

Literary Warrant[†]

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Barité, Mario. 2018. "Literary Warrant." *Knowledge Organization* 45(6): 517-536. 129 references. DOI:10.5771/0943-7444-2018-6-517.

Abstract: This paper reviews the coining and evolution process of the literary warrant concept from its introduction by Hulme in 1911 until today, its use, applications and adjustment to a digital information environment. Different theoretical and methodological perspectives of literary warrant found in the literature of library and information science are reported and discussed. The usage by three significant knowledge organization systems are studied. The relationships and points of discussion with the general notion of warrant and with derived warrants (user, cultural, academic and organizational warrant) are established. Among other conclusions, it is set that over a century after its first enunciation it is possible to predict that the principle will be increasingly used in digital environments and other information contexts, even outside the library and information science field, with similar objectives and intentions. Its scope of application increases insofar as it can support the development of new concept structures such as taxonomies, ontologies or concepts and topic maps and it can warrant the terms to be included in specialized dictionaries or glossaries.

Received: 31 March 2018; Accepted 7 April 2018.

Keywords: literary warrant, classification, knowledge organization systems (KOSs)

[†] Derived from the article of similar title in the ISKO Encyclopedia of Knowledge Organization, version 1.0 published 2017-08-10. Article category: Theoretical concepts. The author would like to specially thank Professor Birger Hjørland for his important contributions and suggestions as well as his inspiration and support.

1.0 A brief history

The literary warrant concept was initially formulated in 1911 by the English librarian E. Wyndham Hulme (1859-1954) who included it in his work *Principles of Book Classification*, published in a series of articles in the *Library Association Record* between 1911 and 1912. Hulme established (1911, 447) that "a class heading is warranted only when a literature in book form has been shown to exist, and the test of the validity of a heading is the degree of accuracy with which it describes the area of subject-matter common to the class." Considering this starting point, Chan, Richmond and Svenonius deduced (1985b, 48) that, for him, "the basis for classification is to be found in the actual published literature rather than abstract philosophical ideas or 'concepts in the universe of knowledge.'"

Hulme was, for many years, the librarian of the British Patent Office (today named Intellectual Property Office), and a prominent member of the still existing Newcomen Society devoted to the history of Engineering and Technology (see <http://www.newcomen.com>). In these roles, es-

pecially with the help of his easy access to patents, he published many books and articles about different topics such as the invention of English flint glass, the statistical history of iron trade in England and Wales between 1717 and 1750 or the Gallic fortification in Caesar's time. In the development of his research work on patents and technology history, Hulme probably deposited the idea that relevant topics of documents could be counted and weighted, as well as considered as a quantitative basis to select appropriate terminology for classification systems in libraries. Maybe due to this view, Hulme is also considered a pioneer in the history of bibliometric studies. In fact, historically, bibliometrics was developed mainly in the west, and arose from statistical studies of bibliographies. Before the term "bibliometrics" was proposed by Pritchard (1969), the term "statistical bibliography" was in some use. It was Hulme (1923) who coined the term "statistical bibliography," and who used the term "to describe the process of illuminating the history of science and technology by counting documents" (Egghe and Rousseau 1990, 2).

In the few words of Hulme's explanation of the literary warrant concept, he established a basic notion and suggested its potential and projections, while he left several blind points because he never afterwards developed his idea. Hulme committed the original sin of presenting the concept without explicit detailed explanations. Maybe this situation justifies the fact that the discussion about warrants followed a sinuous way in knowledge organization (KO).

The foundation and justification of literary warrant is given in the daily interaction with documents. In this way, Hulme advocated that the terms of a classification system—or, for extension into any other knowledge organization system (KOS): thesauri, taxonomies, lists—had to come from literature rather than theoretical or philosophical criteria, scientific considerations or classifications (Foskett 1996; Yee 2001; Svenonius 2003). The original conception of literary warrant is supported, then, by a “solid and tangible foundation: the contents of books” (Rodríguez 1984, 19). In the same way, but in her own words, Beghtol (1995, 31) established that “the literary warrant may be generally characterized as the topics around which a literature has become established.” Thus, the subjects of documents act as a catalyst for the processes through which the conceptual structures intended for classification and indexing of information resources are created, thinking in users' requirements and retrieval of documents by topics.

This concept has managed to stay alive through the decades, though in a somewhat tangential way, as a theoretical and methodological body in the library and information science (LIS) field. For fifty years, the bibliography about literary warrant was relatively scarce. In fact, for a long time, only the Library of Congress *Classification (L.C.C.)* supported the existence of literary warrant as a criterion for the revision of its tables, based on the collection of the United States Library of Congress (Rodríguez 1984; Stone 2000).

Nevertheless, some researchers sporadically took a look at Hulme's work. Ranganathan (1957) used literary warrant as a tool to arrange the focus of a facet in a decreasing sequence, considering the quantity of documents published on every focus. At the beginning of the sixties, Faradane ([1961] 1985) proposed a combination of literary warrant and users point of view as justifiable as well as desirable for specialized classifications. Taking a closer look, Lancaster stated (1977, 91) that “user warrant” could be more valuable than “literary warrant” “in the development of efficient controlled vocabularies for information retrieval.” R. K. Olding delivered a speech at the Graduate School of Library Service at the University of California on February 16, 1968 under the title “Wyndham Hulme's Literary Warrant and Information Indication.” The fact

that Hulme's initiatory book, after the 1911-12 publication, only had two further editions (Hulme 1950a; [1950b] 1980) speaks about their hiding impact, in the same way as cinema remake movies, which come back every thirty or forty years. Beyond occasional references, then, literary warrant was treated like a marginal term, pushed into a kind of conceptual purgatory (Howarth and Jansen 2014), but always under the critical magnifying glass of all those who considered that an elementary method like counting could not be seriously considered as a procedure for terminology selection. That's why Rodríguez wrote (1984, 17) “literary warrant is one of the most fundamental principles of subject analysis [but] the term is rarely encountered today, and the name of Hulme is virtually forgotten,” and claimed for its rediscovery.

In response to this alarm warning, Hulme's heritage received several recognitions. Those responsible for a compilation of library and information science (LIS) canonical texts transcribed the pages in which Hulme formulated the literary warrant principle, with the certainty that his contribution accounted for three selection criteria of fundamental texts in the following fields: theoretical emphasis, significance and impact, as well as perspicuity (Chan, Richmond and Svenonius 1985b, xiv). Afterwards, literary warrant applicability was extended from classification systems to thesauri (Lancaster 1986). In the same year, Beghtol (1986) proposed for the first time a generic definition of “warrant,” and studied, in-depth, four types of semantic warrants: literary, scientific/philosophical, educational and cultural warrants. With this work, warrant studies were open to additional contributions (Cochrane 1993; Beghtol 1995; Dabney 2007; Barité 2011; Nunns, Peace and Witten 2015, Bullard 2017), and their suitability for electronic resources and web environment has been explored (Vizine-Goetz and Beall 2004; Campbell 2008; Gokhale, Deokattey and Bhanumurthy 2011). The literary warrant analysis was incorporated into archival studies (Duff 1998), and “has been extended and refined to support a wide range of research in recordkeeping, archival and other fields” (McKemmish and Gilliland 2013, 100).

Hjørland identified literary warrant as one of the four most significant principles of the so-called traditional approach (along with the principle of controlled vocabulary, Cutter's rule about specificity and the principle of organizing from general to specific), one of the six theoretical approaches he mentions as relevant in the field of KO (Hjørland 2008, 89-90).

Literary warrant was also introduced in standards (National Information Standards Organization 2010) and began to be considered as a foundational (Singh 2001, 178), “pivotal” (Beghtol 1995, 31) or “focal” (Huвила 2006, 60) concept but always in the twilight of a discipline corner. Although the literary warrant concept is continuously men-

tioned in literature, there is a scarce number of research papers specifically and seriously focused on its problems. In fact, today the term “literary warrant” does still not have enough literary warrant to get its own classification number in the *Classification System for Knowledge Organization Literature*, created by Dahlberg to classify the references of the section “KO Literature” of the journal *Knowledge Organization*, over forty years ago.

2.0 Discussion

Various kinds of problems can be identified—either exclusively or mainly—in relation to the extent and effectiveness of literary warrant application.

2.1 The roles of document types involved

Something which can be very revealing is the study of the evolution, from Hulme’s original concept, which focused literary warrant only on book classification, to a scenario in which dozens of documentary types coexist, and there are about twelve KOSs used for subject representation and as information retrieval tools (Abbas 2010). The current document typology involves: i) conventional documents such as books, journal articles, maps, musical scores, art objects; ii) digitized representations of conventional documents; and, iii) documents and audiovisual information resources of digital nature and/or those that are only available in a digital environment and that might never be printed in book or any other traditional form. This complex situation compels us to renew the discussion about the notion of “document”—its nature, its contents, its aboutness, its mediation and generative capacity—with regard to cases such as, for instance, web portals, sites and pages, linked or grouped resources, databases, different versions of documents written in collaboration, fan fiction, open data and other information resources (Schamber 1996; Buckland 1997; Frohmann, 2009; Irvine-Smith 2015). On the other hand, some documents are more directly related to the generation of new knowledge, to the discussion of new ideas that are not always admitted by peers (congress communications, articles in scientific journals), while others only intend to show the state-of-the-art of a subject field (handbooks, dictionaries, glossaries), provide learning texts (university textbooks, educational material, guided learning material, atlases), or even to promote specialized knowledge dissemination among ordinary citizens (magazines of scientific popularization, documentary films and videos, role-playing based on scientific evidence or progress).

A new discussion on the notion of a document or a different assessment of the various kinds of documents in terms of their objectives may imply—to a certain extent—

the discussion of a renewed and modern concept of literary warrant. Thus, it is legitimate to wonder whether a weighted literary warrant in terms of the documentary types involved, the authors’ objectives and/or the relative acceptance of their new ideas should be attributed instead of a merely numeric warrant, a qualitative and quantitative assessment calculated in terms of the intrinsic quality of the documents taken into account in this numeric value. The authors of the *Thesaurus of Health Informatics*, for example, understood literary warrant as the inclusion criterion of “the terms that would be found in *key documents* in the literature of the discipline” (Sievert et al. 1998, x, emphasis added), thus establishing a weighting of the quality of the chosen documents.

2.2 Epistemological approaches

If it is accepted that all the methods of KO are related to fundamental theories of epistemology, and they could be placed in one of four approaches or fundamental clearly delimited methods of classification: empiricism—observations and inductions, rationalism—principles of pure reason or deductions, historicism—studies of context, development and evolution of knowledge fields—and pragmatism—analysis of values, goals and consequences—(Hjørland 2003; 2004; 2013), it might be pertinent to consider how literary warrant could be placed in the tension among those four fundamental methods.

In a first approach, it can be said that literary warrant introduces an empirical principle in KO, given that Hulme only starts from observation data; it is enough for him to find out if there are or are not enough documents that could be grouped under the same subject and receive the same classification number, something that only happens “when a literature in book form has been shown to exist” (Hulme 1911, 446). He restates (1911, 447) his conviction when he points out that a classification should be enlarged when a more specific literature will have been developed as “a reflex of the degree in the specialization.”

Hulme illustrates his idea by saying that the periodic table of elements in chemistry only has a reference value for a classification system, and that if in his time there were not sufficient monographs on iron or gold, there should not be a class for those concepts in a book classification, because no books on iron or gold had been published. If in Hulme’s mind there was no place in classification systems for subjects that did not have enough bibliographic production to support it, far less would he have validated the inclusion of dummy terms (or node labels), inserted in the hierarchical scheme of thesauri only to indicate the logical basis of a division. Therefore, for Hulme, authority does not come from the classifier’s preconceptions or philosophical, knowledge or classifier’s theories, but from the

data and evidence provided by literature. He states (1911, 447) by means of an ancient but meaningful word that “the real classifier of literature is the book-wright.” Hence, as the book-wright is not built on actual books but on knowledge expressions contained therein, the data provided by literature always require an interpretation as well as the identification of the most immediate subject issues and the relationships with the deeper and more consolidated knowledge basis; a knowledge representation that can be seen as objective, neutral or “universal” or—on the contrary—as a culturally biased representation, in general unintentionally but also deliberately (Olson 1997; Olson and Ward 1998). Considering the latter, as literary warrant evolves into a cultural warrant, it follows the path from an empiricist to a pragmatic perspective; if we understand that literature compiled in a knowledge field can express and validate the power relations in our societies, it will be necessary to add symbolic representations filled with “values” that ensure the visibility of the different perspectives or thinking trends. Olson and Ward suggest an example of this technique through the implementation of “paradoxical spaces” by means of the introduction of concepts opposed to those proposed by the dominant culture so that classification systems introduce a feminist perspective in various social, economic and political issues, beyond the greater or scarcer literary warrant of a subject (Olson and Ward 1998).

A limitation of the mainly empirical approach of literary warrant can lie in the establishment of conceptual relations between, for instance, the terms of a thesaurus. Although descriptors may have been chosen one by one on the basis of literary warrant, we might wonder if the same procedure should be followed with regard to the relations, because their empirical determination by literary warrant might be opposed to semantic theories in which such relations are considered (Svenonius 2000; Hjørland 2015). As Hjørland mentions (2017) “even if the concepts selected for a controlled vocabulary should be derived by the principle of literary warrant, might be that systems such as the periodic system (or the Linnean taxonomy of living organisms) may be fruitfully applied for determining the relation between classes,” and this is what often happens, because (Hjørland 2017) “in practice, both the periodic system and the Linnean system are widely applied for classification systems and other kinds of controlled vocabularies.”

Beyond these fair appreciations, it is possible that literary warrant can be consistently applied to identify synonyms and distinguish those that will be considered as descriptors from non-descriptors. It is also possible that generic or partitive relations between concepts of natural and biological sciences, due to their paradigmatic nature, can be supported by literature without any difficulties, and thus make coincide in the same praxis empiricist and ra-

tionalist views for the benefit of acceptable classification schemes. However, a considerable part of scientific literature focuses on research or proposals, the results of which were (under debate or even rejected) conflicting thinking trends, without reaching consensus (something usual in social and human sciences), or works with conclusions that have been outdated by more recent research or that submit hypotheses that have not been possible to confirm. There is also enough literature gathered and stagnant on diseases that have disappeared from the world or have a very low impact nowadays. These circumstances can remain more or less invisible if we consider literary warrant just like a quantitative datum.

Maybe some of these bodies of literature have acquired a significant density, but as their matters have been forgotten or outdated, their initial literary warrant would not offer the necessary assurance to include or maintain their reference terms in thesauri, lists and classification systems. Or would they? Would it be necessary to keep available this documentation, which is more or less in a standstill waiting for unexpected facts or real facts to reawaken their use and even compel the establishment of new relationships based on empirical data? Something like that happened with the documentation on anthrax relatively fixed and stable in its two domains—biology and medicine—, which underwent a quick documentary update when spores of the bacillus were sent in mailed letters in the United States in 2001, after the collapse of the Twin Towers, something that forced the association of the bacillus name with biological weapons and new forms of terrorism. In short, it seems clear that literary warrant is situated more or less comfortably in an empiricist approach to classification. It can, however, require in some situations the combination or complementation with rationalist or pragmatic perspectives ensuring a knowledge representation that is more adequate to users’ needs.

There still is an open door in this house. As mentioned above, Hulme also coined the term “statistical bibliography” under the common belief that the terms and relations should be found by empirical studies of literatures, rather than philosophical classifications. However, several authors claim (Hjørland 2016) that bibliometrics cannot be considered as a neutral activity corresponding to the ideals of classical empiricism, and this concern led to the writing of a manifesto (Hicks et al. 2015) to guide bibliometric practices trying to avoid—among other issues—the deviations produced by ill-founded approaches or by the selection of inadequate indicators.

Would it be possible for the empiricism upon which the literary warrant is based to be subject to the same debates? Just to cite an example, the various interpretations that different indexers can make of the same document in their respective content analyses can move up or down the fig-

ures representing the literature body of a certain subject. This could set a limit to the establishment of a unique and undoubted literary warrant with universal value, accepted everywhere.

2.3 Literary warrant and vocabulary control

The links between literary warrant and vocabulary control have not been sufficiently studied in KO literature yet. In most documents in which both topics are studied, they are separately treated without establishing any relation between them. This dissociation might be explained by the fact that literary warrant as a terminology compilation and justification method is at a stage previous to the moment of standardization of terms and their relations through vocabulary control. From that perspective, literary warrant and vocabulary control are not seen as antagonistic or opposed but rather as complementary, since literary warrant supplies the reference terms and vocabulary control gives their definitive configuration and the relations between them.

Many of the matters related to standardization of terms and their relations do not have a direct bearing on literary warrant since they only are formal rules for the selection of singulars and plurals, correct spelling, preferred grammatical form and similar issues.

Another reason in favor of the independence of the two concepts lies in the fact that even if literary warrant was not used to justify the terminology of a KOS, the fulfillment of vocabulary control operations would still be required to a greater or lesser extent.

Barité (2014) identified nine systematic practices of vocabulary control:

- control of synonyms and variants,
- control of equivalences,
- control of homonyms and polysemy,
- control of abbreviations,
- writing scope notes,
- writing definition notes,
- writing historical notes,
- control of hierarchical relationships, and
- control of associative relationships

These nine practices aim at the fulfillment of five purposes: restriction, disambiguation, normalization, hierarchization and relation (Barité 2014). At first sight, there does not seem to exist an intersection area between those nine vocabulary control practices and the procedures associated with the determination of the literary warrant of an issue. There are, however, some points in the vocabulary control process where literary warrant can operate as a central element for decision making:

- a) The choice of a preferred term among a set of synonyms or quasi-synonyms. For the American standard, literary warrant is the justification of two situations: “the representation of a concept in an indexing language or ... the selection of a preferred term because of its frequent occurrence in the literature” (National Information Standards Organization 2010, 6).
- b) The justification for the simultaneous inclusion of two or more homonyms in a KOS, insofar as they appear in the literature of various disciplines with sufficient literary warrant, something that does not always happen.
- c) The justification for the inclusion of equivalent terms in other languages, either in the schemes or in bilingual or multilingual indexes attached to thesauri or lists, insofar as the terms appear in literature in different languages.
- d) The determination of the most frequent relations found in literature, whether paradigmatic or syntagmatic, semantic or functional, in order to consider their inclusion in pre-coordinated not faceted systems and even in taxonomies, folksonomies and ontologies.
- e) The indication of the obsolescence of terms and concepts. A literary warrant that decreases over time until it reaches a value of zero, which remains stable for a reasonable period, could be showing the obsolescence and lack of adequacy of terms and/or concepts. This is especially useful in the revision of KOS, when it is necessary to identify classification numbers or discontinued descriptors.
- f) In the opposite sense, a literary warrant that increases regularly for a given subject during a reasonable time period is an appropriate indicator to support the inclusion of new terms in a KOS.
- g) Those responsible for the *Dewey Decimal Classification* have a smooth process working in such a way that the topics with insufficient literary warrant, but the literature of which may grow in the future, are mentioned specially in including notes, but also in definition notes, scope notes and class-here notes, awaiting for the warranty to justify the assignment of a special number (*Dewey Decimal Classification* 2011, 17). This is the reason why they are called “standing room terms” in the CDD context (see Section 3.3. *Dewey Decimal Classification*).

Farradane cautiously stated ([1961] 1985, 127) that “literary warrant represents the standpoint of research at a particular time, in a particular culture or a particular country, and must be quoted with caution; even in science it will have probable lasting validity only when it concerns facts, not theories. Independent methods of checking our ordering of knowledge must be sought.” However, many of the actions that can be taken from literary warrant in vocabulary control operations show that it is not only capable of

providing the fixed picture of the documentary collection of a subject but also that it can show the trends in knowledge compilation throughout time, thus contributing to synchronous as well as diachronic activities and research (Barité 2011, 232).

In short, on certain occasions, literary warrant can successfully participate as a methodological support in decision-making within the vocabulary control process, guiding toward solutions that are endorsed by the literature, because it has the appropriate instruments for further restriction, disambiguation, hierarchization and standardization of terms as well as the identification of their relations according to data empirically validated by documents.

2.4 The role of classifiers and indexers

What is the role classifiers and indexers have to play when facing the documentation that is the basis of literary warrant? Hulme's opinion can be considered at least curious: "the so-called book classifier is merely the recorder" (Hulme 1911, 447) and not an interpreter of contents given that he considered classification merely as a "mechanical time-saving operation for the discovery of knowledge in literature" (Hulme 1911, 356). From this point of view, the classifier or indexer passively lets the bibliographic data "speak for itself." Although all the research on automatic indexing seems to reinforce Hulme's initial criterion, exactly the opposite has been valued for many years: the heuristic ability of the classifier or indexer to place a work in its context and discipline and in the subject "place" where it should be easier for an interested user to find it. This discussion keeps a direct relationship with a certain ambiguity around the term "aboutness"—or "subject"—(Hjørland 2017b) because it is possible to defend either the concept of an essential aboutness belonging to each document beyond indexers' interpretations or explicit information on the user's needs, expressed and registered in their searches in online catalogs and databases.

There still is a third position represented by Svenonius who says (2003, 824) that "in back-of-the-book indexing, literary warrant sanctions the usage of the author of the book," something that may not coincide with the usage of terms within the author's specialty field. In fact, every time an author proposes a new term—or, a new terminology—and it is not recognized or accepted by the peers, he only "speaks for himself," giving rise to the disagreement between the term or terms coined by the author and those already firmly established by the literature of the specialty. Anyhow, literary warrant studies could have an incidence on (and contribute to) the discussion between document-oriented indexing, author-oriented indexing and request-oriented indexing. This disagreement has to be solved in some way by consistent indexing policies, which generally

may prevail the warrant strongly established by specialists over that suggested by a single author.

An issue related to the previous one and still mainly unexplored in literature is whether literary warrant only refers to what we could call the "main subject" of every document or if it may include the set of topics that can be identified in a process of content analysis. Both perspectives replicate, in a certain way, the differences in objectives between the classification process (intended just to provide an adequate location to documents on a shelf or a digital collection) and the indexing process (intended to thoroughly examine the subject and formal elements that can be significant for a future user of those documents). The association between literary warrant and main subject can be more easily established in the process of classification; however, the indexing of any document requires a more analytical consideration since it is possible to identify all subjects, main and secondary, with some significance for subject retrieval of the document.

2.5 The dilemma of inconsistent schemes

The strict implementation of literary warrant may cause inconsistencies in the internal organization of schemes or voids not understood by indexers or users, considering the existence of homogeneous objects, some with literary warrant, some without it. For example, Riesthuis (2005) mentions that the third edition of the ASIS&T thesaurus is based on literary warrant to a greater extent than previous editions. It has no descriptor for all countries (the Netherlands have a descriptor, but Romania or Portugal do not in this edition), only for those about which it has been written in the publications upon which it is based.

An area in astronomy currently subject to changes is the one related to dwarf planets of the solar system. At present, there is agreement about the existence of seven: Eris, Ceres, Haumea, Kuaoar, Makemake, Pluto and Senda; this list may soon change since there are at least a dozen stars candidates to be in that category under astronomers' examination (Vidmachenko 2016). In case there is not enough literary warrant for the seven, should it prevent classifiers from including a complete list in an astronomy thesaurus? Shouldn't the thesaurus be, besides an indexing tool, an instrument to form and inform about the current state of knowledge? On the other hand, if lunar craters that have been listed and named up to the present amount to 1,517, does it make any sense to include all of them in that same astronomy thesaurus, if there is enough literary support, i.e., sufficient studies, sufficient attention and sufficient interested people just for a few of them? These questions represent to a certain extent the doubts on the criteria, limits and flexibility that literary warrant should apply in each situation. Anyhow, these doubts are of meth-

odological nature and ultimately show the essential strength and plasticity of the literary warrant principle as well as the need for its consistent application maybe combined with other warrants or criteria assuring certain balance in the schemes.

2.6 Proper names as descriptors

Although in daily professional practice it is quite usual for indexers to face the difficulty to find standardized forms of authorities referring to personal or family names, corporate body names, geographical places or current events, the names of institutions (for instance ministries), countries and cities (Myanmar for Burma) and even the different names under which an author is presented change. Standards only provide formal rules for the building of authorities of proper names or they suggest that standardized forms be taken from other lists of authorities (country codes, standardized lists of geographical places, indexes or glossaries of acronyms, etc.) and in the best case they make a generic reference to the use of some form of warrant as a justification of the selected proper names (National Information Standards Organization 2010; International Organization for Standardization 2011).

Some authors have reported that proper names affect the quality of indexing and information retrieval, among other reasons, because they are not standardized, also due to translation problems or doubts as to their inclusion as descriptors (Nadkarni, Chen and Brandt 2001; Matusiak et al. 2012). One could wonder if literary warrant can make a contribution to the selection as well as the choice of the authorized forms of proper names. Some situations can be easily solved: “in *Dewey Decimal Classification* William Shakespeare has his class number, due to the literary warrant requiring the distinct classification of his works” (Buizza 2011, 14). But, when there are events of such a magnitude that they will most likely give rise immediately but also in the medium term, in a sporadic but regular way to their own body of literature, such as the fall of the Berlin Wall in 1989 or the collapse of the Twin Towers in 2001, is it necessary to wait until we have a sufficient literature body and the editors of KOS decide (or not) to incorporate new descriptors or classification numbers in subsequent editions of their systems? The lack of a specific and appropriate descriptor for the collapse of the Twin Towers, for instance, can weaken information retrieval for users obliged to use indirect descriptors such as “terrorist attacks,” “terrorism” or “collapse of buildings.”

In other words: can literary warrant justify local modifications of schemes or does it have to contribute to (and support) the decisions taken by the editors of KOS who have a wider perspective of the development of documents in certain subject areas? Besides, those editors are

usually reluctant to use descriptors related to concrete historical facts if they are not sure about their long-term significance, and they often forget to include in new editions topics that clearly have a large documentary support.

3.0 Literary warrant in KOS

The people responsible for many modern thesauri, generally Americans, assure that they use literary warrant as a justification for the selected terminology, either exclusively or together with other warrants (Sievert 1998; National Agricultural Library 2002; American Astronomical Society 2013). In the case of the most recent editions of the Universal Decimal Classification, the concept is merely mentioned in the glossary of the User Guide (McIlwaine 2007), but nothing is said, either earlier or later, about the way in which literary warrant is treated by those responsible for the UDC. It is unusual to find in European thesauri any reference to the use of Hulme’s principle to justify terminology. Although Hulme was a British citizen, his heritage has been acknowledged and used specially in the USA. For this reason, this section will report on the use of this principle in three American KOS (*LCC*, *LCSH* and *DDC*).

3.1 Library of Congress Classification (LCC)

Although it is not a national library, the US Library of Congress (website: <http://www.loc.gov/catdir/cpsol/lcco/>) acts as such and offers several services of worldwide reference: it is in charge of the legal deposit; it is the primary source for the original cataloguing of documents in the US through the Cataloging-In-Publication (CIP) programme, among other services, which turns into a worldwide reference institution in classification and indexing issues.

Already in 1897, when the collection had over a million documents, it was decided to commission Hanson and Martel to create a new classification system according to the requirements of the Library of Congress, which was finally based on the first six expansions of Charles Ammi Cutter’s Expansive Classification, after excluding two other alternatives: “Melvil Dewey’s *Decimal Classification* then in its fifth edition, and the Halle Schema devised by Otto Hartwig” (Chan, Intner and Weishs 2016, 7). Since 1898, the *Library of Congress Subject Headings (LCSH)* were also developed as a list aimed at indexing, although it has not been possible to establish the full compatibility between *LCC* and *LCSH* (Manheimer 1972; Frank and Paynter 2004).

The *Library of Congress Classification* is—as its name implies—a system created to classify the collection of that particular library or, in words of Marcella and Newton (1994, 79), “to represent and cater for an existing collection and to try to predict and create space for that collec-

tion's future development and growth." At first, it was not intended to be applied internationally, although it has had a significant influence on classification criteria of several national, academic and research libraries in the United States and other countries. Its publication in more than forty volumes, published on several dates makes it difficult to follow its updates.

Insofar as the development of the LCC is based upon the real documents that make up its collection, the higher or lower specificity of each class does not depend in principle on a general plan. Some authors (Crovisier and Intner 1987) have questioned the consequences, thereof, such as scarce general logic of the schemes and the use of outdated terminology. The separate publication of the classes, each of them with its particular logic "its own form and geographic division and index [cause] a concomitant lack of unifying structural features" (Marcella and Newton 1994, 79). The references to literary warrant as one of the major supports for the development and update of the LCC constantly appear in literature (Immroth 1972; Stone 2000; Mills 2004; Broughton 2004; Chan, Intner and Weishs 2016). We must remember to take the dimension of the literary warrant impact, that "the LCC is based entirely on the Library of Congress collection" (Hallows 2015, 88), and Library of Congress is the major library in the world.

Hulme had already stated that the Library of Congress was the contemporary literature deposit, which could best adjust to the implementation of his principle with the highest impact and lowest possible cost since it had—and has—the greatest collection of documents in the world including all types of documents and all the peculiarities of form, presentation and contents that documentation might present (Hulme 1911; Rodríguez 1984). In some official pages of the Library of Congress, it is established that literary warrant is one of the main principles of the LCC and *LCSH* (http://www.itsmarc.com/crs/mergedprojects/subjhead/subjhead/3_2_lcsh.htm). Hoffman (2013, 101) describes the policy implemented when she indicates that:

LCSH and LCC are based on 'literary warrant.' This means a subject heading and classification number are created only when something has been published on a particular topic. Therefore, *LCSH* and LCC are not universal standards representing knowledge. They were developed to describe materials in the Library of Congress. Today, the Library of Congress accepts suggestions and will consider additions/changes if there is literary warrant.

The criteria to create new subject headings following the literary warrant was established in the rule H187-1 of the

Subject Cataloging Manual: "Establish a subject heading for a topic that represents a discrete, identifiable concept when it is first encountered in a work being cataloged, rather than after several works on the topic have been published and cataloged" (Library of Congress 2008). This rule is complemented by sheet H 180 (Assigning and Constructing Subject Headings), which allows to "assign headings only for topics that comprise at least 20% of the work" (Library of Congress 2008).

The major criticisms that literary warrant has received throughout the years came from authors who have studied their application and use in LCC as well as *LCSH*. In a list of subject strengths and weaknesses, Broughton mentions (2015, 164) that the "the biggest difficulty is that the Library does not collect systematically in all subject areas." LC is a copyright deposit library in some fields, but not in others such as medicine, agriculture or education. Another consequence of the copyright library is that the system has very strong U.S., western, white, male and Protestant bias (Berman 1971; 2000; Henige 1987; Knowlton 2005; Broughton 2015). Other areas such as "politics, law, administration, military and naval science" have also an excellent coverage "because the library is there primarily to serve Congress" (Broughton 2015, 165).

From other perspectives, some researches focused on studies that examine the application of LCC and *LCSH* in such different areas as ancient Chinese books (Cheng and Chen 2016) or women studies (Wood 2010) and conclude that literary warrant is relevant as a justification for the selection of the most adequate subject headings for those specific areas but was ignored by LCC, which was criticized (and was probably done because the topics and themes treated in them make up less than 20% of the total content).

3.2 *Library of Congress Subject Headings (LCSH)*

First published between 1909 and 1914, the *Library of Congress Subject Headings* have led a relatively independent development as compared to the Library of Congress *Classification*. The thirty-eighth edition of *LCSH* contains headings established by the Library up to January 2016.

As mentioned by those responsible, "the headings included in this list were obtained by creating a file consisting of all subject heading and subdivision records in verified status in the subject authority file at the Library of Congress" (Library of Congress 2016, vii), thus collecting almost 340,000 authority records. The justification of the terms on the list results from "the A.L.A. list, several other lists of subject headings, and many reference books were consulted as sources for new subject headings. New subjects also arose in the daily cataloging done at the Library" (Library of Congress 2016, vii). In this way, the list evolves

and expands taking into account not only literary warrant “coming directly” from the collection of the Library of Congress but from the “indirect” warrants provided by other reference sources.

3.3 Dewey Decimal Classification (DDC)

Several reasons allow us to say that the attention paid to literary warrant by those responsible for the *Dewey Decimal Classification* is relatively recent. The first one is evident: the system was created thirty-five years before the formulation of Hulme’s principle. There is no evidence that Dewey, deceased in 1931, had either taken any note of the principle and assigned it to the update base of his system or an exchange of letters between Dewey and Hulme. Moreover, the *DDC* and literary warrant are supported by approaches of a different nature. Hulme’s conception looked for an economy principle in the presentation of schemes, without taking into account formal maps of knowledge, no matter how legitimated by science they were.

Anyhow, it cannot be denied that Dewey had a certain intuition about the value of real documents as a support for the organization of his system since in the first sentences of the preface to the first edition he points out that the design of his classification “was the result of several months’ study of library economy as found in some hundreds of books and pamphlets, and in over fifty personal visits to various American libraries” (Dewey 1876, 3).

Dewey’s intention was focused on the quick retrieval of the item requested by the user and to this end he did not hesitate to create a fiction, arbitrary and effective alike, to fulfill that objective: the notion that knowledge, such as the elements of the decimal system, can be represented through successive and homogeneous groups of ten elements. In the introduction to several editions of the *DDC*, we can find the idea that a bibliographical classification has to be essentially practical; it has to be a means to find works and not a philosophical system and this is a point of contact with Hulme’s ideas. Only since the 1950s, the concern of those responsible for the Dewey system to incorporate elements of the classification theory to the new editions can be noted (Miksa 1998). This is recognized, for example, by Scott who wrote (1998, 2) that “the modern history of *DDC* is generally dated from 1958, with the publication of a refocused Edition 16 ... Changes were kept to a minimum, reflecting only those most urgently needed to accommodate existing knowledge and literary warrant.”

Literary warrant is mentioned several times in the twenty-third edition of *DDC* (2011b), the last one published in English. There is a first level of recognition in the glossary where the term is specifically defined as “Justification for the development of a class or the explicit inclu-

sion of a topic in the schedules, tables, or Relative Index, based on the existence of a body of literature on the topic” (2011, 7). It is not the only reference in the glossary, since literary warrant is established as an arbitrator to decide when a term can have its own classification number and when it cannot. In fact, “standing room” is defined as “A term characterizing a topic without sufficient literature to have its own number, and considerably narrower in scope than the class number in which it is included” (2011, 11). Accordingly, an “including note” is defined as “A note enumerating topics that are logically part of the class but are less extensive in scope than the concept represented by the class number. These topics do not have enough literature to warrant their own number” (2011, 7). This narrow relationship in *DDC* between terms with their own number, standing room terms and terms without an own number that are recorded in including notes offers a dynamic view of literary warrant, linked to the revision processes of the system.

In the introduction to the twenty-third English edition of the *DDC* (Mitchell 2011), literary warrant is likewise mentioned four times:

- i) In section 11.2 (Relative Index): “the Relative Index ... includes most terms found in the schedules and tables, and terms with literary warrant for concepts represented by the schedules and tables” (33);
- ii) in section 11.9 (Interdisciplinary Numbers): “Interdisciplinary numbers are not provided for all topics in the Relative Index. They are omitted when the index entry is ambiguous, does not have a disciplinary focus, or lacks literary warrant. In such cases, there is no number opposite the unindented entry” (34);
- iii) in section 11.10 (Terms Included in the Relative Index): “The Relative Index contains most terms found in the headings and notes of the schedules and tables, and synonyms and terms with literary warrant for concepts represented by the schedules and tables” (35);
- iv) and finally, in section 11.15 (Terms Not Included in the Relative Index): “When there is strong literary warrant for such a phrase heading as a sought term, it may be included in the Relative Index, e.g., English literature. When the phrase heading is a proper name or provides the only form of access to the topic, it may also be included, e.g., English Channel, French horns, Amharic literature” (36).

The literal transcription of the four mentions made in the introduction to the latest English edition of *DDC* enables us to have an idea of the importance assigned by the editors of the system to literary warrant to make decisions related

to the inclusion or exclusion of terms in various contexts and situations. On the other hand, the sources for literary warrant may vary according to different translations made to take into account topics with local or regional value (Beall 2003). The implementation of literary warrant by the editors of *DDC* (as it happens with those responsible for *LCC*) may involve some difficulties: “the subjects go out of fashion and the treatment of subject changes” and “because the close connection with the Library of Congress it has often been felt that is a considerable bias in favour of books” (Bowman 2005, 5). However, the important role that Hulme’s principle plays arises from what has been said: the updating methods of the Dewey system. Moreover, as Rowley and Hartley mention “Dewey Decimal Classification’s literary warrant has been improved through becoming part of OCLC, as OCLC’s Online Union Catalog is now accessed electronically as part of the revision process” (Rowley and Hartley 2008, 211).

4.0 Meanings and applications of literary warrant

The review of monographs, papers, congress communications and KO dictionaries and glossaries have paid different levels of attention to literary warrant for over a century, proving that its original meaning has been expanded (Lancaster 1977, from classification systems to thesauri; Vizine-Goetz and Beall 2004, trying to determine literary warrant for topics in electronic resources), and restricted (Beghtol 1986, 113, when she talks about terminological warrant’s CRG perspective as a narrowed idea of literary warrant). Thus, Hulme’s principle acquired dissenting nuances and approaches.

We could also construe that although literary warrant has undergone a diversification of meanings and applications, this variety can be considered as a manifestation of the Promethean nature, which enables it to split into close significations, all of them functional to the purposes of KO. An examination of all the perspectives found in KO literature on literary warrant led us to identify and explain five different approaches in which literary warrant is seen, as follows.

4.1 Theoretical principle

Literary warrant is mentioned as “criterion” (Clason 1973), “concept” (Olson 2002) and “principle” (Yee 2001; Hjørland 2008). It is, therefore, seen as an objective—and consequently, external—expression (Mai 2011; Howarth and Jansen 2014), such as a systematic and consistent approach to KO oriented to information retrieval. As a theoretical formulation, it can be applied to all knowledge areas and it enhances the value of knowledge recorded in documents as a common pattern of scientific and technological understanding.

4.2 Methodological tool

First, many authors agree to consider literary warrant to justify the selection and hierarchization of terms and related terms to be included (or to be excluded because of their low justification) in any KOS. Second, literary warrant is considered relevant in processes of KOS creation, evaluation and revision (particularly in operations of quality evaluation of terminology). Its potential has been proven, as previously mentioned, by their regular application by those responsible for *LCC*, *DDC*, *LCSH* and other systems and thesauri (Beall 2003; Vizine-Goetz, and Beall 2004; Green and Panzer 2014). Third, literary warrant could justify and arrange terms in mapping fields of knowledge, to order topics or to select the first focus in a facet (Rajaram, 2015), and to decide the inclusion/exclusion of dictionary and glossary terms (Cabr e, 1993).

4.3 Body of literature on one topic

In this sense, literary warrant is expressed in the assignment of a quantitative value, like a material dimension of documentation. One of the central issues has been the matter of enough in literary warrant, i.e., the quantitative data, the number of works upon which it can be said that a subject has enough literary warrant to be considered as an authorized term in KOS.

When proposing the extension of the principle to the development of thesauri, Lancaster (1977, 9) suggests that the terms must be warranted “if enough [marked in the original] literature on the topic is known to exist and that, if the term were not introduced into the vocabulary, this literature would be hidden away in a much larger class that would not be very useful for retrieval purposes,” but he didn’t propose a way to quantitatively establish the meaning of “enough.”

Langridge took a step forward when he recognized that “the term [literary warrant] is also occasionally used in the narrow sense of the volume of literature on a subject” (Langridge [1973] 1977, 52; emphasis original), although he did not suggest how to determine this volume. Nevertheless, already in 1958 Custer, in the editors’ introduction to the sixteenth edition of *DDC* established, without explicit reference to Hulme’s principle, that “the editors ... have been guided by the principle that the existence in American libraries of more than twenty titles which would fall in a given number raises a presumption in favor of subdivision” (Custer 1958 apud Cockshutt 1976, 33). Beall (2003), an expert who works at the Library of Congress confirmed this point, at least with regard to the *DDC* in which she detailed the steps usually followed in the review process of schedules. According to the criterion established by section 2.2.2.1. of the unpublished Editorial

Rules of Dewey Decimal Classification, of April 1999, “an expansion is considered when [the Editorial Policy Committee] find twenty or more works in number on a topic for which provision has not been made” (2). Twenty works seem to be the border between having or not having literary warrant. Or at least for those responsible of the DDC it is the measure of enough. The word “work” seems to be sufficiently comprehensive to include any complete and autonomous knowledge expression, which might be contained in a document, whether a book or a video, web page or scientific journal article.

The volume of literature in other contexts can be different or may need other parameters. It is very useful to indicate the real documentation warrant of online thesauri, terminological data banks and web taxonomies, because it enables to immediately determine the literature production supporting a term as well as to review the according to the rules of application of the standard ANSI/NISO Z39-19-2005. In fact, this standard establishes that “literary warrant is the “justification for the representation of a concept in an indexing language or for the selection of a preferred term because of its frequent occurrence in the literature?” (NISO [2005] 2010, 6). However, it is nowhere determined the way or measure to select the preferred term between two or more terms.

Not only the generic measure of enough literary warrant could objectively be a number—as we say *ut supra*—it is also possible to distinguish the relative weight of the various types of works: canonical texts, manuals, dictionaries and other reference works, theses, technical or descriptive monographs, critical and legal documents, articles in specialized journals or regular proceedings. In other words, in this way it is possible (and maybe necessary) to consider the relative importance of every type of document in the general production of a discipline. This could be useful, for instance, to perform comparative studies about the internal integration of specialized documentation in different disciplines.

4.4. State-of-the-art of KOS evaluation tool

Literary warrant allows comparing the situation of knowledge field structures versus the situation of KOS conceptual structures, their quality and currentness. If the KOS was constructed according to the state of knowledge and enabled to reasonably classify and index all types of specialized documents, literary warrant could contribute to visualize areas more or less explored by research, and zones of obsolescence, through the measurement of scientific, technical and critical production in every topic. This demands a large compilation of bibliography in a subject field, duly classified or indexed throughout a lengthy period of time by one KOS. Dahlberg (1995) used literary warrant (without mentioning the term) to analyze

current trends in KO based upon the bibliographic references published in the KO literature bulletins, incorporated as supplements to the ISKO journal *Knowledge Organization* and classified by the *Classification System for Knowledge Organization Literature*, in the 1991-1993 period. Barité (2011) extended the study over the 1994-2009 period. Both studies applied the Systematifier, a methodological device created by Dahlberg to organize the topics of a domain in three axes, theory, praxis and environment (Dahlberg 1978; 1995), which allows identifying more productive and less studied subareas in the KO domain. In this way, literary warrant contributes to weighting the quality of conceptual structures of KOS to reflect the reality of a field, and the adequacy, timeliness or obsolescence of a KOS.

4.5. Prediction tool of research

Beghtol wondered (1995, 4) twenty years ago “is statistical analysis of existing indexing bibliographic records predictive of trends in different subject domains?” If literary warrant can establish the state-of-art of domains, maybe it is also able to identify gaps as well as areas with an increasing production, suitable for research purposes. For prediction, it is necessary to have a collection of documents of a discipline, covering periods of five or more years, classified by the same updated classification system. Diachronic studies covering in this way enough scientific or specialized academic production show predictive trends.

The terminological warrant suggested by the Classification Research Group (Beghtol 1986, 113) may help to establish the state-of-the-art or to predict research in a domain in the studies being made on keywords in journal articles. The five literary warrant perspectives can be reduced to three: theoretical, methodological and applicative. The three perspectives are at the same time autonomous as well as complementary and allow establishing a documented map of knowledge. They are not necessarily exclusive since they interact and mutually influence each other. Thus, it could be agreed that literary warrant is a theoretical principle that supports a method, or that it is at the same time a principle, a methodology and a product. In its nature, literary warrant has an essentially multi-sided value, taking into account different approaches and utilities in the scientific discourse representation.

If literary warrant can be useful whether it is seen as a conceptual orientation, an organized set of analytical tools (Huvila 2006), or an application of a material dimension (body of works), we can conclude that in this nature, literary warrant has an essential polyhedral value. In other words, it has the capability to exhibit different faces, facets and vertices, which could be integrated into a common figure with its own identity, considering approaches, purposes and utilities in the scientific discourse representation.

5.0 Literary warrant and other warrants

5.1. Warrants

At present, there is agreement on the fact that literary warrant is just one of the warrants that have to participate in the complex engineering process of building a conceptual structure, especially with regard to the selection of terms and the relationships between them. It is likely that a certain methodological insufficiency of literary warrant or the need to face systematic knowledge organization from other points of view caused the appearance of new autonomous warrant forms. Some of them have had significant attention from literature while others have not been studied in-depth and have only been sporadically quoted, and some others have been quite recently proposed and there is no perspective of their validation. Given that not all warrants have been submitted in a clear and exhaustive way, their analysis and interconnection has been limited up to the present. Table 1 shows a list of warrants in chronological order of proposition.

Hereafter, we submit a basic explanation of the warrants that have had a greater impact on the literature and their relationship with literary warrant, on the understanding that each of them will require additional historical and systematic studies. In 1986, Beghtol proposed grouping together literary warrant, scientific/philosophical warrant, educational warrant and cultural warrant under the generic expression of “semantic warrant,” since in all cases the problem is finally focused on the meanings and scopes assigned to every term.

5.2. User warrant

Lancaster (1977, 9) made a distinction between literary warrant and user warrant and considered the latter to be more significant, because “the maker of a controlled vocabulary must know a considerable amount about the potential users of his system and about the types of requests they are likely to make.” The oldest predecessor of user warrant was Cutter’s (1876, 69) principle of “common us-

Type of warrant	Author and year	Comments
“Common usage”	Cutter 1876, 69	
Literary warrant	Hulme 1911	
Scientific/philosophical & educational warrant (consensus)	Bliss, 1929	
Cultural warrant	Lee 1976	
User warrant	Lancaster, 1977	
Logical warrant	Fraser 1978	
Request oriented warrant	Soergel 1985, 230	Maybe a type of user warrant
Semantic warrant	Beghtol 1986	Generic name given to literary, cultural, user and scientific/philosophical & educational warrant
Phenomenological warrant	Ward 2000	
Ethical warrant	Beghtol 2002	Related with cultural warrant
Structural warrant	Svenonius 2003	
Gender warrant	Olson and Ward 2003	Maybe a type of cultural warrant
Academic warrant (also named scholarly warrant)	Sachs and Smiraglia, 2004	Similar to scientific/philosophical and educational warrant
Organizational warrant	National Information Standards Organization 2005	
Autopoietic warrant	Mai 2011	Based on Rafferty and Hilderley, 2007. Maybe a type of user warrant
Textual warrant	Tennis, Thornton and Filer 2012	
Market warrant	Martínez Ávila 2013	
Indigenous warrant	Doyle 2013	A type of cultural warrant
Genre warrant	Andersen 2015	A type of cultural warrant
Epistemic warrant	Budd & Martínez Ávila 2016; Martínez-Ávila and Budd 2017	
Policy warrant (corresponding to policy based indexing)	Hjørland 2017, http://www.isko.org/cyclo/subject#2.4	A type of cultural warrant?

Table 1. Types of warrant.

age,” placed by this author as “the supreme arbiter” for “the choice of names and subjects.”

More recently, in digital environments, folksonomies are the result of free tagging content on collaborative information services. In this context, user warrant was built on the idea that the terms selection process must be associated to the social classifications (Morrison 2008; Mai 2011). “The collective and self-motivated approach of social tagging offers novel opportunities to users, including flexibility with information organization, enhanced findability, and serendipitous browsing with respect to information activities” (Kim, Decker and Breslin 2010, 60). On the other hand, the American Standard (National Information Standards Organization 2010, 6) suggests the use of the number of occurrences of several synonyms in free text information searches to distinguish preferred terms from non-preferred, as it has already been said.

5.3 Cultural warrant

Lee coined the term “cultural warrant” in 1976, since it seems common sense to take it into account that individuals pertaining to different cultures have different information needs and different ways of interpretation of established knowledge. In fact, a great amount of applied research has local references and there are information segments that are only relevant in a given geographic (and therefore cultural) space and not in another one; this is true for music, social uses and habits or law, which has a particular configuration for each state, country, region or county, depending on the culture and social traditions of each place. Cultural warrant guides literary warrant towards local forms of knowledge organization. Several authors (Grolier 1976; González Casanova 1996; Beghtol 2002) see that classification systems are historically and culturally conditioned and reflect the social, political and religious conditions of their respective times, although this appreciation is not always seen as an advantage but rather as an obstacle to the universality of their schemes. Due to this reason, some classification schemes strongly influenced by the values of a culture can partially or totally exclude those of others. These exclusions raise the need “to integrate knowledge across cultural, geographic and linguistic boundaries” (Beghtol 2002, 45), if we intend to use indexing languages with the same profit in different places, times and contexts.

This principle should also contribute to avoid forms of discriminatory, sexist or pejorative language in the selection and formalization of indexing terms, adopting an ethical attitude and a policy of citizenship construction; information professionals cannot ignore this (Guimarães and Pinho 2007). In this sense, cultural warrant leads literary warrant towards socially acceptable or politically correct forms of terminology, thus avoiding an unequal treatment

of people due to their religion, race or personal condition. At the same time, other authors talk about a deliberate trend in KOS to favor the cultural perspectives of minorities or specific communities of users and this may not only be acceptable but also desirable in some contexts (Beghtol 2002; Barité and Colombo 2013; Hjørland 2016). In the words of Hjørland, when he writes about policy-oriented indexing, in this case “the subjectivity of indexers should be an ideal (but not any form of subjectivity, of course, just a subjectivity developed to consider a specific perspective).”

5.4 Academic warrant

Experts’ opinion, also called “academic warrant” (Sachs and Smiraglia 2004), is especially valuable since it assesses the solutions found from the perspective of specialists who are in turn qualified users of information systems. Hoerman and Furniss note (2000, 44) that “in fact, the use of literary warrant is de facto consultation with subject experts; if the terms used in the documents are used for the subjects and the authors of the documents are assumed to be expert over that which they write, then expert opinion is reflected in literary warrant.” This idea may be debatable insofar as there may be experts using terminology either little set or recognized, repeatedly used by small groups of researchers, without a wide recognition by their peers, as mentioned *ut supra*.

5.5 Organizational warrant

Finally, there has been an increase of references in literature to controlled vocabularies built to meet the communication and information exchange needs between persons working in large organizations or corporations. These vocabularies developed *ad hoc* could improve efficiency at work and fulfill corporative goals. A usual problem is that the organization or corporation creates a particular sub-language, including terms of their own or with a conceptual content different from the usual one and, therefore, they require controlled tailored tools. The works on corporative taxonomies, ontologies and thesauri (Nielsen and Eslau 2002; Gilchrist 2003; Van Der Walt 2004, among others) are an example of this trend. The evidence of this problem led the American standard to include the “organizational warrant,” which identifies “the form or forms of terms that are preferred by the organization or organizations that will use the controlled vocabulary” (National Information Standards Organization 2010, 16).

5.6 Between warrants

If we take into account the variety of warrants and sub-warrants that have been proposed by several authors in

over a century, it is legitimate to wonder if literary warrant is opposed to other kinds of warrants, if they are just different operationalizations of literary warrant or if the diversification of the original principle requires a vision integrating all the warrants. We also can wonder if all warrants or some of them can be combined to obtain a higher quality in terminology or if it is more convenient to select one warrant for a certain type of KOS in order to ensure consistency and uniformity of the vocabulary used. Huvila states (2009, 5) some of these concerns when he points out that “the various warrants raise an immediate question on their respective interrelations and how it might be possible to found a single KOS scheme on multiple warrants. Combining the different warrants is not straightforward.” He adds (2008, 5) that Svanberg (1996) “points out, however, that the diverging warrants may be used to complement each other. Besides complementing each other, warrants may be contrary to each other.” Aitchison, Gilchrist and Bawden (2000) go in the direction of an inclusive look, when they say that not only the selection of reference sources and current literature can contribute to the selection of terminology but also the checking of searches in the information system, individual experience and the knowledge provided by users as well as indexers. In this same line, Tennis (2005) states that today “warrant is based on literature, users, scholarly opinion and is culturally biased.” The exploration of new reliable methodologies is required for the combination of these warrants, according to the idea that “they may function both as analytical tools and as a framework for design,” even if two warrants “might even be contrary to each other” (Huvila 2006, 78). Even though a descriptive analysis could lead to consider that some warrants are opposed to others, or that they appear to lead a parallel life without influencing each other, from a perspective of methodological intervention it may be right to take the direction of complementing the approaches and methods, to better serve the information needs in complex societies, as the ones in which we are living.

For Bullard (2017, 77) “the various warrants available to classification designers represent contradictory positions in classification theory yet they compete and are combined by classification designers in daily practice.” After reviewing the positions of literary, scientific, user and ethical warrant and discussing the possible compatibilities and incompatibilities between them, she concludes that “inevitable compromises of daily classification work” demand “the interaction between warrants” (87).

Huvila takes up the concept of hospitality as it was presented by Beghtol (2002) to address the issue of the coexistence of the warrants, and says that “hospitality refers to the ability of a KOS to incorporate new concepts and to found new semantic and syntactic relationships between

the existing and the new structures,” because “in a slightly broader sense of meaning, the concept of hospitality may be used to denote an ability to incorporate both intra and inter warrant differences i.e. eventual changes within and between individual warrants” (Huvila 2006, 60). Certainly, the greatest effort classificationists can make to ensure uniformity and consistency in the terminology they decide to include in classifications implies—among other decisions—the selection of one and just one type of warrant, the one which is more appropriate for the terminological representation of a domain, something that is reasonable for the selection of terms as well as for the relations existing between them. However, nothing prevents the combination of various warrants, in a balanced and rational way, should this contribute to a more adequate representation of knowledge with regard to a context and a particular community of users. In the second case, the Gordian knot that has to be cut is mainly of methodological nature; it seems that, beyond classificationists’ intuitive approach, the definition of the protocols of the most adequate methods for the combination of warrants is still an outstanding debt of KO.

6.0 Conclusions

Beghtol (1986, 110) defines warrant as “the authority a classificationist invokes first to justify and subsequently to verify decisions.” Taken in its broadest possible meaning, “warrant” is, therefore, what makes a KOS the opposite of arbitrary or non-professional. Given this broad meaning, any serious approach to KO applies, implicitly or explicitly some kinds of warrant, either empirical, logical, historical or pragmatic/political.

Hulme installed literary warrant in the notional system of KO, and incorporated, surreptitiously as well as firmly, a notion of warrant as a rationale element of subject headings validity in KOS. What Hulme established in 1911 was an approach based on empirical (statistical?) studies of literatures. This corresponds well with his establishing of the term “statistical bibliography” (today bibliometrics). One of the most important contributions of Hulme’s concept is that it kept the focus on the literature to be indexed, classified, represented in libraries (and today information systems more generally). Many people in LIS have turned to the study of users or abstract cognitive systems as an alternative to the study of documents and literatures. However, the study of literatures remains important, and the principle of “literary warrant” supports this insight.

The literary warrant concept could be considered relevant for at least three reasons: 1) Hulme dared the traditional justification of classification terms, based on the authority of philosophers or scientific organization thinkers (like Bacon or Leibniz), or on scientific consensus (as it

happens with the Cutter Expansive Classification), or on the authority of the same nineteenth century classificationists (Brunet and their classification for Parisian booksellers, Brown and others); 2) He shifted the axis from the authority of classificationists and specialists—always contaminated by subjectivity or social mentalities—to the authority of knowledge, as it is registered in documents and socialized; and, 3) Hulme also proposed a quantitative approach to the management of documentation in libraries and in other information contexts. That said, the next problem is how documents and literatures are to be considered in LIS? Hulme's suggestion was explicitly addressed against "philosophical" classifications such as the periodical system of chemistry and physics. However, the periodical system is not just a speculative system but a scientific triumph. It is not just empiricist or rationalist, but the product of a long scientific development supported both empirically and theoretically (but still partly open). Hulme's principle may be interpreted more or less extremely. A less extreme interpretation is that empirical occurrences of literature can be combined with theoretical classifications such as the periodical system, as is done, for example in the UDC and in the MEDLINE databases. Empiricism can never be used in a pure form, because the way we select the sources for our empirical studies and the way we see the world is always influenced by our subjectivity and cultural background. Therefore, our position today is the acknowledgement of empirical, rational, historical and pragmatic/political elements establishing warrant for our KOS. Because the historical and pragmatic/critical elements have been underrepresented in the history of KO, the need is in particular for their integration. Hulme's view is important (and in accordance with the growing tendency towards bibliometrical studies), but it should be recognized that there always will be a tension between different epistemological positions and that a pure empiricist position is an illusion.

Although literary warrant is frequently mentioned in literature and KOS so widely used as *DDC*, *LCC* or *LCSH* use it as a guiding principle in the revision of their schemes, there still are few systematic papers focused on its problem areas. One of the consequences of the lack of sufficient critical studies on literary warrant is that nowadays we have more questions than answers on its nature, uses and its Promethean way of adapting to a digital environment and surviving in a subject, technological and concept environment diametrically different to the one prevailing in the twentieth century.

It has been shown that the literary warrant could be insufficient—in certain contexts or situations—to serve as the only support to a methodology for the construction of conceptual structures. The literature review carried out shows that it still is an open concept, in full evolution, but

it has been necessary to include other warrants to improve the quality of classification systems, controlled vocabularies and other languages. Not less than other twenty forms of literary warrant have been submitted up to the present, thirteen of them in the last twenty years. This could be interpreted as a recognition of the contribution as well as the limitations of Hulme's original concept. It could also express a certain academic anxiety to look for complete solutions that might only be tentative answers. In the KO field, as well as in other subject areas such as terminology and the various forms of knowledge representation that work with concepts as tools, there may be no place for the certainty level of exact sciences.

Nevertheless, it is possible to predict that the principle will be increasingly used in digital environments and other information contexts, even outside the LIS field, with similar objectives and intentions. Its scope of application increases insofar as it can support the development of new concept structures such as taxonomies, ontologies or concepts and topic maps and it can warrant the terms to be included in specialized dictionaries or glossaries.

There are two contradictory trends in KO that have an impact on the foundation of literary warrant: one tending to the construction of universal languages, which can be employed at any time in any place in accordance with the globalization of the information sources and channels and based upon the existence of knowledge with allegedly universal value; the other one aims at the construction of KOS of local value (for instance, corporative taxonomies and thesauri, or thematic ontologies) facilitating the communication and efficiency of a more or less closed group of users. The classifications with local value can express the wide scope of applied social research, knowledge produced by a corporation or the capacity of a users' community to generate valid knowledge in a given place and time or valid at different levels (for example specialists and ordinary people). Must literary warrant reconcile such diverse modalities of knowledge production and manifestation? Or should there be different expressions of literary warrant along with other warrants taking into account such a diverse reality?

In any case, it is important to underline that literary warrant has to express a dynamic vision of knowledge development. As such, it has to contribute to the permanent update and assessment process of the terminology of controlled vocabularies, following criteria of quality and adjustment to experts' consensus and users' needs.

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