Semantic Order in the 16th Century: An Introductory Discussion of Conrad Gesner’s Pandectae

Abstract
This work consists of a brief discussion regarding the semantic aspects contained in Pandectarum sive partitionum universalium... or Pandectae (1548) of Conrad Gesner (1516-1556). It situates the contributions of Gesner in the field of Knowledge Organization (KO) from a bibliographical and especially historical-documentary perspective. The Pandectae propose an innovative approach to the semantic treatment of documents, classifying them with a model which is an expansion from the medieval one while providing with orientation about the preparation of indexes. However, the effectiveness of the Pandectae is not necessarily in their semantic organization, but in their conceptual framework. Both Bibliotheca Universalis and in particular the Pandectae feature as fundamental historical documents for the understanding of the basis of knowledge organization. They are doubtlessly the earliest works to discuss bibliographical techniques (Wellisch, 1981) while materializing classificatory sensitivity - which is theorized, formulated and applied with logical finezza and acute sense of categorical multidimensionality (Serrai & Sabba, 2005).

Introduction
The historical dimension of Knowledge Organization (KO) finds fertile grounds for its development in the ancient bibliographical practices, because earlier forms of registration, organization and mediation of knowledge can shed light on questions, problems, technologies and products that encompass the field of KO today.

Historically there are numerous examples of projects related to knowledge organization, such as: Pinakes of Callimachus in Antiquity and Institutiones Divinarum Litterarum of Cassiodorus in the Middle Ages. The latter expressed the real "bibliographical gesture" that confirms the existence of bibliographical experiences and consequently the existence of the organization of knowledge prior to Modernity (Crippa, 2015).

In Early Modern Europe, the concept of Bibliography undergoes a breakthrough moment during which there is an expansion of the figure of the humanists. According to Araujo (2015, 127):

- interested in the ancient texts and the ways in which they should be organized, many [humanists] have dedicated themselves not only to the classification of beings, but also of knowledge. In the modern bibliographers there was a dissection posture of the elements of natural sciences which was transferred to the dissection of knowledge, constituting the idea of an anatomy of knowledge.

- In this context the contributions of Conrad Gesner (1516-1565) - considered the father of Bibliography - are inserted.

The aim of this paper is to present a brief discussion of the semantic aspects contained in Pandectarum sive partitionum universalium Conradi Gesneri Tigurini, medici & philosophiae professoris, libri XXI : Ad lectores. Secundus hic Bibliothecae nostrae tomus est, totius philosophiae & omnium bonarum artium atque studiorum locos communes & ordines universales simul & particulares complectens... or Pandectae (plural form), of Gesner.
From a bibliographical and historical-documentary perspective, this research intends to set the contributions of Gesner in the field of KO.

**The Bibliographical Project of Conrad Gesner**

Conrad Gesner was a Swiss scholar, scientist and bibliographer. He was a typical Renaissance “polymath”, with the ability to articulate and discuss numerous areas of knowledge. He published books on multiple topics such as linguistics, medicine, theology, botany, zoology, paleontology and mineralogy. His scientific and scholarly activity, [...] can be built around two distinct phases: 1) the phase of studies that included classical studies, application in Medicine, the profession, and interest in Botany [...] 2) the mature phase, that is, the scientific production: a) bibliographical works b) linguistic-philological works c) medical works, physical and natural sciences (Sabba, 2012, 30).

The vocation of Gesner for the preparation of bibliographical works, such as the *Catalogus Plantarum* (1542), resulted in the most ambitious bibliographical project of Modern Europe: *Bibliotheca Universalis*.

The work was published in four parts between 1545-1555: 1) *Bibliotheca Universalis, sive Catalogus omnium scriptorum locupletissimus, in tribus linguis, Latina, Graeca, et Hebraica...* (1545); 2) *Pandectarum sive partitionum universalium...* (1548); 3) *Partitiones theologicae* (1549) and 4) *Appendix bibliothecae* (1555).

*Bibliotheca Universalis, sive Catalogus...* is an alphabetical name catalog featuring 5031 authors of works composed in the three Sacred Languages, namely Latin, Greek and Hebrew. The catalog is organized alphabetically by first names of authors, but is accompanied by a separate list organized by surnames (Sabba, 2012). It also presents a summary and extracts of the documents listed.

One of the major motivations for the development of *Bibliotheca* is the fact that Gesner felt great concern when the Turks burned and looted, in 1527, the Library of Matías Corvino, during the attack in the city of Buda. This event would have exerted influence on Gesner who decided to do later work in order to safeguard the testimony of thought, in the case of the disappearance of books (Malclès, 1960).

In this sense, the *memorial* aspect of *Bibliotheca* is to be noted as Gesner attains the materialization of a broad and representative bibliographical universe in a knowledge map. His interest is also in bibliographical mediations between *Bibliotheca* and a community of scholars concerned with the quality of their sources of study.

According to Blair (2010), the justification for the universalist ambition of Gesner is that in his considerations all authors are worthy to be remembered or cataloged. Gesner lists them up, leaving selection and judgement to others.

**Pandectae**

The *Pandectae* contemplate the classified display of the documentary material, that is, the exposition of knowledge extracted from the book of the first part.

Initially, the scheme was designed in XXI Partitions: *Pandectae* comprise XIX
Partitions, so that *Partitiones theologicae* comprises the last Partition, published separately in 1549 and named Partition XXI. The XX Partition designed to present the semantic catalog of medical works was not completed (Serrai, 1990).

The back of the title page of the *Pandectae* presents the complete scheme of general classes (Fig. 1), actually resulting in a systematic repertory.

Figure 1. Complete scheme of the general classes in the *Pandectae*  
(Gesner, 1548, http://www.e-rara.ch/zuz/content/pageview/67861)

The classification system in the *Pandectae* stems from the seven liberal arts spanning to categories of complementary subjects and of interest to scholars of the Renaissance.


The reason for this division is the fact that these partitions reproduced the scopes of subjects according to Philosophy. Gesner believed Philosophy to be the constituent element of knowledge.

Each Pandectae class represents a book corresponding to a partition. Each book, in turn, is organized as follows: book title (the title of the respective partition), the dedicatory (whom the book is dedicated to) and the overall exposition of the subclasses subordinated to the class that names the book or partition. Finally, the titles are listed according to all subclasses.

According to Serrai & Sabba (2005, 56-57):

The Partitions, or main classes, are represented in Titles; the Titles are subdivided into Parts - sequentially. The Parts contain the Loci, followed by a brief reference to the authors and the works which deal with the themes identified or placed in those Loci. References are accompanied with information about the book and chapter of the work. The book itself is referred to implicitly because it is mentioned only under the author's name. The Loci are usually presented in a thematic sequence, which means, they cover the scope of subjects connected to a particular Part. Otherwise, the Loci appear in alphabetical order – such as in lists which include philosophers, animals, plants, gods, oracles, etc.

In short: the books listed in Bibliotheca Universalis, sive Catalogus... are arranged in alphabetical order by authors. In the Pandectae, the listed books are ordered according to the loci communes and are gathered by their subjects (Serrai, 1990).

According to Malclès (1960), Gesner’s classification system is unique as it expands the seven liberal arts of the Middle Ages.

Therefore, the gesnerian scheme reflects his conception of the division of knowledge directly linked to the classical thought of the Renaissance man.

Index in Gesner

The Pandectae distribute and hierarchize disciplines/subjects in a system of 21 classes displaying the contents of documents represented as semantic places or Loci.

According to Serrai (2007), the Loci and the classification scheme are the logical elements on which the Pandectae structure is based. The bibliographic research is structured and based on those very elements.

The Loci are concepts or categories that express the themes and the core elements
which are considered significant and representative of a document as part of one of the areas of interest and study of a specific culture. The *Loci* are thus able to express information and the intellectual content of that document. In bibliographical terms, the *Loci* - or the semantic indexes of a document - are also known as subjects or objects (Serrai, 2007).

*Loci communes* and *particulares*, which make up the gesnerian index, are extracted from each part of the editions (comments, prefaces, etc.), but Gesner also uses *loci* books as Maximus Planudes, Agathia etc.

According to Gesner (1548), indexing a book is a known process. The indexing process, in the gesnerian view, is clearly exposed by Considine (2015, 490-491):

You should write out its key points on one or more sheets of paper, in any order, single-sided, marking the words by which multiword items are to be ordered. Then you should cut up the sheets of paper so that each unit of information is on a separate slip. The slips which are imagined here will be so narrow that if each is sorted as soon as it has been cut away from the page, it will still cling to the blade of the scissors used to cut it (a larger slip will of course immediately fall away from the scissors under its own weight). Sorting the slips into piles on a tabletop, or into containers, may be done in one or more passes. [...] After sorting, they may be copied out in their final order, or, preferably, they may be glued down onto sheets of paper. This should be done with a water-soluble paste so that the slips can be detached from their backing sheets if they have to be rearranged. As an alternative to pasting, sheets of heavy paper can be prepared to hold two columns of slips by passing threads through them so that slips can be held in place by the threads at each side of each column. Such sheets can be bound up into volumes of a hundred folios—though no more than that, since each folio will be heavy to start with and made heavier by the slips fastened to it.

In the process of indexing, Gesner was innovative: he was the first to recommend the use of slips to create an alphabetical index. Each alphabetically ordered item would be copied on a single-sided sheet of paper and cut out into slips (Blair, 2010).

The indexes developed in *Bibliotheca Universalis* and the *Pandectae* are sophisticated if compared to other works by Gesner’s contemporary scholars.

An example of this is the main *Pandectae* index that was printed as the last part of the Book XXI (Fig. 2): it takes 77 columns of 26 folios and contains around 4000 entries alphabetically arranged (Wellisch, 1981).
In the *Index communis in libros XX*, there are both numbers and letters next to the alphabetically arranged entries.

These locators/codifications are organized by page number and letters. Numbers refer to a certain page. Letters refer to a column on a certain page (a=first column, b=second column, c=third column, d=fourth column). The letter "T" refers to the
Theological Book, i.e., Book XXI.

Gesner is paramount in the development of indexes, as they appear in other works of his, such as in those related to Botany, Pharmacology, Linguistics etc.

Final Considerations

The Pandectae propose an innovative approach to the semantic treatment of documents, classifying them with a model which is an expansion from the medieval one while providing with orientation about the preparation of indexes. However, the effectiveness of the Pandectae is not necessarily in their semantic organization, but in their conceptual framework.

For Serrai & Sabba (2005), the Pandectae offer the advantage of making a universal structure of loci communes to mirror the totality of science and art, something that no one had tried before.

Gesner’s desire, registered in the preface to his work, was that others could follow on from him. That attests the historical process underlying the different forms of record, organization and mediation of knowledge. Such desire may have come to design/define the practices in the areas of information and knowledge at different historical moments.

The echoes of the gesnerian bibliographical project is materialized on two fronts: 1) Bibliography takes its nature as a discipline/subject from Gesner and 2) other universalists have developed projects of registration, organization and mediation of documents and information over the centuries.

In this context, Paul Otlet is not to be forgotten. In his search for an environment and for tools of international collaboration, he created the International Institute of Bibliography proposing a Universal Book which comprised individual cards instead of slips. Even the card catalog has its origin in Gesner’s experiments with paper slips (Wright, 2014).

Gesner’s oeuvre has proved to be an irrefutable inspiration along the centuries and might have certainly influenced Otlet as well: “Conrad Gesner had created his great bibliography by cobbling together material from a wide range of existing sources. Otlet e La Fontaine followed his example, building their Universal Bibliography largely by drawing on previously published material” (Wright, 2014, 71).

Both Bibliotheca Universalis and in particular the Pandectae feature as fundamental historical documents for the understanding of the basis of knowledge organization. They are doubtlessly the earliest works to discuss bibliographical techniques (Wellisch, 1981) while materializing classificatory sensitivity - which is theorized, formulated and applied with great logical finezza and acute sense of categorical multidimensionality (Serrai & Sabba, 2005). Herein lies one of the many keys to understand the contributions of the so-called father of Bibliography to KO in contemporary times.
References


Considine, John (2015). Cutting and Pasting Slips: Early Modern Compilation and Information Management. *Journal of Medieval and Early Modern Studies*, 45(3) September: -


