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Webs of "Wirkung": modelling the interconnectedness of classification schemes

Abstract

This paper explores relationships between different classification schemes. It suggests how these relationships could be considered part of the reception of a scheme, in particular as an aspect of its "Wirkung". Both intra-domain and inter-domain scheme relationships are examined, and are combined with pre-existing research on intra-scheme relationships. A model is posited which maps inter-scheme relationships, showing some of the complexities evoked in analysing the connections between classification schemes. Musical instrument (organology) classification is used as examples throughout the paper, to illustrate the ideas being discussed.

1. Introduction

Classification schemes rarely exist in a vacuum; for instance, they cannot escape the shadow of other schemes which arrange the same knowledge, nor separate themselves entirely from general trends in knowledge organisation.[1] This paper explores how seemingly discrete classification schemes can be interrelated, and is a study of the nature of inter-scheme relationships. The relationship between one scheme and another can be considered as part of the "Wirkung" (effect) of the original scheme – applying terminology and ideas from reception theories to knowledge organization. "Wirkung" is part of the reception of an artwork (Holub, 1984, xii), and in this context describes how one classification scheme influences another.[2] However, this paper will demonstrate that connections between classification schemes are not just restricted to binary form; there are whole sequences of connections between classification schemes, which could be described as a web of "Wirkungs".

This paper draws upon examples of musical instrument classification; the reason for using musical instruments is that these examples are readily available through the author's doctoral research, and they suitably illustrate the theoretical points in question. It should be emphasised that the examples of schemes and relationships used in this paper merely illustrate the points being made, rather than prove them; hence, the resulting model of scheme relationships contains only suggestions rather than facts.

First, the paper considers how we know that two classification schemes have a relationship. The next two sections look at relationships between classification schemes in the same domain (intra-domain relationships) and between classification schemes in different domains (inter-domain relationships), using the domains of organology (the study of musical instruments) and information science.[3] Next, attention is turned to considering how inter-scheme relationships coalesce with existing theories about intra-scheme relationships and versions of schemes. Then, ideas posited in the paper are constructed as a prototype model, showing some of the issues and

[1] The author wishes to thank Prof. David Bawden and Dr Julian Gilbey for their ideas and advice.

[2] The author is currently working on a paper which applies reception theories to classification schemes, as part of her doctoral studies.

[3] For the purposes of this paper, the terms "information science" and "bibliographic schemes" have been used almost interchangeably.

complexities in contemplating the connections between classification schemes – though, this model is very much a work-in-progress. This is followed by a final thought about how studying the connections between classification schemes can demonstrate their meaning and significance.

2. Constructing the classification scheme connection

Establishing whether two classification schemes are connected to each other is an important precursor to analysing any relationship between them. This task is far from simple, and covers a number of ontological issues. It could be argued that the knowledge that two schemes are connected is based around two different criteria: whether the connection is implicit or explicit; whether the evidence for the connection is based on primary or secondary sources. Explicit knowledge that a classification scheme is connected to another would usually be found in writings by the author of that scheme, such as a scheme's introduction or article about their scheme.[4] Conversely, a classificationist analysing two different schemes and ascertaining that the similarities are best explained by a relationship between the two schemes, is an example of an implicit connection. Naturally, the most concrete of connections are where one scheme explicitly acknowledges the use of another, rather than relying on the inference and proof evoked by an implicit connection. Where the classificationist finds an implicit or explicit connection between two schemes by analysing the schemes or authorial writings themselves, this could be considered "primary"; relying on another classificationists' account of the connections could be considered "secondary".

So, four perspectives on classification scheme connections are proposed: explicit/primary, implicit/primary, explicit/primary and implicit/secondary. This paper makes use of most of these different perspectives; each example of classification scheme connection given in the paper has been judged by the author to have at least one of these different perspectives. However, space does not permit any discussion of details about which examples are using which type of perspective.

When an implicit connection is present, another question must be asked. If two schemes demonstrate a resemblance to each other, it is important to consider whether the resemblance is caused by one scheme influencing another or whether both schemes are simply reflecting the arrangement of knowledge in that discipline. Therefore, it is possible that two schemes are connected through knowledge alone, through the schemes or by connections between the knowledge and the schemes. The model proposed in this paper is concerned with the nature of scheme relationships; therefore, this paper makes an assumption that in all the examples selected, the schemes are at least to some degree connected, leaving the topic of connected knowledge/connected schemes for potential future research.

3. Keeping it in the domain: the intra-domain, inter-scheme relationship

[4] Note that the presence of an explicit connection between two schemes – for instance, where the introduction of one scheme specifically states that it is indebted to another – does not mean that the schemes themselves necessarily reflect that connection; sometimes, authors' intentions do not follow through in actions. Also, there are possible motives for an author to hide connections to an existing scheme; for instance, the example of Mahillon's scheme (Jairabhoy, 1990).

Analysing the connection between two schemes in the same domain is interesting, as it can map classification practices within that domain. A selection of types of relationships between classification systems are described briefly below, using examples from the organology domain. As much literature about organological classification explicitly discusses the relationships between schemes, this section makes a good use of the "secondary" perspective.

Within organology, the examples are drawn from a particular group of relationships, those between a specific organological scheme, the scheme created by Hornbostel and Sachs (H/S; 1914) and other exemplars of schemes. The reasons for selecting this particular type of relationship are as follows. H/S is pivotal to organological classification in the 20th and 21st centuries. This importance is evident from the literature in a number of ways; for instance the introduction to H/S is reprinted in the seminal music reference text, *The New Grove* (Wachsmann et al., 2013). As well as H/S proving central to organological taxonomy, theorists writing about other organological schemes or the development of organological taxonomy frequently compare schemes to H/S; hence, these accounts provide a useful set of examples of relationships which can be mined for the purposes of illustrating some of the potential types of intra-domain, inter-scheme relationships.

One type of relationship unearthed by this examination of organological classification is based around "extension"; for instance, Galpin added "electrophonic instruments" to the four main classes underpinning H/S, which later metamorphoses into "electrophones" in Hood's scheme (Wachsmann et al., 2013). There is also a type of relationship which is concerned with the separation between the intrinsic qualities of a classification scheme (for instance, structure, citation order) and more extrinsic qualities (for instance, notation, format); the relationships between old and new schemes could be labelled "is_written_in_new_format/notation_by". For instance, Hood's scheme uses the contents of H/S, but utilises a different type of notation, based on Labanotation (Hood, 1971). There is a type of relationship which is based around the notion of "fixing" the perceived problems inherent in the existing scheme, where the new scheme is created as a deliberate antithesis to the original one. This could be labelled a "reaction"; an example of this phenomenon is found in Sakuri's scheme. Dournon (1992, 252) suggests that Sakuri shows its disagreement with the fundamental structure of H/S by increasing the number of main classes from four to seven. The idea of one scheme being a reaction to another scheme draws deeply from the reception studies paradigm; scholarly criticism of a scheme, part of the "Rezeption" of a scheme, causes a new scheme to be created. Thus, classification schemes become an act of "Wirkung", as a direct result of the "Rezeption" of the original scheme.[5]

4. Crossing domains: introducing the inter-domain, inter-scheme relationship

Classification schemes from one domain can also have relationships with schemes from other domains. So, in this section, the singularly important H/S will be used as an

[5] As discussed, creating a new scheme is often a two-part process: finding fault with the status quo via criticism of existing schemes, and then attempting to create a solution to the problem by creating a new scheme which "solves" the perceived defect of the existing schemes. Kartomi (2000, 308) suggests that in the 1990s, after many schemes were created to countenance perceived errors in H/S, scholars started to realise that in the real world of actual instruments, a "perfect" classification scheme is no more than a mirage.

example from the organology domain, and its infiltration into various bibliographic classification schemes will be examined.

An analysis of the relationships between H/S and bibliographic schemes reveals that the relationships do not fit easily into the types described in section 3. Instead, the schemes in the information science domain seem to use *specific elements* of H/S; in other words, the relationship between schemes appears to act below the level of scheme-to-scheme relationship, at the level of a scheme's "properties". So, the following examples illustrate how some of the constituent parts of H/S are recycled in other schemes, and the interconnections between music and information science schemes. However, it is important to note that sometimes the property of the original scheme is only shared in part of the instrument schedules of the borrowing scheme.

Domain-specific schemes can be contributors to new terminology. For example, H/S created its own terminology for the main classes of instruments, which has proven invaluable for tracking H/S's influence on other schemes and the prolificacy of H/S's connections. For example, the original edition of Bliss (Bliss, 1953) and the 15th edition of Dewey Decimal Classification (DDC; Dewey, 1951) both include terminology from H/S; what is interesting about these particular examples is that the connection to H/S does not extend to structure, it is based on terminology alone.

One of the defining features of H/S (and before this, also in Mahillon's scheme) is that the first characteristic of division is based on how the sound of the instrument is produced (Hornbostel and Sachs, 1914); it is interesting to track how bibliographic schemes follow this primary structural element. For example, the 3rd edition of Universal Decimal Classification (UDC; British Standards Institution, 2006) uses the four main classes of H/S, albeit in a different order.

Notation is another "borrowable" property. Hornbostel and Sachs (1914) utilised DDC's notation principles, using a "European" version of DDC – the original /forerunner to UDC – in their scheme (Gnoli, 2006, 143). Interestingly, in this example it is H/S which borrows a property from another scheme, and becomes part of that scheme's "Wirkung", rather than vice versa. So, there is a connection between H/S and (a version of) DDC through the property of notation, which becomes even more complex when versions of classification schemes are introduced.[6] Other shared characteristics encountered when examining properties include, structure within classes and contents; alas, space does not permit further comment or examples.

5. Temporal connections: combining inter-scheme and intra-scheme relationships

Classification schemes themselves are not by nature stable entities; for instance, as time passes, a successful scheme might see new "versions" and "editions". We could label the relationship between one scheme and another version of the same scheme as an "intra-scheme relationship", and classification scholars have already provided much insight into these types of relationship.[7] While at first glance, intra-scheme relationships and issues concerning editions of schemes might seem irrelevant to the

[6] There is no space to discuss the exact connection between DDC and this early version of UDC. Instead, the assumption of a general "adaptation" relationship has been made.

[7] For instance, Žumer, et al. (2012) explore the relationships between specific editions of classification schemes and the collective of all possible editions of that scheme, using the FRBR model; Tennis (2010) discusses the idea of different versions or states of the same scheme, and "scheme versioning".

inter-scheme focus of this paper, inevitably questions about which "version" of a scheme is included in an inter-scheme relationship arise, and thus temporal, intra-scheme aspects become important.

An example of the conflation between intra-scheme and inter-scheme relationships can be seen in the interconnectedness of H/S and DDC. As discussed above, various editions of DDC have utilised elements of H/S, such as terminology (DDC15) and structure (Phoenix schedule; Dewey et al., 1980)[8]; therefore, there is a connection between H/S and DDC, which coexists with the connections between these various editions of DDC. Furthermore, H/S was itself influenced by DDC, through the element of notation – see section 4. Therefore, we have a web of connections between these two schemes (or families of schemes): an early version of DDC influences H/S; H/S then influences DDC15 and the DDC Phoenix schedule. However, it could be argued that there is also a potential intra-scheme relationships between UDC1 and DDC, and DDC15 and DDC Phoenix schedule are to some degree reactions to earlier editions of DDC. This analysis suggests that time is an important element, as the temporal frame is necessary to understand how one scheme (DDC) can be influenced by another scheme (H/S) which itself was influenced by the original scheme (DDC), without creating a paradox. Indeed, the web of classification schemes can prove very elaborate.

6. A model of interconnected classification schemes

The discussion and examples above have illustrated the variety and depth of connections between classification schemes. Though by no means any sort of representative sample, the examples of musical instrument classifications suggested that there were two main types of connections. These can be superimposed into a quasi-entity-relationship framework, where the classification schemes are considered as entities. So, one type of relationship connects one entity with another, and is shown in figure 1. Another type of connection exists between properties of the classification schemes, rather than between the classification schemes themselves – see figure 2. In some cases, the property is only shared by part of the instrument schedules in the subsequent scheme, hence the label "is_partially_used_by". There is a question about the relationship between both sets of connections; it is interesting, and needs further research. The frameworks appear to be linked to some degree, but as it is possible to describe the presence of linked properties at entity level using the relationship type "lends_its_properties_to" (see figure 1), this suggests they are not mutually exclusive.[9]

The next stage is to consider how some of the examples in sections 3 to 5 can be used to to demonstrate the model in action. For example, it is possible to model the connections between H/S and UDC (3rd edition). If this was represented pictorially, only the properties which are shared would be indicated: main class structure and terminology. Therefore, if connections between a series of different schemes were

[8] In this paper, "Phoenix schedule" is used to note the *music* Phoenix schedule, while acknowledging that Phoenix schedules for other subjects were also created.

[9] It is interesting to note that, though by no means any sort of representative sample, the examples of musical instrument classification in sections 2 and 3 suggest that the intra-domain connection is more likely to be between entities, whereas the inter-domain connection is more likely to be reliant on properties of the entity. Therefore, while the model does not differentiate between intra-domain and inter-domain divisions, this potential trend is worthy of exploration in future research.

mapped, it would be possible to see how many and which properties were shared for different pairs of schemes; this in turn would enable useful analysis of the population of schemes for specific subect areas.

The final example incorporates a number of different factors; it plots (some of) the relationships between H/S and various editions of DDC – see figure 3.[10] As discussed above, this is a complex example which is not only inter-domain, but also involves some intra-scheme relationships. Differentiating between planes now become important. Different versions of the same scheme (intra-scheme) are positioned within the same horizonal plane, and so "scheme versioning" (Tennis, 2010) takes place along the vertical axis. This example demonstrates how the model can successfully show relationships between more than two entities, and can be used to transverse different versions, schemes and domains. The resulting map of connections is complex. It shows how one particular property of a scheme, such as terminology, might get recycled a number of times. It also shows how the effect of an individual scheme can resonate through a series of other schemes, or in other words, create a chain of "Wirkungs".

7. A thought about intangible connections and the reception of schemes

Hitherto, this paper has focused on tangible connections between classification schemes – for instance, terminology or notation. However, there are also "intangible connections", where an idea such as the reputation or purpose of a classification scheme are utilised by another. Studying the relationship between two schemes, brings insights into the original scheme, especially its reception; or, the act of "borrowing" illuminates both the "borrower" and the "borrowed". Thus, studying the connections between classification schemes enhances understanding of what the schemes signify.

An example of this phenomenon is taken from H/S and DDC. The Phoenix authors explicitly discuss adopting elements from H/S, alongside their statement that the Phoenix schedule aims to have a "value-free basis" (Dewey et al., 1980, xxii).[11] This reflects on the Phoenix schedule, but also attaches meaning to H/S. The authors' writings infer that H/S is viewed as the model of a culture-neutral scheme, and by being described and used in this way, this "essence" of cultural neutrality attached to H/S exists even in separation from the original scheme, even beyond the boundaries of organology and into another domain. So, while an analysis of H/S alone would reveal that it *is* culture-neutral (to a large degree), analysing the connections between H/S and other schemes is useful because it reveals that H/S is (also) *received as* culture-neutral.

8. Concluding thoughts

Examining the relationships between classification schemes has revealed some interesting insights. It appears that relationships can be described using a scheme-to-scheme model or property-to-property model. These connections can prove complex,

[10] Some relationships, especially those related only by proxy to H/S or DDC have been omitted, such as Mahillon's alleged basis in various Indian classification schemes (see for instance, Jairazbhoy, 1990) and subsequent editions of UDC. "DDC1+" represents all the early editions of DDC which influenced UDC1.

[11] The practical intention was to make it easier to classify concepts of non-Western instruments in DDC, which Clews (co-author of scheme) suggests was usually a problem in music classifications (Clews, 1975, 7).

especially once older versions of schemes and intra-scheme relationships are also taken into account. This model is just the first step towards mapping scheme relationships, and there appears to be potential for much extension, re-working and adding nuance to this basic structure. Future research could include applying this type of analysis to other types of KOS; in addition, there is potential in exploring the links between scheme relationship analysis and theories of "intertextuality". Overall, this paper demonstrates that studying the influence of one scheme on another not only unlocks interesting information about the specific schemes in question, but asks ontological questions about the nature of classification schemes more generally. It also illustrates the correlations between scheme inter-connectedness and reception. Classification schemes appear to live in a dense web of "Wirkungs".

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Figure 1. Classification scheme connections as scheme-to-scheme relationships

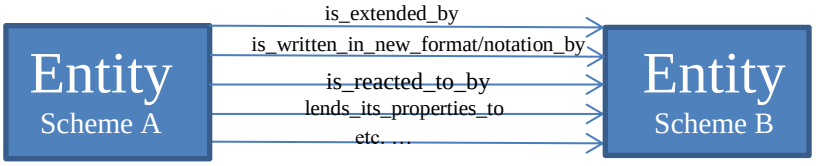

Figure 2. Classification scheme connections as property-to-property relationships

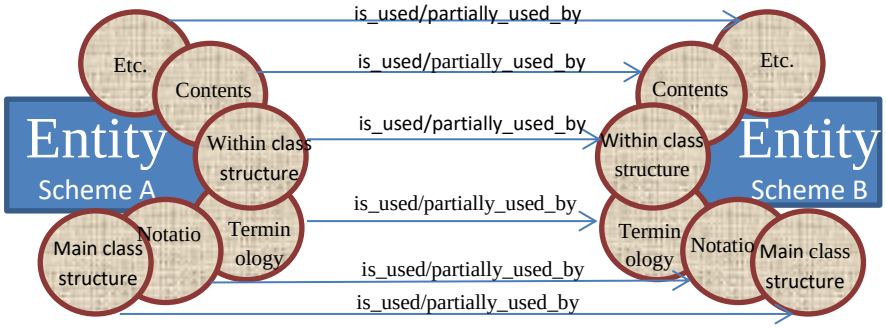

Figure 3. A selection of connections between H/S and DDC