenziabilità in relazione alle due sottoclassi degli aerofoni, e cioè come aerofono libero a interruzione e come strumento a fiato propriamente detto, consistente in un dispositivo in cui l'ancia è accoppiata a un'estensione tubolare in modo che sia messa in vibrazione l'aria in esso confinata. Analogo, speculare problema si pone in relazione con il *taxon* 422.311.

49. Dalle ricerche di Emilio Di Fazio [1997, 62-66] nei Monti Lepini (Lazio meridionale) non è emersa una presenza del dispositivo come aerofono libero, bensì solo come ancia incapsulata applicata a un tubo cilindrico munito di fori digitali. Tuttavia un indizio della possibile esistenza dell'ancia separata da un risuonatore è data proprio dal nome, nel quale si specifica che la *pifaretta* (il nome del dispositivo sonoro) in quel caso è accoppiata a un tubo assimilato al flauto diritto (*cifolitto*): come dire che la *pifaretta* da sola è nota e designata in quanto tale.

412.122 Ancie a lamella rigida elastica complanari al supporto	La lamella è ritagliata dallo stesso materiale di cui è composto il supporto che la sostiene, per cui può muoversi attraversando l'apertura ricevendo un flusso d'aria sia in entrata sia in uscita, il che consente di ottenere il suono in espirazone o in inspirazione	
412.122.1 Singole		*Corni sciamanici ad ancia del Sud Est asiatico*
412.122.2 In serie		*Organi a bocca dell'Asia sud-orientale*
412.123 Ancie a lamella rigida elastica non complanari al supporto	La lamella è applicata al supporto che la sostiene, per cui può muoversi attraversando l'apertura rispondendo solo a un flusso d'aria monodirezionale	
412.123.1 Singole		
412.123.2 In serie		*Harmonium*
412.2 *Aerofoni ad interruzione membranocinetici ovvero ancie di materiale membranaceo tensibile*	Il flusso d'aria è forzato contro una membrana posta in tensione che chiude in tutto o in parte un'apertura; lo spostamento della membrana entra in vibrazione ed interrompe il flusso in modo periodico	
412.21 Ancie a membrana battenti	La membrana preme contro il bordo di un'apertura, per cui ad ogni ciclo interruttivo il passaggio dell'aria si chiude in modo periodico in rapporto con le vibrazioni	*L'ancia del tornado*[50]

50. Strumento aerofono ad ancia membranocinetica tesa su un supporto circolare di diametro maggiore di un tubo interno concentrico al primo sulla cui circonferenza poggia la membrana stessa di plastica sottile. Soffiando lateralmente attraverso un foro ricavato nel cilindro esterno la cui estremità funge da supporto della membrana, l'aria è forzata nello stretto spazio intercorrente tra il cilindo esterno e quello interno su cui poggia la membrana. In questo modo la pressione allontana temporaneamente la membrana e si fa strada attraverso l'apertura così ricavata, per poi subire l'interruzione provocata dalla ricaduta del diaframma contro il bordo del cilindro minore. Così descritto, e nella sua concreta realizzazione, sembrerebbe esclusa la presenza concreta come aerofono libero di questo strumento, poiché la presenza del cilindro che sostiene la membrana lo colloca tra i tubi ad ancia (strumenti a fiato propriamente detti). Tuttavia, riducendo al minimo questa parte tubolare, purché sia sufficientemente sviluppato l'interstizio tra i due tubi che fa da condotto dell'aria, si ottiene un meccanismo funzionante che non ha bisogno di accoppiamenti con tubi risunatori, non più di quanto essi non siano comunque sempre virtualmente presenti nelle ancie battenti doppie e singole di natura idiocinetica.

412.22 Ancie a membrana libere	La membrana è tesa su un supporto in modo che il flusso d'aria che la intercetta ne provoca lo spostamento verso un lato e poi, in forza dell'elasticità del dispositivo messo in tensione, con moto contrario, verso la direzione opposta	
412.221 Ancie a membrana libere non incapsulate	La membrana, naturale o artificiale, è insufflata in campo aperto	*La foglia d'edera* [Di Fazio 1997, 58] *o la corteccia di betulla insufflate all'esterno del cavo orale. Gli elastomeri a nastro (gomma o polietilene) della Calabria* [La Vena 1996, 67-68; 72-73]
412.222 Ancie a membrana libere incapsulate	La membrana, naurale o artificiale, è insufflata all'interno di una cavità, le cui variazioni intervengono a modificare i parametri del suono	*La piastrina cinguettante da palato (palatal birds chirping whistle)*
412.3 *Aerofoni ad interruzione cordocinetici ovvero ancie di materiale nastriforme tensibile (ancie a nastro)*	Il flusso d'aria è forzato di taglio contro una striscia sottile posta in tensione al centro di un'apertura stretta e oblunga; la pressione del flusso d'aria provoca lo spostamento della striscia dapprima da un lato e poi, a causa dell'elasticità del materiale messo in tensione, in direzione contraria, in tal modo attivando un movimento interruttivo periodico del flusso stesso	
412.31 Ancie a nastro a tensione temporanea	La striscia è tenuta tra i pollici e la base delle due mani del suonatore, lasciando una stretta fessura entro la quale la striscia è posta in tensione dall'estensione temporanea dell'impugnatura	*Il filo d'erba tenuto tra le mani in posizione verticale*

412.32 Ancie a nastro a tensione permanente	La striscia è tesa entro una fessura ottenuta schiacciando l'estremità prossimale di un cono di fibra vegetale arrotolata, ovvero intagliando due valve di legno simmetriche e poi serrate una contro l'altra. A causa della rarità dei dispositivi in questione non conosciamo in dettaglio il comportamento acustico di questi strumenti, in particolare il ruolo che vi svolge il supporto dell'ancia di forma tubolare, di cui non si può dire se abbia solo funzione di amplificazione o se divenga un vero risuonatore; il che farebbe di questi strumenti un caso di strumenti a fiato propriamente detti	*America meridionale (waikoko dei bambini Chóco, adjulona dei Carajá e Šavajé)* [Izikowitz 1935, 252-254]; *America settentrionale (Cree, Naskapé, Penobscot* [ibidem]; *Tsimshian e altri popoli della North-West Coast* [Galpin 1902-1903, 129-130]
412.4 *Strumenti ad interruzione non autofonici*	Il dispositivo interruttivo si muove senza l'intervento del flusso d'aria oggetto dell'interruzione ma a causa di un impulso di tipo muscolare o prodotto da congegni meccanici	
412.41 Aerofoni a spostamento	Il dispositivo interruttivo si muove sul suo proprio piano	*Sirena a disco forato, sirena ad onde*
412.42 Aerofoni a vortice	Il dispositivo interruttivo ruota attorno al proprio asse	*Rombo, ventilatore a pale*
413 Aerofoni a esplosione[51]	L'aria riceve un unico impulso compressivo	

51. Qualche dubbio può insorgere a proposito della legittimità dell'inserimento di tutti gli aerofoni a esplosione nella sottoclasse degli aerofoni liberi: è infatti noto l'uso di tubi aperti alle due estremità, contro le quali è praticata la percussione con il palmo della mano. L'effetto che ne deriva è un suono caratteristico, leggermente glissato, che è prodotto dalla compressione dell'aria in corrispondenza del punto di percossa e la rapida trasmissione della compressione all'interno del tubo; l'onda di pressione si scarica all'esterno attraverso l'apertura opposta a quella percossa; ciò provoca un moto periodico dell'aria circostante, che produce onde percepite dall'orecchio sotto forma di suono. Il dubbio nasce a proposito dell'aria confinata entro il tubo, che riceve la compressione e la scarica poi all'esterno: poiché tubi di diversa dimensione (e quindi contenenti masse d'aria diverse, sotto forma di colonne) producono suoni di diversa altezza, viene da chiedersi se non vi sia un ruolo determinante nella generazione della vibrazione da parte dell'aria contenuta nel tubo, il che è tipico degli strumenti ad aria confinata, e cioè degli strumenti a fiato propriamente detti. Tuttavia, se si usa un tubo non cilindrico o che comunque presenti differenti diametri alle due estremità, praticando la percussione alternativamente sulle due aperture si producono suoni di altezza ben diversa, pur essendo sempre uguale la massa d'aria confinata all'interno. Ciò dunque torna a favore dell'ipotesi di funzionamento come aerofoni liberi: la dimensione dell'apertura ha a che fare con la resistenza acustica che, a parità di massa, è diversa in rapporto con l'ampiezza della 'superficie' del foro opposto a quello contro cui si applica la percussione, attraverso cui l'aria interna viene a contatto con l'aria esterna; tanto più ampia è tale zona, tanto più bassa la resistenza esercitata contro la massa d'aria pressata all'interno del tubo a scaricarsi verso l'esterno e dunque più acuto il suono prodotto. Anche quando si percuotono con le dita i fori di un flauto, senza soffiarvi dentro, si ottengono suoni di altezza diversa e disposti secondo una successione scalare che sembra corrispondere in altezza (o meglio, in rapporto intervallare con gli altri suoni della scala) a quella prodotta dagli stessi fori quando si suona il flauto soffiando nell'imboccatura: in realtà la diversa altezza non è determinata dalla messa in vibrazione di colonne d'aria di differente lunghezza, bensì dalla stessa massa d'aria che trova diversa resistenza a scaricare all'esterno la pressione indotta dalla percussione, in proporzione diretta alla diversa somma delle aperture attraverso le quali la

413.1 *Strumenti ad aria compressa*	L'impulso istantaneo è prodotto da un accumulo di compressione dell'aria	
413.11 Ad aria libera	La compressione avviene su una porzione d'aria non confinata in un contenitore	*La foglia rotta per un forte colpo percussivo della mano*
413.12 Ad aria confinata	La compressione riguarda l'aria contenuta entro un involucro chiuso di cui si libera di colpo l'estremità tappata	*Schioppetto, il sacchetto di carta gonfiato e percosso*
413.2 *Strumenti a deflagrazione*	La compressione istantanea è provocata da una rapidissima combustione provocata da una reazione chimica	
42 Strumenti a fiato (propriamente detti)	L'aria vibrante è contenuta entro lo strumento stesso	
421 Strumenti a taglio	Un flusso d'aria nastriforme batte contro un bordo affilato	
421.1 *Flauti ad insufflazione non canalizzata (privi di dispositivo di insufflazione)*	Il suonatore stesso forma con le labbra un flusso d'aria nastriforme che non è forzato o guidato per mezzo di un dispositivo di canalizzazione	
421.11 Strumenti a taglio non propriamente flauti ovvero strumenti a fiato ad insufflazione ortogonale	Il flusso d'aria formato dal suonatore si infrange sul bordo di un foro aperto in un piano ortogonale alla direzione del flusso stesso	
421.111 A cameratura chiusa e fissa	Lo strumento contiene una camera chiusa a forma di basso cilindro o di ellissoide, al centro delle cui facce contrapposte si apre un foro per il passaggio dell'aria	*Il richiamo da caccia composto da due fondelli di cartuccia, il fischietto giocattolo ricavato dal nocciolo di albicocca e simili: Europa, Turchia* [Picken 1975, 376-378], *Brasile* [Izikowitz 1935, 284-285]

pressione si trasmette all'aria ambiente. (Su queste questioni cfr. Picken [1975, 374-376]).

421.112 A cameratura aperta e variabile	La cameratura è priva di parete su un lato. La lingua del suonatore crea in quel punto un'estensione temporanea della camera che contribuisce alla determinazione dei parametri del suono	*Il flauto di pietra di Milena (Sicilia)* [Guizzi 2002, 159-160], *della Turchia* [Picken 1975, 378-380] *e dell'America meridionale, Colombia* [Izikowitz 1935, 284-285]. *Il fischietto di lamierino ricavato da un tappo di bibita: Calabria* [La Vena 1996, 76-78, 97], *Turchia* [Picken 1975, 377-380]
421.12 Strumenti a suono di taglio ad insufflazione non ortogonale	Il flusso d'aria formato dal suonatore si infrange su di un bordo affilato disposto non perpendicolarmente rispetto il piano su cui si muove il flusso stesso	
421.121 Flauti tubolari	Il bordo affilato fa parte di un flauto a forma di tubo	
421.121.1 Flauti diritti	Il suonatore soffia nell'apertura superiore del tubo	
421.121.11 Flauti diritti privi di speciali dispositivi di taglio	Il flusso d'aria si infrange contro il bordo dell'apertura del flauto	
421.121.111 Insufflati dall'alto	Il flusso d'aria si dirige dall'alto verso il bordo dell'apertura del flauto	
421.121.111.1 Singoli		
421.121.111.11 Privi di fori digitali		
421.121.111.111 Aperti		
421.121.111.112 Chiusi		*La chiave cava*
421.121.111.12 Muniti di fori digitali		
421.121.111.121 Aperti		
421.121.111.122 Chiusi		*Particolarmente in Nuova Guinea*
421.121.111.2 In serie o flauti di Pan[52]	Una pluralità di flauti diritti di diversa intonazione è connessa in un unico strumento	*Flauti di Pan*

52. I flauti di Pan di diverse aree del mondo (anche europee, come è il caso di alcuni strumenti lungo il bacino del Volga in Russia o nei paesi Baltici), ma soprattutto nella zona dell'Altipiano andino attorno al Titicaca e in

421.121.111.21 Flauti di Pan aperti		
421.121.111.211 Flauti di Pan aperti (a zattera)	Le canne sono legate l'una all'altra in forma di tavola oppure sono ricavate dalla trivellazione di una tavola	*Cina, Oceania, America centrale e meridionale*
421.121.111.212 Flauti (di Pan) aperti a fascio	Le canne sono legate in forma di fascio tondo	*Isole Salomone, Arcipelago di Bismark*
421.121.111.22 Flauti di Pan chiusi		*Cina, Sud-Est asiatico, Oceania, America centrale e meridionale, Africa, Europa*
421.121.111.23 Flauti di Pan misti a canne aperte e chiuse		*Isole Salomone, America meridionale*
421.121.112 A flusso laterale	Il flusso d'aria si dirige lateralmente verso il bordo dell'apertura del flauto	
421.121.112.1 A flusso laterale indiretto	Il flauto ruota in un'orbita circolare o sul proprio asse ed impatta l'aria circostante che si infrange lateralmente contro il bordo di un'apertura. La struttura tubolare contiene l'aria messa in vibrazione	*Parücia (Piemonte)*
421.121.112.2 A flusso laterale diretto	Il suonatore dirige il suo soffio lateramente contro il bordo di un'apertura. Riconduce a una specifica tecnica esecutiva, più che a un dato strutturale	*Alcuni flauti di Pan a fascio*
421.121.12 Flauti diritti muniti di specifici dispositivi di taglio	Il flusso d'aria si infrange contro un dispositivo ricavato nell'apertura del flauto	
421.121.121 Con dispositivo a tacca	Il flusso d'aria si infrange contro una tacca intagliata nell'apertura del flauto	*Quena (America andina), Africa orientale*
421.121.122 Con dispositivo a smussatura	Il flusso d'aria si infrange contro una smussatura del bordo dell'apertura del flauto	*Shakuachi (Giappone)*
421.121.2 Flauti traversi	Il suonatore soffia contro il bordo affilato di un foro laterale della canna	

Melanesia (Are 'Are, Malaita, Isole Salomone) si caratterizzano anche per una precisa caratteristica che non è riferibile solo alla prassi esecutiva, ma che invece si basa su un preciso impianto costruttivo: si tratta del fatto che di regola non si suona uno solo strumento ma esso ha bisogno almeno di una sua 'controparte' che ingloba metà della scala necesaria alla melodia, secondo uina distribuzione delle note che è ripartita ad incastro tra le due componenti della coppia. Ciò merita un approfondimento tassonomico di cui ci si dovrà occupare con la dovuta attenzione, considerando che la casistica già accertata dalla ricerca sul campo segnala combinazioni complesse anche tra flauti a una sola fila o a due file sovrapposte, con i tubi tutti chiusi o con soluzioni miste di tubi chiusi e aperti.

421.121.21 Flauti traversi singoli		
421.121.211 Flauti traversi aperti		
421.121.211.1 Privi di fori digitali		*Timor sud-occidentale*
421.121.211.2 Muniti di fori digitali		*Flauto europeo*
421.121.212 Flauti traversi semichiusi	Lo sbocco è ricavato attraverso un piccolo foro nel nodo di chiusura della canna	*Borneo nord-occidentale*
421.121.213 Flauti traversi chiusi		
421.121.213.1 Privi di fori digitali		
421.121.213.11 Con fondo fisso		*Apparentemente inesistenti*
421.121.213.12 Con fondo mobile (flauti a stantuffo)		*Malacca, New Guinea*
421.121.213.2 Muniti di fori digitali		*Bengala orientale, Malacca*
421.121.22 Flauti traversi in serie		
421.121.221 Flauti traversi in serie aperti		*Chamber flute-orum*
421.121.222 Flauti traversi in serie chiusi		*Presso i Siusi (Brasile nord-occidentale)*
421.122 Flauti globulari[53]	Il flauto è a forma di recipiente vascolare	
421.122.1 A insufflazione a flusso libero	Il flusso d'aria è indirizzato contro l'apertura del flauto dal suonatore senza ausilio di alcuna guida	
421.122.11 A insufflazione laterale indiretta	Il flauto ruota in un'orbita circolare o sul proprio asse ed impatta l'aria circostante che si infrange lateralmente contro il bordo di un'apertura	*Europa, America meridionale, Asia; trottole cave*

53. Il gruppo dei flauti globulari senza fessura interna è in realtà sacrificato entro i confini di un solo *taxon*. Ciò vale anche in relazione alle diversificazioni plurime operate per altri flauti, come i traversi, e dunque costituisce una lacuna nell'economia del sistema come Hornbostel e Sachs intesero delinearlo nel 1914, che non basta ritenere potenzialmente colmabile ricorrendo ai criteri con i quali i due autori nell'introduzione chiarirono la natura flessibile e adattabile del loro sistema: si è di fronte, in altri termini, a un relativo squilibrio nella considerazione complessiva della rilevanza attribuibile all'intera sottoclasse dei flauti nelle sue articolazione interne. I molteplici casi in cui si suddivide il gruppo generalmente definito da questo *taxon* (421.13) sono particolarmente rappresentati nelle culture musicali dei popoli precolombiani, che hanno sperimentato forse tutte le possibili combinazioni degli elementi costitutivi dei flauti globulari, privi o no che fossero della fessura interna o di un becco distinto. Un tentativo di partenza di esplorazione di questo mondo e di proposta di una sua sua sistematizzazione fu fatto da chi scrive in Guizzi [1992], cui si rinvia.

421.122.12 A insufflazione laterale diretta	Il suonatore dirige il suo soffio lateralmente contro il bordo di un'apertura	
421.122.121 Privi di fori digitali		*America, Oceania, Africa, Europa (richiamo di scorza d'arancia* [La Vena 1996, 97-98])
421.122.122 Muniti di fori digitali		
421.122.2 A insufflazione a flusso guidato	Il flusso d'aria è indirizzato contro l'apertura del flauto dal suonatore con l'ausilio di una guida	
421.122.21 Privi di dispositivi di taglio	La guida non incorpora un dispositivo di taglio	
421.122.22 Muniti di dispositivi di taglio	La guida incorpora un dispositivo di taglio	
421.2 *Flauti ad insufflazione canalizzata (muniti di dispositivo di insufflazione)*	Un condotto porta il flusso d'aria contro il bordo affilato di un'apertura	
421.21 A dispositivo di taglio ortogonale[54]	Il flusso d'aria è condotto attraverso un cannello contro il bordo di un foro	
421.211 A cameratura esterna	Il flusso d'aria canalizzato attraverso un condotto si infrange contro il bordo di un foro con impatto minimalmente obliquo. Il dispositivo è contenuto entro un corpo cavo che comunica con l'esterno attraverso alcune aperture praticabili con la mano. In tal modo la vibrazione primaria si accoppia con quella dell'aria contenuta nella cameratura e il suono è modulabile regolando lo fiato verso l'esterno	
421.211.1 Con foro aperto centralmente sulla parete di una cavità globulare	All'interno della cameratura avvolgente è presente un dispositivo del tipo di quelli di cui al *taxon* 421.111, ma munito di un solo foro, che si contrappone al flusso d'aria incanalato dal condotto di insufflazione	*Richiamo da caccia per pernici*

54. Lo sbocco del flusso d'aria non è perfettamente ortogonale al piano del foro di taglio, in quanto, trattandosi per lo più di richiami per uccelli, questi strumenti sono calibrati in modo da non ottenere un suuono 'limpido' dal punto di vista timbrico. I suoni parziali sono invece determinati da una leggera disassatura del tubo che conduce il flusso d'aria rispetto il bordo contro cui quest'ultimo è forzato ad infrangersi e per questo producono un timbro particolarmente 'soffiato', che è esattamente quello che caratterizza la voce dei volatili oggetto del richiamo.

421.211.2 Il foro è costituito dal bordo superiore di un tubo	Il bordo contro cui si infrange il flusso d'aria è quello di un tubo contrapposto al dispositivo di canalizzazione del fiato	
421.22 Flauti a fessura esterna	Il condotto è posto all'esterno della parete del flauto	
421.221 Tubolari		
421.221.1 Diritti	Il condotto dell'aria è applicato in modo da trovarsi lungo l'asse longitudinale del tubo	
421.221.11 A smussatura e anello	In prossimità dell'estremità distale è ricavata una smussatura che accoglie un anello di materiale flessibile; tra l'anello e il corpo è intagliato un breve condotto per l'aria	*Indonesia (suling)*
421.221.111 Singoli		
421.221.111.1 Aperti		
421.221.111.11 Privi di fori digitali		*Cina, Borneo*
421.221.111.12 Muniti di fori digitali		
421.221.111.2 Semichiusi		*Malacca*
421.221.111.3 Chiusi		
421.221.112 Flauti a fessura esterna in serie		
421.221.12 A condotto interno bloccato e deviazione verso una copertura esterna[55]	L'aria è inizialmente soffiata entro il tubo ove incontra un ostacolo a diaframma deflettore che la costringe ad uscire all'esterno e ad incanalarsi per mezzo di una copertura rigida o flessibile contro la finestra ricavata a valle del diaframma	*America settentrionale (flauti dei Nativi americani), America meridionale (flauti dell'Amazzonia)*
421.221.2 Traversi	Il condotto dell'aria è applicato in modo da trovarsi perpendicolarmente all'asse longitudinale del tubo	*Il flauto atuñsa dei Motilones della Sierra Perijá, Venezuela* [Izikowitz 1935, 375]
421.222 Globulari	Il condotto dell'aria è applicato all'esterno di un corpo vascolare in modo che il flusso d'aria si infranga sul bordo di un'apertura	*America precolombiana*

55. Partizioni ulteriori come sub 421.221.11.

421.222.1 A condotto singolo	Il condotto dell'aria è costituito da un unico canale	
421.222.2 A condotto doppio	L'aria è convogliata verso due aperture del corpo vascolare da altrettanti condotti	*America meridionale (nazca), America centrale (chiriqui)*
421.23 Flauti a fessura interna	Il condotto è all'interno del flauto	
421.231 Tubolari		
421.231.1 Diritti		
421.231.11 A condotto applicato	Il condotto mantiene una forma autonoma ed è giustapposto al foro di insufflazione o precostituisce un percorso che facilita l'immissione dell'aria entro la fessura	*Europa (flauto dolce baritono o basso, fujara in Slovacchia). America meridionale, Perù e Bolivia (mohoceno basso)*
421.231.12 A fessura e finestra (singoli)	Il condotto è ricavato in forma di fessura longitudinale entro il corpo del flauto e sfocia su un'apertura a finestra	
421.231.121 Aperti		
421.231.121.1 Privi di fori digitali		
421.231.121.2 Muniti di fori digitali		
421.231.122 Chiusi		
421.231.122.1 Privi di fori digitali		
421.231.122.11 Con fondo fisso		*I fischietti da segnalazione europei*
421.231.122.12 Con fondo mobile		*Flauti a stantuffo*
421.231.122.2 Muniti di fori digitali		
421.231.13 A fessura e finestra (in serie)[56]		
421.231.131 Flauti a fessura interna in serie aperti		
421.231.131.1 Privi di fori digitali		*Canne labiali dell'organo*
421.231.131.2 Muniti di fori digitali		*Flauto doppio a becco*
421.231.132 Flauti a fessura interna in serie semichiusi		*Registri di flauti a camino dell'organo*
421.231.133 Flauti a fessura interna in serie chiusi		*Canne labiali chiuse dell'organo*
421.231.2 Traversi	L'aria è immessa attraverso un'apertura laterale passando attraverso un condotto	
421.231.21 A condotto applicato	Un cannello convoglia il fiato verso l'apertura laterale di un tubo al quale è fissato permanentemente con la giusta angolatura	*Fife con dispositivo di canalizzazione del fiato; flauto traverso Nazca, di osso, insufflato con un cannello perpendicolare*
421.231.22 A fessura e finestra	L'aria è immessa nella fessura in posizione laterale, poi compie il suo cammino lungo l'asse longitudinale verso la finestra	*Europa, i flauti armonici di corteccia o di legno a imboccatura traversa; Italia (tituella dei Monti Lepini)* [Di Fazio 1997, 54-57], *Calabria* [La Vena 1996, 112-118], *Toscana, Lombardia; Norvegia (seljefløyte)*
421.232 Globulari		
421.232.1 A condotto applicato	Il condotto mantiene una forma autonoma ed è giustapposto al foro di insufflazione o precostituisce un percorso che facilita l'immissione dell'aria entro la fessura	*America centrale (Maya) e meridionale (Apinayé, Canella, culture precolombiane di Ecuador, Perù e Bolivia)*
421.232.2 A condotto camerale	Il condotto è composto da una o più cavità	*America precolombiana (vasi silbadores)*
421.232.3 A fessura e finestra		
421.232.31 Privi di fori digitali		*Fischietti in forma di animale (Europa, Asia)*
421.232.32 Muniti di fori digitali		*Ocarina*
421.233 Misti (con le stesse specificazioni dei precedenti)	Il flauto riunisce le caratteristiche degli strumenti tubolari e di quelli globulari	
422 Tubi ad ancia	Il flusso d'aria, attraverso la mediazione di lamelle oscillanti applicate allo strumento, ottiene accesso ad intermittenza alla colonna d'aria da mettere in vibrazione	
422.1 *Tubi ad ancia battente ad allontanamento ovvero a fessura laterale/mediana*	Il tubo è provvisto di un'ancia del tipo descritto nel *taxon* 412.111.13	
422.11 Privi di fori laterali		
422.111 A tubo fisso		

56. I *taxa* relativi ai flauti a fessura interna in serie andrebbero integrati almeno dalla considerazione di un'ipotesi che non è solo teorica, ma è suffragata dalla conoscenza di strumenti realmente esistiti, quale è quella dei 'flauti a fessura interna globulari in serie': in particolar modo nelle culture precolombiane, infatti, sono noti flauti di tal genere, costituiti da dispositivi doppi.

422.112 A tubo variabile	La lunghezza della colonna d'aria è modificata per mezzo dell'intervento del suonatore sul tubo, che è composto nella parte distale di segmaenti connessi 'a cerniera' che possono essere temporaneamente separati o riconnessi con la sezione di tubo a monte	*Netterpipa della Svezia meridionale* [Emsheimer 1989]
422.12 Muniti di fori laterali		
422.2 *Oboi*	Il tubo è munito di un'ancia a lamelle reciprocamente battenti (per lo più ricavate da uno stelo appiattito)	
422.21 Oboi singoli		
422.211 A canneggio cilindrico		*British Columbia*
422.211.1 Privi di fori digitali		*Aulos, cromorno*
422.211.2 Muniti di fori digitali		*L'oboe europeo*
422.212 A canneggio conico		
422.22 Oboi in serie		
422.221 A canneggio cilindrico		*Aulos doppio*
422.222 A canneggio conico		*India*
422.3 *Clarinetti*	Il tubo ha un'ancia composta da una lamella battente unica	
422.31 Clarinetti singoli		
422.311 A canneggio cilindrico		
422.311.1 Privi di fori digitali		*British Columbia*
422.311.2 Muniti di fori digitali		*Il clarinetto europeo*
422.312 A canneggio conico		*Saxofono*
422.32 Clarinetti in serie		*Egitto (zummára)*
422.4 *Tubi ad ancia libera*	La lamella oscilla attraverso un'apertura esattamente calibrata. Devono essere sempre presenti i fori digitali; altrimenti lo strumento rientra tra le ancie libere 412.12	
422.41 Tubi ad ancia libera singoli		

422.411 Con ancia lamellare rigida elastica a movimento bilaterale	Il dispositivo interruttivo è costituito da una lamella del tipo di cui al *taxon* 412.121.2, inserita nell'estremità prossimale di un tubo, in modo che la funzione interruttiva determina vibrazioni periodiche nell'aria contenuta nel tubo stesso	*Monti Lepini (pifaretta a cifolitto)* [Di Fazio 1997, 62-66][57]
422.42 Tubi ad ancia libera in serie		
422.5 *Tubi ad ancia membranocinetica*	Il dispositivo interruttivo è costituito da una membrana elastomerica posta in tensione e accoppiata con un tubo di risonanza	
422.51 Privi di fori digitali		*Tornado*
422.52 Muniti di fori digitali		
421.521 Singoli		*Calabria* [La Vena 1996, 157-158]
421.522 In serie		
422.6 *Tubi ad ancia cordocinetica*	Il dispositivo interruttivo è costituito da una striscia tensibile posta in tensione e accoppiata con un tubo di risonanza	
422.61 Privi di fori digitali[58]		
422.62 Muniti di fori digitali		*British Columbia* [Galpin 1902-1903]
423 Trombe	Il fiato ottiene accesso alla colonna d'aria da mettere in vibrazione attraverso la mediazione delle labbra vibranti del suonatore	
423.1 *Trombe naturali*	Prive di dispositivi per la modificazione dell'altezza dei suoni	
423.11 Trombe di conchiglia	Una conchiglia funge da tromba	
423.111 Con imboccatura apicale		
423.111.1 Prive di bocchino		*India*
423.111.2 Munite di bocchino		*Giappone (rappakai)*
423.112 Con imboccatura laterale		*Oceania*

57. Con le considerazioni analoghe a quanto già detto nella nota riferita al *taxon* 412.121.2

58. Questo *taxon* è qui inserito per scrupolo di completezza dello schema tassonomico, ma la sua definizione attende ulteriori approfondimenti. In termini generali, oltre alla ovvia necessità di considerare i casi concreti eventualmente presenti in letteratura o nelle collezioni museali, ci si deve porre in primis lo stesso scrupolo che Hornbostel e Sachs si posero a proposito del *taxon* 422.4 «Tubi ad ancia libera» (per i quali si dice che «La lamella oscilla attraverso un'apertura esattamente calibrata. Devono essere sempre presenti i fori digitali; altrimenti lo strumento rientra tra le ancie libere»), soprattutto per la precisazione contenuta nella parte finale della descrizione.

423.12 Trombe vascolari	L'aria messa in vibrazione è contenuta entro un recipiente vascolare	
423.121 Ad imboccatura apicale	Le labbra sono applicate nel punto longitudinalmente più distante dall'apertura distale	*Trombe di terracotta, Rio Negro* [Izikowitz 1935, 236-237]; *trombe poliglobulari di terracotta della Guiana* [Izikowitz 1935, 239-241]
423.122 Ad imboccatura laterale		*Trombe a vaso del Sud America (Buzina 'Masen'), Matis Atalaya, Valle dello Javari; a sud del Rio delle Amazzoni (tucurima)*
423.13 Trombe tubolari		
423.131 Trombe diritte	L'imboccatura è posta perpendicolarmente all'asse	
423.131.1 Tube diritte	Il tubo è privo di curvature e pieghe	
423.131.11 Prive di bocchino		*Alcuni tipi di alphorn*
423.131.111 Singole		
423.131.112 In serie[59]		*Le trombe di corteccia scalate come flauti di Pan e suonate in coppia nei riti cristiani in Bolivia*
423.131.12 Munite di bocchino		*Pressoché ovunque nel mondo*
423.131.2 Corni diritti	Il tubo è curvo o ripiegato	
423.131.21 Privi di bocchino		*Asia*
423.131.22 Muniti di bocchino		*I lur*
423.132 Trombe traverse[60]	L'imboccatura è posta su un lato	
423.132.1 Tube traverse		*Sudamerica*
423.132.2 Corni traversi		*Africa*

59. Qui il riferimento è ristretto agli strumenti che incorporano nella loro struttura diversi tubi di dimensioni diverse. Altra questione è quella rappresentata dalla pluralità di trombe (e corni) utilizzati di regola in gruppi nei quali ciascuno strumento è affidato a un diverso suonatore, ma che agiscono sempre simultaneamente e in gruppo, secondo una tecnica esecutiva ad *hoquetus*. Esempi notevoli sono quelli dell'Africa centrale, con particolare riferimento al celebre caso dei Banda Linda.

60. Questo gruppo si gioverebbe di un'ulteriore distinzione, operata in base alla presenza (o all'assenza) del bocchino. Se si intende infatti correttamente quest'ultimo come cavità posta in una depressione della superficie su cui poggiano le labbra nell'atto di suonare, che comunica con il canneggio interno per mezzo di un passaggio relativamente più ristretto, anche i corni traversi possiedono spesso un bocchino di tal fatta, di regola integrato al corpo dello strumento e in rilievo, all'esterno, in rapporto con la superficie esterna.

423.2 *Trombe cromatiche*	Munite di dispositivi per la modificazione dell'altezza dei suoni	
423.21 Trombe con fori digitali		*Cornetti, cornette a chiavi*
423.22 Trombe a tiro	Il tubo può essere allungato per mezzo dell'estrazione della prolunga inguainata nel canneggio	*Trombone europeo*
423.23 Trombe a pistoni	Il tubo può essere accorciato o allungato per mezzo dell'esclusione o dell'inserimento di canneggi supplementari	*Europa*
423.231 Cornette da segnali	Il tubo ha uno sviluppo interamente conico	
423.232 Corni da caccia	Il tubo ha uno sviluppo prevalentemente conico	
423.233 Trombe	Il tubo ha uno sviluppo prevalentemente cilindrico	
Suffissi comuni		
-5 muniti di fori digitali		
-6 con serbatoio d'aria		
-61 con serbatoio d'aria rigido		
-62 con serbatoio d'aria flessibile		
-7 con dispositivi di chiusura meccanica dei fori digitali		
-71 con meccanica a chiavi		
-72 con meccanica ad anello		
-8 con tastiera		
-9 con movimento meccanico		

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La nuova collana *Quaderni di etnomusicologia* della Fondazione Ugo e Olga Levi di Venezia promuove studi etnomusicologici o di musicologia transculturale, privilegiando l'edizione di primi risultati di ricerche innovative, rassegne sistematiche della letteratura specialistica, atti di convegni e traduzioni di studi di interesse etnomusicologico editi in lingue non comunemente accessibili. I volumi sono sottoposti a revisione tra pari.

The conference *Reflecting on Hornbostel-Sachs's Versuch a century later* was the last international conference organized by Febo Guizzi before his untimely death. It was hosted by the Fondazione Ugo e Olga Levi in Venezia on 3-4 July 2015. The conference intended to celebrate the 100 years of the Hornbostel-Sachs classification, and for the occasion Febo Guizzi had invited international researchers whose noteworthy achievements had been published in recent years, and those who, although they did not work specifically on the Hornbostel-Sachs classification, could help with the historical background that led to the 1914 *Versuch*, and shed light on the relationship between the systematics of Hornbostel-Sachs, Victor Mahillon, and André Schaeffner.
The conference was also an occasion to listen to some critical voices on the usefulness of the taxonomical approach in today's digital era; and, in particular, on questions regarding the hierarchical structure and the problems posed by the class of electrophones, which Hornbostel and Sachs never developed.
Just a few days before the conference began, Febo Guizzi had achieved the final version of his Italian translation, which along with the results of his emendations, were shared with the participants. This version, both in Italian and in English, is now published at the end of these proceedings.

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