



## **ONTOLOGY FOR THE DOMAIN OF PLUCKED STRING INSTRUMENTS IN NINETEENTH CENTURY BRAZIL. CONCEPTUAL FIELD DEFINITION**

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### **ABSTRACT**

The aim of this work is to look for methodologies in the field of Knowledge Organization that can assist in the conceptual organization of the domain of plucked string instruments in the field of Musicology. A kind of knowledge organization system that can be used in the organization of this domain is the 'ontology' that describes the concepts of the domain and defines relations between them. However, in order to elaborate this ontology, especially for the conceptual field definition, there is a need for consolidated theories and methodologies in the field of Knowledge Organization. Two methodologies guided our work: the Dahlberg's Analytical Theory of the Concept and the discourse analysis methodology used by López-Huertas. The terminological survey was made using nineteenth century sources - musical study methods and musical dictionaries written between 1789 the 1899, which we consider to be representative of the 'authors' knowledge' - and in current sources about plucked strings instruments - theses, dissertations and scientific articles, which we consider to be representative of 'users' knowledge'.

### **KEYWORDS**

Plucked string instruments, ontology, concept theory, Knowledge Organization, conceptual field.



## INTRODUCTION

The arrival of the Portuguese court in Brazil, fleeing Napoleon in 1808, marked the political, economic, social and cultural life of the country. These changes had a strong impact in the field of music. The number of professional musicians, amateur musicians and music professors multiplied. There was increased demand for musical instruments, written music, musical methods of study and music dictionaries.

This century is so important for Brazilian culture that a lot of musicologists have dedicated the bulk of their research to this period. Some have given their attention specifically to plucked string instruments, but in this field area they have faced problems with terminology due to the diversity of terms used, which varies in accordance with different social groups, their location and historical period.

Taborda (2004, p. 11) brings up a number of issues regarding the terminology of plucked string instruments. The term *violão* is only used in the Portuguese language; in other languages the term *guitar*, derived from the Greek *kithara* is used: *guitare* in French, *gitarre* in German, *chitarra* in Italian and *guitarra* in Spanish. The term *viola* in Portuguese is used for two types of distinct chordophones: plucked and bowed instruments. In both Brazil and Portugal the term *viola* has diverse regional and temporal assignments - *viola de tripa*, *viola de arame*, *viola francesa*, *guitarra francesa*.

Castro (2007) says that this terminological problem provokes 'an organological confusion' among the stringed chordophones in Brazil in the nineteenth century. According to the author, "[...] it is already registered that there are many sizes and types of 'violas', or, of chordophones, produced in Portugal, that for the logical would have come to the colony" (p.13).

Souza (2002) places the following question: "In Brazil, there is some doubt regarding the denomination of the instrument. Is it the *viola* that's called *violão*? Or the *violão* that's called *viola*?" (p. 10).

Affonso (2005, p.1) chose the Portuguese translation of the term *guitare*, originally French, to be *guitarra*, and not *violão*, and based his choice on an organological question, since the term *guitarra* in Portuguese is used until middle of nineteenth century to denominate the instruments with an eight form resonance box.

With the intention of searching for solutions for the terminological issues of plucked string instruments in the nineteenth century Brazilian domain, our proposal is to promote an interdisciplinary study involving the fields of Knowledge Organization and Musicology. The use of an *ontology* for the domain appeared to be a good solution, as it makes the formal description of the concepts possible and defines the relationships between them. However, for its elaboration we feel it is necessary to study the

consolidated theories and methodologies that currently exist in knowledge organization for the definition of the conceptual field. Two methodological conceptions were important in our research: the Analytical Concept Theory proposed by Dahlberg (1978) and the method of discourse analysis used by Lopéz-Huertas (1997).

**CONCEPT THEORY**

Ingetraut Dahlberg, in 1978, conceived Analytical Concept Theory aiming the elaboration of terminologies for the social sciences. She affirms that “language constitutes man’s capacity to assign *objects* that surround them, as well as to communicate with others” (DAHLBERG, 1978, p. 101). In other words, knowledge was fixed through elements of language and so from language it is possible to make reference to *objects* from the empirical world. These *objects* can be things, phenomena, laws, facts, processes or attributes.

In *concept theory*, in contrast to conventional approaches in terminology, the idea is to systematize the *concept* and not the *term* (linguistic symbol), as the term denotes de concept (GOMES & CAMPOS, 1996, p.249). The concept, conventionally considered in the terminology as a *unit of thought*, is viewed in concept theory as a *unit of knowledge* and, thus, ceases to be so abstract. The concept results from the sum of statements formulated about an object. In table 1 we present statements formulated about a specific object from the universe of plucked string instruments.

**Table 1.-** Statements about an object from the universe of plucked string instruments

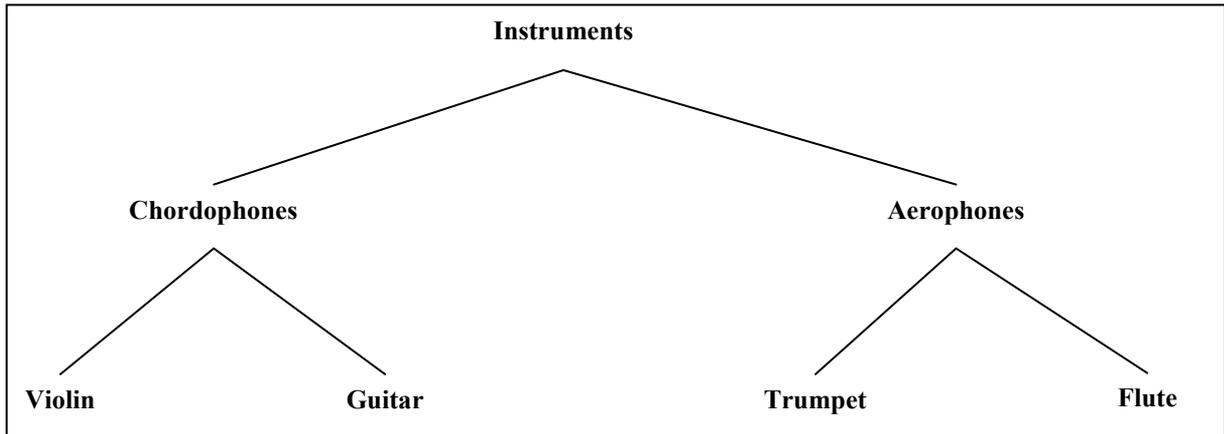
OBJECT	STATEMENTS
<b>Violão Di Giorgio Author of the University UNIRIO</b>	It has 6 nylon strings
	It was manufactured in 1970
	It was manufactured by Di Giorgio
	It’s located in the University UNIRIO
	It’s Author’s type

It is important to notice that the objects and the concepts are in different conceptual levels. In the *level of the concepts*, the objects selected from the empirical world are considered *referent* and the statements are *characteristics* of the concept. In the *level of objects* there are *attributes* and in the level of the concepts there are *characteristics*. In table 2 we show examples of simple and complex characteristics.

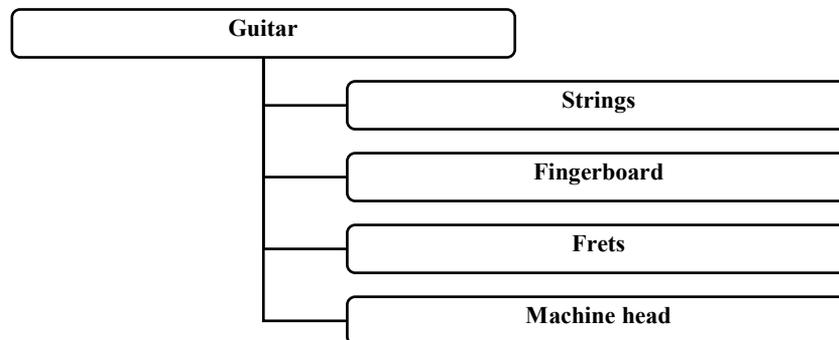
**Table 2.-** Simple and complex characteristic of the concept *violão*.

SIMPLE CHARACTERISTICS	COMPLEX CHARACTERISTICS
Wood	[sound board] made of wood
Nylon	[string] made of nylon

When there are common characteristics between the concepts, it is highly probable that the concepts have *relations* between them. The relations can be of various types. Two different types of relations observed in the domain instruments are represented in figures 1 and 2.



**Figure 1.-** Coordinated hierarchic relations. Source: The author (2008)



**Figure 2.-** Partitive relations. Source: The author (2008)

Dahlberg, as Ranganathan, uses the notion of category as both a resource for the agreement of the nature of the concept, as well as for the formation of conceptual structures for the systematization of the knowledge (CAMPOS, 2001).

Dahlberg (1978b) says that the formal categorical analysis of the concepts is important to the systems' formation and in the combination of the concepts. She suggests six basic categories: objects, phenomena, processes, properties, relations and dimension. In table 3 we show examples of these categories applied to the domain of plucked string instruments.



**Table 3.-** Examples of categories applied to the domain of plucked strings instruments.  
Source: The author (2008)

CATEGORIES	EXAMPLES
1. Objects	guitar, strings
2. Phenomena	Sound
3. Processes	Play
4. Properties	Made of gut, made of wooden, made of metal
5. Relations	Necessity, causality
6. Dimension	weight, time, space

Gomes & Campos (1996) affirms that category is “a concept with a general application that can be used to group other concepts. According to this definition, category is a certain kind of characteristic that may be stated as to form an item of reference, possessing a gathering property” (p.251). In tables 4, 5 and 6 we proceed to the categorical analysis of the terms of the domain of plucked string instruments and show that the last statement leads to the basic category.

**Table 4.-** Categorical analysis of the term ‘violão’. Source: The author (2008)

The ‘violão’ is a plucked string instrument.  
A plucked string instrument belongs to the chordophones family.  
A chordophone is an object that emits sound through strings.  
An object that emits sound through strings is a **material object**.  
In the final instance ‘violão’ is an **object**.

**Table 5.-** Categorical analysis of the term ‘to play’. Source: The author (2008)

Play is a musical action.  
A musical action is a **process**.  
In the final instance ‘to play’ is a **process**.

**Table 6.-** Categorical analysis of the term ‘of metal’. Source: The author (2008)

‘Of metal’ is a type of string.  
A type of string is a **property** of the string.  
In the final instance ‘of metal’ is a **property**.

Depending on the domain we are working on, the list of basic categories can change. Vickery (1983 p.14) emphasizes that when choosing a list of categories we cannot do so mechanically; the list should be used temporarily until we ascertain its adequacy to the subject matter.



## **DISCOURSE ANALYSIS IN THE IDENTIFICATION OF DOMAIN CATEGORIES**

Categorical analysis is not a simple process. To identify the categories of a knowledge domain, Lopéz-Huertas (1997) uses the *discourse analysis methodology*. This method takes into consideration the ‘author’s knowledge’ (knowledge generator) and the ‘user’s knowledge’ (user’s information needs). Lopéz-Huertas (1997) says “that if the model for communication used by the system were close to those of the texts and of the users, the additional effort made by the user in getting to know the system would decrease”.

Lopéz-Huertas (1997) uses this methodology for the creation of a musical instruments thesaurus. The starting point for the creation of the thesaurus is the selection of *conceptual terms* that are representative of the field. These terms are considered *units of analysis*. For each term definitions of authors harvested in diverse texts, such as articles, books and dictionaries, are compiled. In the next step, the relevant characteristics for the concepts are identified. Terms mentioned repeatedly are considered macrostructures for the *unit of analysis* and are represented in *categories*.

In setting up the musical instruments thesaurus, Lopéz-Huertas (1997) used as a starting point the definition of ten musical instruments as found in four distinct dictionaries. From the analyses of these definitions, he identified categories for relevant *text elements* (terms). Table 7 lists the relevant text elements and related categories.

**Table 7.-** Relevant text elements and related categories. Source: (Lopéz-Huertas, 1997)

<b>RELEVANT TEXT ELEMENTS</b>	<b>CATEGORIES</b>
Instrument	Type of sound device
Stringed	Source of sound
Plucked	Manner of producing sound
Plectrum	Means of producing sound
With frets	Physical/morphological characteristics
5 a 9 strings	Physical/morphological characteristics
Fingerboard	Physical/morphological characteristics
Made of wood	Material
Sweet pitch	Musical character
Played with the thumb	Playing techniques
Like the viola	Relation with other instrument

Based on these list of categories identified for ten instruments one is able to make a unified list of categories. This list, according to Lopéz-Huertas (1997) is the real starting point for building the structure of the thesaurus.

Lopéz-Huertas (1997) emphasizes that the methodology of discourse analysis used for the elaboration of the musical instruments thesaurus allows us to identify a large amount of categories, due to the capacity to discover ‘hidden categories’ in the

definitions, to represent each concept in multiple forms and to validate the suggested categories.

## **TERMINOLOGICAL ORGANIZATION FOR THE PLUCKED STRINGS DOMAIN**

In the terminological organization for the plucked strings domain we used the methodologies described previously, fulfilling the following stages: selection of sources, research of terms, compilation of definitions in the sources, identification of the characteristics and organization of the categories.

The **selection of sources** is based on criteria like historical importance, terminological precision and relevance. The ‘author’s knowledge’ was searched in nineteenth century sources - musical study methods and musical dictionaries written between 1789 the 1899 -, while ‘user’s knowledge’ were searched in current texts - theses, dissertations and scientific articles on plucked strings instruments.

The **research of terms** was first conducted on sources from the nineteenth century, written between 1789 the 1899, since they were considered indicative of the terminology used at that historical time period. Later, we analyzed current texts for the comparison with the terms selected previously. In table 8, we list the selected analysis units chosen from the nineteenth century sources.

**Table 8.-** *Analysis units* selected from the nineteenth century sources.

Source: The author (2008)

<b>TERMS/ ANALYSIS UNITS</b>	
<b>TERMS IN PORTUGUESE</b>	<b>TERMS IN ENGLISH</b>
alaúde	lute
bandolim	mandolin
guitarra	guitar
guitarra portuguesa	portuguese guitar
vielle	vielle
viguela	viguela
vihuela	vihuela
viola	viola
viola braquesa	viola braquesa
viola chula	viola chula
viola franceza	french guitar
violão	guitar



For each term we compiled the definitions found in the nineteenth century sources. In table 9 to 11 we show some examples of the definitions found in distinct sources for the term *guitarra* (guitar).

**Table 9.-** Definitions for the term *guitar*. Source: (LEITE, 1796)

<b>GUITARRA (LEITE, 1796)</b>
<p>“[...] que segundo dizem teve sua origem na Gram-Bretanha [...] seis cordas (primas, segundas, terceiras, quartas, quinta, e sexta) quatro são dobradas, e duas, singelas. As dobradas são as quatro primeiras e as singelas são as duas ultimas. [...] doze divisões d'arame, que ordinariamente atravessão o ponto [...] o ponto é huma regra de páo [pau] preto, Mogne, ou de outra qualquer qualidade que cobre a superficie de todo o braço da Guitarra [...] As Cordas da Guitarra [...] devem-se ferir com a polpa dos dedos, e também com as pontas das unhas”</p>
<p>“[...]it is said to have originated in Great Britain [...] six strings (primas, seconds, thirds, fourths, fifths, and sixths) four are doubled, and two, singles. The doubled ones are the first four and the singles are the other two. [...] twelve wire divisions, that usually cross the fingerboard [...] the fingerboard is a rule of black wood, Mogne, or another one that covered the all the guitar fingerboard surface [...] guitar strings [...] must be played with the pulp of the fingers, and also with the tips of the nails”</p>

**Table 10.-** Definitions for the term *guitar*. Source: (MACHADO, 1855)

<b>GUITARRA (MACHADO, 1855)</b>
<p>“instrumento de seis cordas de arame antigo, e de nenhum préstimo na orchestra.”</p>
<p>“instrument of six strings of old wire, which is of no use in an orchestra.”</p>

**Table 11.-** Definitions for the term *guitar*. Source: (VIEIRA, 1988)

<b>GUITARRA (VIEIRA, 1988)</b>
<p>“<i>guitarra portuguesa</i>, s. f. O nosso instrumento popular por excellencia, é uma imitação tradicional da cithara usada na Edade média [...] pertencente à família dos alaudes. O proprio nome é identico, pois guitarra não é mais do que a modificação de cithara.”</p>
<p>“<i>guitar portuguesa</i>, s. f. Our popular instrument par excellence is a traditional imitation of the cithara used in the Middle Ages [...] it belongs to the family of lutes. The proper name is identical; since guitar is no more than a modification of cithara.”</p>



We can notice that the definitions do not always are coincide. But we considered all of them to have been important in a historical context.

The **identification and extraction of the characteristics** relevant for the concepts had been made from the compilation of the statements about the terms. In table 12 we show some characteristics of the term *guitarra* (*guitar*).

**Table 12.-** Characteristics of the term *guitarra* (*guitar*).

Source: The author, 2008

<b>GUITARRA</b>	
<ul style="list-style-type: none"> <li>• six strings</li> <li>• twelve wire divisions</li> <li>• wire strings</li> <li>• strings played with the pulp of the fingers</li> <li>• strings played with the tips of the nails</li> <li>• fingerboard divided by frets</li> <li>• plucked strings</li> <li>• ten metallic strings</li> <li>• tuned [...] in the following order, G, E, C, G, E C</li> <li>• traditional imitation of cithara</li> <li>• family of lutes</li> </ul>	

The characteristics can be grouped in **categories or classes**. In table 13 we present examples of categories applied to the musical instruments domain.

**Table 13.-** Categories of the musical instruments domain. Source: The author, 2008.

SOURCE OF SOUND	strings
MEANS OF PRODUCING SOUND	with the pulp of the fingers and the tips of the nails
TUNING	Sol, Mi, Do, Sol, Mi, Do (G, E, C, G, E C)
ORIGIN	cithara, lute
PHYSICAL OR MORPHOLOGICAL CHARACTERISTICS	frets, wire divisions, wire strings, six strings, ten strings

## CONCLUSIONS

This work's major contribution has been the research and application of methodologies from the field of Knowledge Organization on issues from the field of Musicology,



specifically concerning the definition of the conceptual field of plucked string instruments.

We are now ready to create an ontology for the plucked string instruments domain. It is important to add that in this research we have some intentions: to preserve the concepts used in the nineteenth century, linking distinct definitions for similar concepts using conceptual relations, and to point out where one can find sources for the plucked string instruments domain.

## REFERÊNCIAS

AFFONSO, Guilherme de Camargo Barros. *A guitarra do século XIX em seus aspectos técnicos e estilístico-históricos a partir da tradução comentada e análise do "Método para guitarra" de Fernando Sor*. (Dissertação de Mestrado). São Paulo: ECA-USP, 2005.

CAMPOS, Maria Luiza Almeida. *A organização de unidades do conhecimento em hiperdocumentos: o modelo conceitual como espaço comunicacional para a realização da autoria*. (Tese de Doutorado). Programa de Pós-graduação em Ciência da Informação, CNPq/IBICT - UFRJ/ECO, Rio de Janeiro, 2001.

CASTRO, Renato Moreira Varoni de. *Os caminhos da viola no Rio de Janeiro do século XIX*. (Dissertação de Mestrado) Rio de Janeiro: UFRJ, 2007. 113 p.

DAHLBERG, Ingetraut. A referent-oriented, analytical concept theory for INTERCONCEPT. *International Classification*, v. 5, n. 3, 1978a, p.142-151.

DAHLBERG, Ingetraut. Teoria do conceito. *Ciência da Informação*, Rio de Janeiro, v.7, n.2, 1978b, p.101-107.

DAHLBERG, Ingetraut. Teoria da classificação, ontem e hoje. Tradução do inglês por Henry B. Cox. Conferência Brasileira de Classificação Bibliográfica, Rio de Janeiro, Brasília: Anais IBICT/ABDF, 1972/1979. p. 352-370. Disponível em:  
[http://www.conexaorio.com/bit/dahlbergteoria/dahlberg\\_teoriam.htm#S5](http://www.conexaorio.com/bit/dahlbergteoria/dahlberg_teoriam.htm#S5)

DODEBEI, Vera L. D. *Tesouro: linguagem de representação da memória documentária*. Niterói; Rio de Janeiro: Intertexto; Interciência, 2002.

GOMES, Hagar Espanha. & CAMPOS, Maria Luiza Almeida. Systematic aspects of terminology. *Meta*, v.41, n.2, jun 1996, p.249-254. 1996.



LEITE, Antonio da Silva. *Estudo de guitarra*. Porto: Oficina typographica de Antonio Alvarez Ribeiro, 1796

LOPÉZ-HUERTAS, M. J. Thesaurus structure design: a conceptual approach for improved interaction. *Journal of Documentation*, v.53, n.2, mar/1977, p.139-177. 1997.

MACHADO, Raphael Coelho. *Dicionario musical [...]*. 2. ed., augm. pelo seu autor. Rio de Janeiro: Typ.do Commercio de Brito e Braga, 1855. 282p.

PEREIRA, Mayra. *Do cravo ao piano forte no Rio de Janeiro: um estudo documental e organológico*. (Dissertação de mestrado). Rio de Janeiro: UFRJ, 2005. 224 p.

SOUZA, Andréa Carneiro. *Viola - do sertão para as salas de concerto: A visão de quatro violeiros*. (Dissertação de Mestrado). Rio de Janeiro: UNIRIO, 2002. 210 p.

TABORDA, Marcia Ermelindo. *Violão e identidade nacional: Rio de Janeiro 1830/1930*. (Tese de Doutorado). Rio de Janeiro: UFRJ, 2004.

VICKERY, Brian C. A classificação em facetas, um guia para a construção e utilização de Sistemas especializados. Traduzido por Piedade, M. Rio de Janeiro, 1983.

VIEIRA, Ernesto. *Diccionario musical contendo todos os termos technicos... Ornado com gravuras e exemplos de música*. 2ª ed. Lisboa: Lambertini, 1899. 551 p. Disponível em: <http://purl.pt/800>