Classificatory Structure and the Evaluation of Document Classifications. The Case of Constitutive Classification

Abstract
Some scholars argue that certain classificatory structures possess inherent social-semantic values and that the desirability (or lack thereof) of these values should form a basis for evaluating the classificatory goodness of such structures. Others hold that it is possible to distinguish between the structural properties of a given classificatory structure and the semantic content (and values) of the classification in which it is used, and that the classificatory goodness of a given structural form is best evaluated by its capacity to support effectively the organization of resources in a given context. This paper illustrates the second, “functionalist” position by means of a historical case study examining the contrasting evaluations of a single structural form - namely, the flat (a)hierarchical structure known as constitutive classification - by two early pioneers of knowledge organization, Julius Otto Kaiser and James Duff Brown. Both men knew of the use of constitutive classification for the organization of documents and were aware of its affordances, yet formed highly different opinions of it: Kaiser, a special librarian who sought to classify documents by documentary form in business offices and business libraries, endorsed it, while Brown, a public librarian concerned with subject-based classification of books, rejected it. In both cases, it was the functional capacity (or lack thereof) of constitutive classification to enable an adequate classification of documents with respect to a given semantic content and in a certain context that determined the evaluation of its structural form. This example suggests that structural form is analytically separable from semantic context and social context and that it is its functional alignment with the latter, rather than any supposedly inherent socio-semantic values, that has, in the past, served as a norm for evaluating the goodness of classificatory structures.

Introduction
In recent years, some researchers within the field of knowledge organization (KO) have argued that the structural properties of certain classificatory schemata are ineluctably related to social-semantic values. Thus, for example, the hierarchical genus-species relationship as such has been proclaimed to be inherently limiting and oppressive (Olson 1999, 71); by the same token, the “broader-narrower” and “superclass-subclass” relationships characteristic of taxonomic structure has been characterized as equivalent to “dominant-dominated relations” (Keshet, 2011, 147, 149-150). Such a view, as one commentator has observed (Tennis, 2012, 394-395), presupposes that there is no solution of continuity between the structural aspects of classification and the semantic content thereof: in other words, classificatory structure and semantic content are so inextricably interwoven that they are, for all intents and purposes, inseparable. From this, it follows that certain forms of classificatory structure are to be evaluated by the kinds of semantic relationships that their structural properties manifest and the values that these properties embody: structures whose properties support semantic relationships deemed to express socially undesirable values are to be critiqued, condemned, and their use is to be discouraged (Olson, 1999, 71).

Other scholars, however, have taken a different position, at least with respect to bibliographical classifications. They agree that, in such classifications, structure and semantics interact with one another in various ways: however, they also maintain that, in many cases, it is possible to separate out the semantic content of a classification (and the values that this bears) from its structural properties (Tennis, 2012, 395). An important con-sequence of this latter view for the evaluation of classifications is the notion that the good-ness of a given classificatory structure in a given context is
defined not by any semantic properties of its structural features (and any concomitant values imputed to these) but rather by the kind of organization of bibliographical resources that it allows a classifier to carry out (pp. 394, 396). To put this in more prescriptive language, the appropriateness of a given structural form is to be judged by the pragmatic criterion of how well it enables a classification to fulfill its function of ordering documentary materials in light of the particular purpose for which it has been designed and the context in which it is to be deployed.

This second, “functionalist” account of classificatory structures, then, posits a distinction between structural form and content. This entails that, taken by itself, the structural form of a given classificatory structure is value-neutral: it is neither inherently good or bad in se, but can be evaluated only in relation to the particular universes of concepts to which it is applied and in light of the particular contexts in which it is used. An important corollary of this is that a given classificatory structure may be evaluated in different ways in different classificatory contexts: in other words, the judgments of goodness or badness passed on it may vary in accordance with differences in both the semantic content of the classifications in which it is used and the contexts of use for which these classifications are constructed. The purpose of this paper is to provide some empirical grounding in support of this contention - and, thereby, in support of the functionalist understanding of classificatory structures as a whole - by means of a case study that examines the contrasting evaluations of a single kind of classificatory structure - the constitutive classification - by two early pioneers of modern knowledge organization who came from quite different professional backgrounds.

**Constitutive Classification**

Let us begin by clarifying what a constitutive classification is. Within the domain of document classification, this form of classification distinguished from other kinds by the extreme simplicity of its structure. As defined in the literature of knowledge organization, “a constitutive structure consists of a set of classes that may or may not be hierarchical but which, when viewed as a whole, comprise the totality of a given universe without establishing nested relationships based upon the inheritance of superordinate characteristics” (Jacob, Mostafa, & Quiroga, 1997, 81 [emphasis theirs]). The stipulation that a constitutive classification does not involve nested relationships rooted in the inheritance of superordinate characteristics entails the absence of any hierarchical genus-species relation-ships among its component classes. This, in turn, implies that “a constitutive classificatory scheme may exist as a flat structure comprised of a set of coordinate classes that, in association, represent the totality of a particular universe without establishing any further relationships between the constituent classes” (Jacob, Mostafa, & Quiroga, 1997, 81). If one takes the universe in question to be a collection of documents, then a constitutive classification takes the form of a series of a few broad main classes, each of which comprises a series of documents arranged in sequence in accordance with some conventional order, be this the alphabetical order of the authors’ names, the numerical order of accession numbers, or some other such syntactic mechanism. The structural lineaments of such a classification are schematically represented in Figure 1 below.
Figure 1: A Schematic Model of a Constitutive Classification of Documents

James Duff Brown, Julius Otto Kaiser, and Constitutive Classification

Today, constitutive classifications are considered to be a limiting case of classification as such and, accordingly, are regarded as a fairly primitive method of organizing documents (e.g., Gnoli, 2008, 118-119; Jacob, 2004, 531-532). However, in the late 19th and early 20th centuries, such classifications were frequently employed for the physical organization of documents in two different spheres: public libraries in Great Britain and business offices throughout the anglophone world. Their use in these contexts is reflected in the writings of two men who are today acknowledged as important pioneers of knowledge organization, James Duff Brown (1862-1914) and Julius Otto Kaiser (1868-1927).

Brown was a prominent figure in British public librarianship in the last decade of the 19th, and the first decade-and-a-half of the 20th, century. Best known today among students of knowledge organization for his innovative Subject Classification (Beghtol, 2004), he was also the primary catalyst in bringing about, on the British scene, the transition from closed-access public libraries, in which the shelves containing the circulating collection were accessible only to the members of the library staff, who retrieved books from them on the basis of requests made from the catalog by the library patrons, to open-access public libraries, in which members of the public had direct access to the library book-stacks (Black, Pepper, & Bagshaw, 2009, 211-240; Bowman, 2005, 143-144, 146). Kaiser, on the other hand, was a special librarian and indexing specialist who, between 1896 and 1927, worked at a number of commercial and technical libraries in both the United States of America and the United Kingdom (Sales, 2012, 49-54). Renowned today for devising the method of “systematic indexing”, arguably the first indexing system to be based completely on the analytico-synthetic approach characteristic of what would later come to be known as facet analysis (Sales, 2012, 15-17, 181-182; Svenonius, 2000, 6, 173-174), Kaiser (1908, §§ 10-11, 79-86; 1911, §§ 42-43) also outlined a method of physically organizing documents for use in a business office or a business library. Although Brown and Kaiser moved in distinct professional spheres - those of the public librarian and the special librarian (or office organizer), respectively - , each was aware of, and discussed in his writings, classifications whose structural form allows us to identify them as constitutive classifications. Let us consider briefly their descriptions of these classifications.

Writing in the late 1890s, Brown (1898, 15) observed that “[t]he form of shelf arrangement most used in English public libraries” was one in which “the library is broken up into six, eight, ten, or more broad classes or divisions”. These divisions typically represented broad departments of knowledge (e.g., “Theology and
Philosophy”, History and Biography”, “Law, Politics, Commerce, etc.”, and “Philology”) and literary forms or genres (e.g., “Fiction”, “Poetry and the Drama”, and “Juvenile Literature”). Under each of these classes, “the books [were] arranged in a separate series of progressive numbers in the accidental order of their accession” (p. 15). As regards notation, each broad class was assigned a capital letter - for example, “B” might designate “History and Biography”, “E”, “Arts and Sciences”; “F”, “Fiction”; “H”, “Poetry and the Drama”; and so on (p. 15) - , while each book within the class received a number indicating its place within the sequence of accession (p. 16). Accordingly, Brown dubbed this form of classification, which governed the arrangement of books on shelves (p. 23), as the “class-numerical” plan or system (pp. 16, 17), while contemporary British writers on library classification referred to it as “numerical in main classes” (Bowman, 2005, 144).

As for Kaiser, he advocated a method of classification for documentary materials that likewise featured “[t]he division of the materials into broad classes” (Kaiser, 1908, § 10, Point 1). However, unlike his counterparts in the public libraries, he proposed defining the broad classes in question in accordance with documentary form: examples of such classes include “correspondence, press cuttings, periodicals, books and pamphlets, trade catalogues” and so on (1908, § 79; cf. §10; 1911, §§ 42, 185). Notationally, each form class was assigned a capital letter that, insofar as it was the initial letter of the name of the class, had mnemonic value: for example, correspondence was denoted by “C”; trade catalogues, by “T”; and so on (1908, §§ 10, 75, 79). Within each of these form classes, documentary units entering into a collection were “numbered consecutively” (§ 81) and arranged in “numerical order” (§ 10, Point 2). The “call number” of a document thus consisted of the combination of its class letter and its number within the class: for example, “C1” indicated the earliest dossier of correspondence to enter into a correspondence file; “C2”, the second dossier to be incorporated therein; “C3”, the third; and so on (§§ 82, 366, s.v. “Call Number”). Such call numbers, in turn, corresponded to the physical arrangement of documents, for Kaiser recommended that a given collection be partitioned into a discrete series of files; each file represented a distinct documentary form and was subarranged by accession numbers of the documents falling into its purview (§§ 10, 14). This mode of “numerical classification” (§ 74), as Kaiser called it, also found favor among other contemporary authors writing on the design and use of card indexes in the business office (e.g., Byles, [1911], 10-11, 14-17; Mares, 1909, 74-75, 83, 85-90, 95, 97, 104-106).

From the foregoing descriptions, it is evident that both the “class-numerical” classification system described by Brown and the “numerical classification” set forth by Kaiser followed the basic structural template of constitutive classification. Yet it is no less apparent that these systems differed fundamentally in the universes to which they were applied, the semantic bases underwriting them, and the material contexts of organization in which they were used: the former featured subject- or genre-based classes by means of which books were arranged on shelves in public libraries, whereas the latter took documentary form as the basis for its classes and covered a very wide range of documentary materials, which were housed in vertical files as well as shelves within the business office and/or business library. Interestingly, Kaiser and Brown also formulated sharply divergent evaluations of numerically subarranged constitutive classifications, to a consideration of which we now turn.
Kaiser and Brown: Contrasting Evaluations of Constitutive Classification(s)

For his part, Kaiser was a thoroughgoing proponent of the form of constitutive classification that he discussed in his writings. In his view, it was “simple, easy to understand and easy to handle” (Kaiser, 1908, § 74). In particular, he made great claims for the numerical subarrangement of form classes, a feature of the classification to which he ascribed a number of virtues. From the perspective of document processing, it allowed the librarian of a business organization to deal efficiently with the incorporation of “a continuous daily supply” of new documents into a collection (1911, § 663, s.v. “Broad Classes”); it also conducted to “mathematical exactness” and “ensure[d] accuracy with the least trouble” in contexts where “large quantities” of documents were handled (1908, §§ 63, 74). As regards document retrieval, it had “the great advantage” that “the access to each number is direct” (§ 122): that is to say, items ranged in a progressive numerical series were, in principle, easily findable. By contrast, he argued, “elaborate library classifications”, such as Dewey’s Decimal Classification, were “either inapplicable or much too complicated and therefore unmanageable” (§ 74). “In all classified files”, he averred, “access is more or less trouble-some and takes time and care” (§ 122): moreover, the use of structurally elaborate classifications would involve “additional labour” on the part of librarian - a consideration that, in his view, could not be justified within a business context (1908, § 250, n. *; cf. 1911, § 663, s.v. “Broad Classes”). Ultimately, then, it was the simplicity of the document form-based constitutive classification and the efficiencies in time and labor associated with it that commended it in his eyes and made it ideal “for business purposes” (1908, §§ 74, 78).

Although Kaiser did concede that “numerical classification” had an “arbitrary character” (§ 74), he did not consider the fact that the semantic basis of the classification was documentary form rather than subject content of documents to be a stumbling block. The identification and representation of the latter he reserved primarily for systematic card indexes, in which information relating to the same subject would be collocated by means of strings of index terms that he called “statements” (Kaiser, 1908, §§ 77, 112, 366, s. v. “Indexes”; 1911, §§ 297, 301-303).

In stark contrast, Brown was a strong and vociferous opponent of the form of constitutive classification that he encountered in public libraries. He conceded that a class-numerical classification provided an efficient means by which books could be processed and shelved in a quasi-mechanical fashion (Brown, 1897, 146). To his mind, however, this efficiency in processing came at too great a cost. The use of accession sequence as the basis for the numerical ordering of books under a broad main class led to arbitrary collocations of books on various subjects on the shelf: as Brown mordantly observed, book number five in the class of “Arts and Sciences” “may be a treatise on botany, number six may be Ruskin’s Art of England, and number seven a book on coal mining” (Quinn & Brown, 1895, 75). At the same time, the breadth of the main classes employed in class-numerical classifications entailed that different books relating to the same subject would often be dispersed within the large number of books placed under a given main class: thus, as Brown (1898, 16) reported, in one contemporary public library “arranged on th[e] class-numerical plan, thirteen books on London are scattered over a large division of over four thousand volumes in this order: 617, 651, 931, 937, 949, 1125, 1188, 1209, 1333, 1457, 1463, 3735, 4026”. Similarly, books written by a single author might well be dispersed within the literary form classes of such a classification (p. 16; cf. 1897, 148). Recourse to catalogs that
collocated books by author or subject might mitigate some of this subject scatter, but only to a limited degree (1897, 147), with the result that any search for books on a given subject would place a great burden on the searcher (1898, p. 26). Brown (1897, 147–148) contended that, in closed-access public libraries, such an arrangement would impede the quality of subject-based retrieval by library assistants, who, he insinuated, might be inclined to cut corners in tracking down books on a given subject dispersed throughout the stacks. For this reason, Brown (1898) called for the abandonment of class-numerical classifications - which he derisively called “numerical finding aids” (p. 16) - in favor of hierarchical subject-based classifications: in his words, “it is … in the public interest that books should be so arranged as to be accessible for easy reference in minute sub-divisions under main classes” (p. 26). As for open-access libraries in which patrons could peruse the stacks for themselves, class-numerical classifications were simply out of the question, for they precluded any productive browsing: rather, as Brown put it, “public access and close [sci., hierarchically detailed - TMD] classification go hand in hand” (The Other Side of the Counter 1892, 303). Indeed, over the course of his career, Brown sought to put this dictum into practice, for he devised no fewer than three hierarchical classification schemes for use in open-access public libraries - the Quinn-Brown, the Adjustable, and the Subject Classifications (Brown, 1898, 97-159; 1906; Quinn & Brown, 1895; cf. Bowman, 2005, 146-149, 155-160).

Conclusion
As we have seen, Kaiser and Brown were familiar with document classifications in which a set of broad classes was directly subarranged by individual documentary units numbered in accordance with their order of accession: that is to say, both men were acquainted with the structural form of constitutive classification. Yet they drew diametrically opposite conclusions about the classificatory goodness of constitutive classifications for the physical organization of documents. Kaiser, who operated on the assumption that the classification of documents by their form was the best mode of classification for the milieu of the business office, fully embraced the structural form of constitutive classification, while Brown, in whose eyes the only appropriate kind of classification within the framework of the public library was one that was primarily subject-based and possessed reasonably well-articulated subclasses, rejected it outright.

Significantly, Kaiser’s and Brown’s differing evaluations of constitutive classification were not based on any social-semantic value imputed to its structural form but rather on whether the structural properties of this classificatory form enabled the kind of organization of documents that each man envisioned to be most appropriate for the particular social and material context within which he worked and its goodness of fit to the semantic bases from which they were operating. To be sure, Kaiser and Brown agreed that the structural form of numerical, or class-numerical, classifications possessed the property of simplicity and that, accordingly, it both made for easy physical arrangement of documents and, all things being equal, supported the ready location of numbered individual documents within a numerical series on a shelf (or in a file) (Brown, 1897, 146; 1898, 15; Kaiser, 1908, §§ 74, 122). Yet, despite this agreement regarding the affordances of constitutive classification, each brought different considerations to his evaluation of it.
For Kaiser, who believed that the classification of documents for physical arrangement was best disassociated from subject indication and who placed a high premium on ease and efficiency in storing, locating, and retrieving documents, the numerical classification best fulfilled the imperatives of “easiest access at the minimum cost of time and labour” (Kaiser, 1908, § 74): provided that such a classification was correlated with card indexes, it constituted, in his view, the optimal mode of document classification for a business office and library housing many different types of documents. Brown (1897, 146-147), on the other hand, believed that whatever advantages the structural form of class-numerical classification might bring in terms of efficiencies in filing and retrieving individual books were more than offset by its incapacity to support the collocation of books on the same subject within a broad class and so to foster efficient shelf browsing: this incapacity, in his estimation, vitiated constitutive classification as a viable classificatory structure for use in public libraries. Yet, if Kaiser and Brown held divergent opinions regarding the value of constitutive classification, both of them, ultimately, based their respective judgments of this mode of classification not on the basis of any supposed semantic feature of its structural form but on its appositeness for fulfilling the functions that they believed a classification for the physical organization of documents should possess within the institutional contexts with which they were concerned.

References


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