

# One Domain Divided in Twain: Ontological Perspectives of Design Expressed via Classification

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## Epistemological and Ontological Perspectives on Design

Design is a complex domain with historically competing views regarding its status. Early scholarship in design focused on ideas of decoration and aesthetics. Design has been correlated with art since the time of Plato, leaving us to use art-based lenses and approaches to examine design even as we came to better understand it as a unique discipline.<sup>1</sup> With the advent of modernity and mass production, design studies began to encompass more than just aesthetic choices. Conway notes that design studies are commonly misconstrued as the study of aesthetics of various historical periods and associated styles, when in reality design is concerned with everything from production processes, forms and materials, and even marketing, advertising, packaging, and sales of design products.<sup>2</sup> Raizman notes the modern turn of design as a visible expression of values and investigates how such meanings emerged from studies based in various epistemological bases, including but not limited to art history, technology, politics, economics, and consumer behavior.<sup>3</sup>

Another turn in design scholarship in the 1960s began to explore the idea of design as a separate discipline, distinct from art. Although influenced by the aforementioned epistemological perspectives, scholars began to distinguish design as a disciplinary field with a unique epistemological perspective. One of the first to examine design itself in a rigorous way, Simon described design as “a science of the artificial,” a distinct field with the goal of creating artifacts to solve problems.<sup>4</sup> Although Simon differentiated design from pure science, he and other contemporary scholars conceptualized design in a scientific way, positing design as a rational and systematic multistage linear progression with variations of the following stages: (1) analysis, (2) synthesis, (3) evaluation.<sup>5</sup> Tasks like compiling exhaustive lists of requirements,<sup>6</sup> identifying goals and constraints,<sup>7</sup> and hierarchical decomposition<sup>8</sup> were primitive attempts to define and scope design problems. This was the common understanding of design at the time.

- 1 Tsion Avital, *The Confusion between Art and Design: Brain-Tools versus Body-Tools* (Delaware: Vernon Press, 2017).
- 2 Hazel Conway, ed., *Design History: A Student's Handbook* (London: Allen & Unwin, 1987), 4.
- 3 David Seth Raizman, *History of Modern Design*, 2nd ed. (Upper Saddle River, NJ: Pearson Prentice Hall, 2011), 12.
- 4 Herbert A. Simon, *The Sciences of the Artificial* (Cambridge, MA: MIT Press, 1969), 59.
- 5 J. Christopher Jones, “A Method of Systematic Design,” in *Conference on Design Methods*, eds. J. C. Jones and D. Thornley (Oxford: Pergamon Press, 1963); L. B. Archer, *Systematic Method for Designers* (London: Council of Industrial Design, 1965); John Luckman, “An Approach to the Management of Design,” *Operational Research Quarterly* 18, no. 4 (1967): 345–58; John C. Thomas and John M. Carroll, “The Psychological Study of Design,” *Design Studies* 1, no. 1 (July 1, 1979): 5–11.
- 6 Christopher Alexander, “The Determination of Components for an Indian Village,” in *Conference on Design Methods*, eds. J. C. Jones and D. Thornley (Oxford: Pergamon Press, 1963).
- 7 Archer, *Systematic Method*.
- 8 Simon, *The Sciences of the Artificial*.

However, it quickly became evident early in this area of research that design could not be reduced so simply. For instance, Darke found ethnographic evidence refuting the idea that designers identify constraints in a formalized way.<sup>9</sup> Other notable scholars refuted the scientific conceptualization of design, such as Schön, who conceptualized design as a reflective practice-based field rather than a scientific one.<sup>10</sup> Contemporary conceptualizations of design distinguish it as a unique epistemology, distinct from art and science, with different methodologies and techniques of practice.<sup>11</sup>

### Expressing Epistemological and Ontological Perspectives via Classification

Epistemological and ontological perspectives on design have changed dramatically in the past century. Yet classification systems—lists of classes arranged according to a set of pre-established principles into groups based on their similarities and differences<sup>12</sup>—do not always reflect this evolution. Classification systems are traditionally considered functional products that enable location and placement of physical documents or resources so that they may be accessed and retrieved for use. However, these systems are themselves design artifacts and as such communicate epistemological and ontological perspectives intentionally and unintentionally.<sup>13</sup>

Historically, philosophers such as John Dewey recognized the variability of classification: “cherry trees will be differently grouped by woodworkers, orchardists, artists, scientists, and merry-makers.”<sup>14</sup> More recently, Hjørland demonstrates this in practice by examining the striking differences between two German classification systems in the domain of psychology, revealing that classification systems cannot be neutral: favoring one aspect of information does so at the expense of other aspects.<sup>15</sup> Similarly, Feinberg demonstrates that the same domain may reflect and communicate multiple ontological perspectives if classified in different ways.<sup>16</sup> An ethics-based classification system produces different schema than a cost-benefit prototype,<sup>17</sup> similar to how Hjørland asserts that a rationalistic classification system produces different schema than historical or cultural ones.<sup>18</sup>

Bowker and Star show how classification systems express particular views about labor and identity, with significant implications from health care billing to racial segregation.<sup>19</sup> For example, they demonstrate how the Nursing Interventions Classification (NIC) gave specific visibility and legitimacy to aspects of the nursing profession that were taken for granted up to that point, such as behaviors and interpersonal aspects.<sup>20</sup> Humor-based interactions with patients, previously classed in 15 different subcategories, was

- 9 Jane Darke, “The Primary Generator and the Design Process,” *Design Studies* 1 (1979).
- 10 Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983); Donald A. Schön, *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions* (San Francisco: Jossey-Bass, 1987).
- 11 Nigel Cross, “Design Research: A Disciplined Conversation,” *Design Issues* 15, no. 2 (Summer 1999): 5, doi:10.2307/1511837; Nigel Cross, *Design Thinking: Understanding How Designers Think and Work* (Oxford: Berg, 2011); Harold G. Nelson and Erik Stolterman, *The Design Way: Intentional Change in an Unpredictable World*, Second ed. (Cambridge, MA: MIT Press, 2012).
- 12 Lois Mai Chan and Athena Salaba, *Cataloging and Classification: An Introduction*, 4th ed. (Lanham, MD: Rowman & Littlefield, 2016).
- 13 Melanie Feinberg, “Classification as Communication: Properties and Design,” PhD diss., University of Washington, 2008, <https://ils.unc.edu/~mfeinber/Feinberg%20dissertation.pdf> (accessed December 13, 2019).
- 14 John Dewey, *Reconstruction in Philosophy* (New York: Holt, 1920), <http://archive.org/details/cu31924024246070> (accessed November 19, 2019).
- 15 Birger Hjørland, “The Classification of Psychology: A Case Study in the Classification of a Knowledge Field,” *Knowledge Organization* 24 (January 1, 1998).
- 16 Feinberg, “Classification as Communication.”
- 17 Ibid.
- 18 Hjørland, “The Classification of Psychology.”
- 19 Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999).
- 20 Ibid.

elevated from being an assumed aspect of the human nature of a nurse to a formal and explicit classification of a job description.<sup>21</sup> One of the implications of classifying humor as a specific nursing intervention is the ability to include it in scientific research and economic reimbursement.<sup>22</sup> Bowker and Star confront the ubiquity of classification alongside its invisibility: they assert that practitioners in every field of study and practice use classification without recognizing the effect that these structures impose, including ethical and economic effects.<sup>23</sup> Other scholars have demonstrated epistemological and ontological perspectives communicated via classification systems, such as how library classification schemes implicitly reflect a white, male, Eurocentric, Christian-centric, heterosexual, able-bodied, bourgeois mainstream perspective<sup>24</sup> and how they erase or bury particular perspectives, such as race/ethnicity in the Dewey Decimal Classification (DDC)<sup>25</sup> and gender and sexuality in the Library of Congress Classification (LCC).<sup>26</sup>

Because these knowledge organization systems express perspectives, they establish an ontological worldview of any specific domain they set out to describe. Given the evolution of ontological and epistemological perspectives in design, we sought to better understand how those viewpoints are portrayed and communicated in classification systems. Drawing on this notion, we explored the representation of design in the two most widely used library classification systems, the Dewey Decimal Classification and the Library of Congress Classification.

#### *History and Structure of Dewey Decimal Classification*

The DDC, originally developed by librarian Melvil Dewey, is a hierarchical classification scheme first published in 1876 and is currently in its 23rd edition. Satija observes that “the DDC is a general classification system which aims to classify documents of all kinds falling in any knowledge domain.”<sup>27</sup> These divisions of knowledge are “at the broadest level ... divided into ten main classes, which together cover the entire world of knowledge.”<sup>28</sup> The DDC was the first library classification that allowed for collocating books of similar topics; previously, US libraries had been arranged in order of acquisition or size, with corresponding catalogs that allowed only for retrieving a specific item but not topical browsing.

Because the DDC is a hierarchical classification system, it uses the concept of hierarchical force: a principle in which all attributes of a superclass apply to all of its subclasses.<sup>29</sup> All instantiations of a work in the DDC will reflect the classes above it in the hierarchical location. As the 10 classes at the top level of the hierarchy are constructed by discipline and not subject, a particular subject—such as design—may appear in more than one class.<sup>30</sup> One distinguishing factor of classification systems is the use of notation, or a set of characters (numerals, letters, and/or symbols) to

21 Ibid.

22 Ibid.

23 Ibid.

24 Hope A. Olson, *The Power to Name: Locating the Limits of Subject Representation in Libraries* (Dordrecht: Kluwer Academic Publishers, 2002).

25 Jonathan Furner, “Dewey Deracialized: A Critical Race-Theoretic Perspective,” *Knowledge Organization* 34, no. 3 (2007): 144–68, doi:10.5771/0943-7444-2007-3-144.

26 Melissa Adler, *Cruising the Library: Perversities in the Organization of Knowledge* (New York: Fordham University, 2017), doi:10.2307/j.ctt1xhr79m.

27 M. P. Satija, *The Theory and Practice of the Dewey Decimal Classification System* (Oxford: Chandos, 2013).

28 Joan S. Mitchell, Julianne Beall, Rebecca Green, Giles Martin, and Michael Panzer, eds., *Dewey Decimal Classification and Relative Index*, 23rd ed., vol. 1 (Dublin, OH: OCLC Online Computer Library Center, 2011), section 4.1.

29 *Online Dictionary of Library and Information Science*, s.v. “hierarchical force,” [https://www.abc-clio.com/ODLIS/odlis\\_h.aspx#hierarchicalforce](https://www.abc-clio.com/ODLIS/odlis_h.aspx#hierarchicalforce) (accessed January 6, 2020).

30 *Dewey Decimal Classification*, vol. 1, section 4.14.

Figure 1

Top level classes of the *Dewey Decimal Classification*. Source: *Dewey Decimal Classification and Relative Index*, 23rd ed., ed. Joan S. Mitchell, Julianne Beall, Rebecca Green, Giles Martin, and Michael Panzer, vol. 4 (Dublin, Ohio: OCLC Online Computer Library Center, 2011).

DDC	Discipline
000-099	Computer science, information & general works
100-199	Philosophy & Psychology
200-299	Religion
300-399	Social Sciences
400-499	Language
500-599	Science
600-699	Technology
700-799	Arts & recreation
800-899	Literature
900-999	History & geography

represent classes and subdivisions.<sup>31</sup> The DDC uses three-digit Arabic numerals for the main classes (see Figure 1). These numbers are further subdivided into a potentially infinite number of additional digits after a decimal point, thus allowing for flexibility of new additions to subclasses and potentially infinite subclasses, as well as illustrating a specific location in a hierarchy of universal knowledge. Some acknowledged limitations of the DDC include the original placement of the main classes and concepts, the limits of base-10 numerals, and the need to construct lengthy notation to represent granular subjects.<sup>32</sup> Because it is a universal knowledge system, it is one of the most complete systems of library classification and has been adopted in more than 200,000 libraries in 135 countries around the world. It is revised on an ongoing basis.

#### *History and Structure of Library of Congress Classification*

The LCC was developed not long after the DDC by the chief classifier, Charles Martel, who supervised its development from 1897 to 1910. Although other classifications existed, the LCC was created specifically “to represent and cater for an existing collection [the Library of Congress] and to try to predict and create space for that collection’s future development and growth.”<sup>33</sup> The LCC has since been adopted and used by mostly large academic and research libraries in the United States, reflecting that ideal of future growth.<sup>34</sup>

Though it was influenced by the DDC, the LCC is not expressly a universal knowledge system. The LCC is enumerative, meaning that all possible classes are enumerated, or listed out.<sup>35</sup> It does “divide all knowledge into twenty-one basic classes,” which are further divided into more specific subgroups.<sup>36</sup> Each main class has its own classification schedule and separate index. The LCC uses an alphanumeric notation to represent classes, with letters representing the 21 main classes and specific classes represented by a combination of letters and numbers (see Figure 2).

31 *Online Dictionary of Library and Information Science*, s.v. “notation,” [https://www.abc-clio.com/ODLIS/odlis\\_n.aspx#notation](https://www.abc-clio.com/ODLIS/odlis_n.aspx#notation) (accessed January 6, 2020).

32 Chan and Salaba, *Cataloging and Classification*.

33 Rita Marcella and Robert Newton, *A New Manual of Classification* (Aldershot, UK: Gower, 1994), 74.

34 Chan and Salaba, *Cataloging and Classification*.

35 Gobinda G. Chowdhury and Sudatta Chowdhury, *Organizing Information: From the Shelf to the Web* (London: Facet, 2007), 76.

36 Library of Congress, “About the Library of Congress Classification,” October 1, 2014, <https://www.loc.gov/catdir/cpsolcc.html>.

Figure 2

Main classes of the *Library of Congress Classification*.

LCC	Main Class
A	General Works
B	Philosophy, Psychology, Religion
C	Auxiliary Sciences of History
D	World History and History of Europe, Asia, Africa, Australia, New Zealand, etc.
E	History of the Americas
F	History of the Americas
G	Geography, Anthropology, Recreation
H	Social Sciences
J	Political Science
K	Law
L	Education
M	Music and Books on Music
N	Fine Arts
P	Language and Literature
Q	Science
R	Medicine
S	Agriculture
T	Technology
U	Military Science
V	Naval Science
Z	Bibliography, Library Science, Information Resources (General)

The schedules in the LCC that are of relevance to this article (e.g., N Fine arts, T Technology) were all established between 1897 and 1910 and were officially published by the Library of Congress in 1910. Thus the original organization of the LCC reflects the subject disciplines as they were seen in the early twentieth century. Given that the schedules were each “developed separately, following its own internal logic,” there is not an overarching cohesion.<sup>37</sup> Most schedules follow groupings from more general to more specific, but the individual order of topics and granularity varies from schedule to schedule. Chan and Salaba assert that there is “little clear and predictable theoretical basis for subject analysis” and that at times the placement of titles does not mirror the current usage.<sup>38</sup> Although relevant connected classifications are noted as “cf.,” “interdisciplinary topics were difficult to accommodate in this system ... many arbitrary choices have been made over the years.”<sup>39</sup> Rather than a bird’s-eye view of a universal knowledge system like the DDC, the LCC schedules were originally created by subject specialists and continue to be updated by specialists to this day.<sup>40</sup>

### *Examination of Library Classification Systems*

We used the structural properties described already and other guiding principles of classification to explore the representation of design in each system as well as any similarities or differences between them. Close reading and critical analysis of classificatory positioning reveals insights about the concept of design and related

37 Library of Congress, “Historical Notes on LCC,” in *Classification and Shelflisting Manual* (Library of Congress, 2013), 1, <https://www.loc.gov/aba/publications/FreeCSM/historicalnotes.pdf>.

38 Lois Mai Chan and Athena Salaba, *Cataloging and Classification: An Introduction*, 3rd ed. (Lanham, MD: Rowman & Littlefield, 2007), 385.

39 Library of Congress, “Historical Notes on LCC,” 1.

40 Let it be acknowledged that a certain confusion is often made between LCC and its complementary sister, Library of Congress Subject Headings (LCSH). LCSH is a controlled vocabulary, not a classification system, and given that infinite subject headings can be assigned, LCSH is not pertinent to the current investigation.

Figure 3

Image of the index entry for design. Source: *Dewey Decimal Classification and Relative Index*, 23rd ed., ed. Joan S. Mitchell, Julianne Beall, Rebecca Green, Giles Martin, and Michael Panzer, vol. 4 (Dublin, Ohio: OCLC Online Computer Library Center, 2011). *Dewey*®, *DDC*® and *Dewey Decimal Classification*® are the proprietary trademarks of *OCLC Online Computer Library Center, Inc.* and are used with permission.

Desha County (Ark.)	T2—767 85
Design	
arts	745.4
automotive	629.231
engineering	620.004 2
philosophy	124
primary education	372.52
road engineering	625.725
structural engineering	624.177 1
Design anthropometry	620.82

concepts. Although a historical tracing would shed additional light on these perspectives, we focus on current representations. Thus we examined the most current versions of each classification.

We searched and recorded all the index notations of design and noted any related subindexed topics. The DDC has a single index for locating subjects, whereas the LCC has each schedule individually indexed. We followed each index reference to its location in the respective schedule, reviewing the context and various hierarchical positioning for each place in the schedule as relevant. Doing so reveals interesting epistemological and ontological perspectives espoused by the system.

### Observations

Neither the DDC nor the LCC has a top-level class for design. Both systems situate design as subaspects of other top-level classed disciplines, both epistemologically and ontologically. The same applies to the LCC: there are 21 schedules of subjects, of which none are design. Unsurprisingly, the two major disciplines in which design is classed are technology/engineering and arts in both systems.

#### *Where Is Design in the Indices?*

The DDC has a singular index that covers the full classification system. Because of the nature of the independently developed schedules, the LCC uses 21 separate indices, one for each top-level class. Thus, the DDC's single index allows for a more universal perspective on locations of design in the system, whereas the LCC demands selecting the subject of the design first or reviewing multiple indices.

Beginning with an examination of the index to the DDC schedules, we can see that design is heavily equated with engineering and technology: three out of the seven subclasses in the index specifically include the word "engineering," and four out of seven appear in the 600s class, the overarching class for technology. Specifically, all four of those are classed in a subclass under 620, which is the notation for engineering (see Figure 3).

Figure 4

Index entry for design. Source: Library of Congress, Policy and Standards Division, *Library of Congress Classification*, N. Fine arts (Washington, DC: Library of Congress, Cataloging Distribution Service, 2010).

**Deserts in art:** N8217.D63  
**Design:** NC1+  
**Decorative arts:** NK1160+  
**Design and drawing**  
**Sepulchral monuments:** NB1851  
**Design and plans**  
**Cemetery architecture:** NA6125  
**Design by special artists**  
**Decorative painting:** NK2180.A+  
**Design cards, Outline**  
**Watercolor painting:** ND2397  
**Design collections**  
**Arms and armor:** NK6605  
**Brasses:** NK7805  
**Bronzes:** NK7905  
**Ceramics:** NK4250  
**Copperwork:** NK8105  
**Costume:** NK4705  
**Crown jewels, insignia, regalia:** NK7405  
**Embroidery:** NK9205  
**Firearms, guns and pistols:** NK6905  
**Furniture:** NK2260  
**Gems (Engraved stones):** NK5545  
**Gilt bronzes:** NK7905  
**Gold and silver, plate, jewelry:** NK7105  
**Interior decoration:** NK2130+  
**Ironwork:** NK8205  
**Jewelry:** NK7305  
**Lace:** NK9405  
**Needlework:** NK9105  
**Pewter:** NK8405  
**Rings (Jewelry):** NK7445  
**Stencil work (Decorative):** NK8655  
**Swords:** NK6705  
**Textile arts and art needlework:** NK8805  
**Watches and clocks:** NK7485  
**Woven fabrics:** NK8905  
**Design theory:** NC703

Figure 5

Index entry for design. Source: Library of Congress, Policy and Standards Division, *Library of Congress Classification*, T. Technology (Washington, DC: Library of Congress, Cataloging Distribution Service, 2010).

**Design**  
**Airplanes:** TL671.2  
**Airships:** TL660  
**Balloons:** TL622  
**Dressmaking:** TT520  
**Locomotives:** TJ635  
**Machine tools:** TJ1180+  
**Men's tailoring:** TT590  
**Packaging:** TS195.4  
**Petroleum pipelines:** TN879.53  
**Radioactive waste sites:** TD898.155.D47  
**Sewerage systems:** TD658  
**Sewers:** TD678+

The LCC has 21 separate indices, one per class schedule. Design occurs scattered through the indices; however, in the broadest associations (indicated by + following enumeration) under *N Fine arts* and *T Technology* (see Figures 4 and 5). As with the DDC, nine out of twelve instances of design under *T Technology* reference the word “engineering” in the classification; for example, following *TJ635 Locomotives* to its place in the schedule, we see “Mechanical engineering and machinery—Locomotives—Design and construction.”

Figure 6  
Pattern of construction in the LCC T  
schedules.

Product X –  
specifying descriptions –  
Product X engineering –  
further specification –  
**Design and construction**

*Technology and Engineering*

The index references general engineering topics (620.0042 *Engineering design*) and specific engineering topics (automotive, road, and structural engineering) as subclasses under 620 *Engineering design*. Following each index reference to its place in the schedules and reviewing its context and hierarchical positioning reveals inconsistencies of treatment. For example, 629.231 *Analysis and design*, lumps design and analysis together, whereas 625.725 *Design* is a subclass of 625.72 *Surveying and design*, and 624.1771 *Structural design* is a subclass of 624.177 *Structural design and specific structural elements*, which in turn is a subclass of 624.17 *Structural analysis and design*. Calling out design as a subclass in 625.725 and 624.1771 implies that it is a distinct topic of enough importance in the areas of road and structural engineering to distinguish from other processes and activities, while the combination of design and analysis in 629.231 suggest that design is not distinct in automobile engineering.

We find a similar positioning in the indices of the LCC. Design as classified under *T Technology*, appears in nine out of twelve instances under engineering products, including *TL671.2 Airplanes*, *TJ635 Locomotives*, *TN879.53 Petroleum pipelines*, and *TD658 Sewerage systems*, following a pattern (see Figure 6).

Classification through patterned application is efficient and consistent when classing physical items, but it perpetuates the subjugation of topics, including design. A similar classing pattern appears with the other reference positions, *TT520 Dressmaking* and *TT590 Men's tailoring*, with design appearing at the same level as construction as before, except here as *Patternmaking and design*.

In addition, the relegation of design to multiple levels of subclasses in various engineering topics reifies the notion that design is a process or activity in other disciplines or domains, rather than its own discipline. It tightly couples design with the production of specific artifacts: in these examples, automobiles, sewers, and roads. In the DDC, if we examine the hierarchy of 624.1771, we see instructional notes at 624.1 to “class specific applications of structural engineering with the applications, e.g., structural engineering of dams in 627.8 [the number for dams].”<sup>41</sup> This reinforces the ontological perspective of design as product- or artifact-based, rather than an overarching theoretical perspective.

41 Dewey Decimal Classification, vol. 3, 242.

Figure 7

Hierarchical construction of DDC 745.4 showing superclasses.

- 700 Arts
- 740 Decorative arts
- 745 Graphic arts and decorative arts
- 745.4 Pure and applied design and decoration

#### *Aesthetics and Art*

Perhaps unsurprisingly, we can also see in these schedules that design is heavily equated with art. For instance, following the index reference in the DDC for 745.4 leads to 745.4 *Pure and applied design and decoration*. This by itself makes a statement about design, grouping it with decoration. Examining the hierarchical force and properties of inheritance (see Figure 7) shows that design is not only grouped with decoration but actually equated with decoration, as 745.4 inherits the characteristics of the superclass 745 *Decorative arts*, implying that design is a subtype of decorative art.

The notes at 745 reference other classes within the arts discipline: "For a decorative art not provided for here, see the art in 736–739 [various sculptural forms], 746–749 [textiles, interiors, glass, and furniture]."<sup>42</sup> A note under the specific subclass of 745.4 reads: "for design in a specific art form, see the form, e.g., design in architecture 729."<sup>43</sup> Similar to technology and engineering, this treatment in the arts implies that design should be classed within its applied context.

While creating artifacts follows logically into *N Fine arts*, it does not mention mass production or industrial design. In the LCC, *N Fine arts* has the highest entry of design at the heading *NC Drawing. Design. Illustration*. Although design is here named as a key focus, within *NC1+ Design*, the word itself does not appear; instead, it consists of topics such as *Collected writings, History of drawing, Study and teaching, and Techniques*. In the *N Fine Arts* index, design has one cross reference in the same schedule, to *NK1160 Decorative arts*, which is similar to the DDC class 745 *Decorative Arts*. However, a large majority of the index under design is indexed under the heading *Design Collections*, which refers to collections collocated by the artifact, such as *NK6905 Firearms, guns and pistols, NK2260 Furniture, or NK9405 Lace*.

#### *Industrial Art*

Interestingly, 745.2 *Industrial art and design* is referenced in the notes in the schedule for 745.4 as a class of potentially related interest: "For industrial design, see 745.2. For design in a specific art form, see the form, e.g., design in architecture 729."<sup>44</sup> 745.2 *Industrial art and design* is adjacent to 745.4 in the schedules, meaning that they are the same level of subclass under 745 (see Figure 8).

42 Dewey Decimal Classification, vol. 3, 606.

43 Dewey Decimal Classification, vol. 3, 607.

44 Ibid.

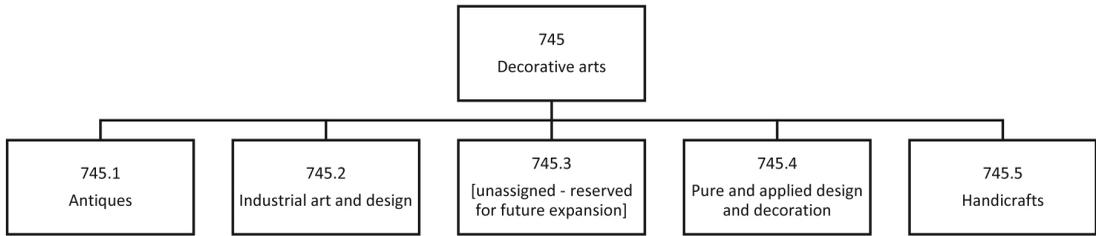


Figure 8  
Visualization of hierarchy at DDC 745 and subclasses.

745.2 is defined in the schedules as “creative design of mass-produced commodities” and notes that design of specific commodities should be classed with the commodity (e.g., design of automobiles subclassed under automobiles). This parallels the note at 745.4 to class design of a specific form with that form. Despite including design in the name and definition of the class, 745.2 was not referenced under “design” in the index. Although the topic “industrial design” does have its own listing in the index with a reference to 745.2, the omission in the general indexical reference for “design” communicates that industrial design is not considered part of design overall. Similar instances appear in the LCC: *NC997-1003 Commercial art. Advertising art* has a cross-reference to *TS171-171.6 Industrial design*, but *TS171-171.6* does not appear in the index for the *T Technology* schedule under design. This is especially revealing considering that pure and applied decoration is equated with design in the index.

#### *Design Theory*

If we follow *NK1160+ Decorative arts* in the index, it sends us to what is actually labeled as *NK1160-1590 Decoration and ornament. Design*. This location contains many subclasses of designers and contains the topic *NK1505 Theory of ornament and design*. Interestingly, the final design entry in the *N Fine arts* index is *NC703 Design theory*. When followed to its placement in the schedule (but not in the index), *NC703 Design theory* is relabeled *Theory of design*, with a cross reference to *NK1160-1590 Design in application to ornament*. But it does not include *NK1505 Theory of ornament and design*. Interestingly, the DDC does not seem to have a specific established class number for design theory, although -01 may be appended to the DDC class numbers to communicate philosophy and theory as a single concept, “covering the general or abstract principles applied to a field or activity of thought” (e.g., 745.401 to represent the philosophy and theory of pure and applied design and decoration).<sup>45</sup>

#### *Additional Treatments of Design*

Outside of the LCC *N Fine arts* and *T Technology* schedules, design appears sporadically. For example, although design is indexed under *GV Recreation, Leisure*, in regard to designing and constructing the spaces in which we practice recreation (such as gymnasiums and ski resorts), similar to the index under *T Technology*. The

45 Dewey Decimal Classification, vol. 1, 5.

BD530+ Design and purpose (Cosmology):  
 Speculative philosophy—  
 Cosmology—  
 Teleology. Causation. Final cause. Design and purpose

Figure 9  
 Hierarchical construction of DDC 124 showing  
 superclasses.

100 Philosophy, parapsychology and occultism, psychology  
 120 Epistemology, causation, humankind  
 124 Teleology

Figure 10  
 LCC schedules for BD530+.

same occurs for most classification under *SB Plant culture* and *SF Animal culture*: design is only spatial and subordinate to those objects, such as *SB472.45 Landscape*, *SB486.D46 Parks & public reservations*, and *SB445 Florists*.

Other represented disciplines in DDC include philosophy and psychology (100s); social sciences (300s); and arts and recreation (700s). None of the index references reflect concepts in the sciences (500s), which is interesting considering the body of scholarship that still reflects the concept of “design science.”<sup>46</sup> However, concepts from design science may be classed in the engineering schedules, which are heavily represented in the DDC.

#### Education

Examining the hierarchical positioning of the index reference 372.52 reveals the placement of design in education, in this case, specifically primary (K–12) education. Notes in the schedule specify that the subject of primary education for design is a subclass of primary education in the arts, lumped together with drawing and painting. Not only is this a limited view of design overall that contradicts scholarship of design, it contradicts other positions put forth in the DDC schedules, such as the treatment of design as an aspect of engineering. In the 700s, design is considered distinct from drawing and painting, while in the context of elementary education it is not. In addition to revealing a conflicted ontological perspective, the treatment of design in 372.52 has implications for the way design is taught in primary education. Unlike the DDC, there is no index in the *L Education* schedule in the LCC.

#### Philosophy

The DDC index for design also includes a reference to philosophy. Following the reference to the schedules reveals the class of *124 Teleology* (see Figure 9). Schedule notes are sparse, indicating only “class here final cause.” Final cause is a translation of “telos,” ancient Greek for “purpose, goal, end,” namely, teleology, the philosophy of the design of the cosmos. However, there are no notes regarding design philosophy, no keywords in the description that

46 See, for example, Nigel Cross, “Design-erly Ways of Knowing: Design Discipline versus Design Science,” *Design Issues* 17, no. 3 (Summer 2001): 49–55, which discusses the history and evolution of design scholarship under a positivist paradigm of technical rationality.

match design, nor any notes or references to design in the superclasses that might be inherited via hierarchical force. It is also notable that there is no reference to the philosophy of design anywhere in the 100s. In the LCC *B Philosophy* index, *Design and purpose* is also indexed referring to *Teleology*. In the LCC, there is no cross reference to *NK 1505 Theory of ornament and design*, where the texts regarding the philosophy of design have been classified (see Figure 10).

### Law

One explicit viewpoint is law-based classification under *K Law*. *K Law* is subdivided by country of origin of the laws, and then further divided by topic. In all of the *K Law* in the LCC subclassifications design appears in two specific index positions consistently, *Copyright and Patents* (compare, in US law classification: *K1470 Copyright*, *K1525 Patent law*). The nature of copyright and patent is that of documentation of cultural artifacts that have been produced and does not address the conceptual or theoretical nature of design. Law is not indexed in the DDC.

### Implications of Design Divided

Thus design in the two main US library classifications is split between Fine Arts and Technology. These two terms are generally understood as the distinction between aesthetics and application. Technology, as a discipline of knowledge, came into use during the Industrial Revolution in the early nineteenth century, “dealing with the mechanical arts and applied sciences.”<sup>47</sup> Fine arts refer to “products are intended to be appreciated primarily or solely for their aesthetic, imaginative, or intellectual content.”<sup>48</sup> Thus, if a patron goes to the library for resources on design, they must immediately make a pivotal epistemological decision: am I an artist or am I an engineer?

The consequences can be dire, such as the following cases of library architecture: the staircase terraces and bleachers seating at the new Hunters Point Community Library in New York, which are a major design focus and yet are inaccessible and raise safety concerns.<sup>49</sup> Another example is the renovation of Cornell University’s Fine Arts Library, where the floating library is made of completely see-through grating, which allows for “upskirting,”<sup>50</sup> prevents anyone wearing heels from accessing the stacks, and doesn’t account for winter weather.<sup>51</sup> This is a direct result of taking into account only half of design—the aesthetic. The architect defended his decisions, suggesting that patrons just “respect each other” and that “coverings on the floor would literally destroy the project.”<sup>52</sup>

We are not here to discuss the merits of the design maxim “form follows function.” But by relegating design philosophies and theories as applicable only to fine art or technology, it returns to

47 OED Online, s.v. “technology, n.” December 2019, Oxford University Press, <https://www-oed-com.libezproxy2.syr.edu/view/Entry/198469?redirectedFrom=technology> (accessed December 8, 2019).

48 OED Online, s.v. “fine art, n.” December 2019, Oxford University Press, <https://www-oed-com.libezproxy2.syr.edu/view/Entry/70365?redirectedFrom=fine+art> (accessed December 8, 2019).

49 Aaron Randle, “When an Architectural Gem Is Not Accessible to All,” *New York Times*, November 7, 2019, sec. New York, <https://www.nytimes.com/2019/11/07/nyregion/long-island-city-library.html>.

50 “Upskirting” refers to taking a non-consensual, usually sexually intrusive photograph with a view up someone’s skirt, but has much broader social implications. See Melinda Sebastian, “Investigating the Way We See Upskirt: The Social and Legal Implications of Gendered Surveillance Online,” PhD diss., Drexel University, 2016.

51 Audrey Wachs, “At Cornell’s New Fine Arts Library, the Book Sets the Standard,” *Metropolis*, November 1, 2019, <https://www.metropolismag.com/architecture/educational-architecture/cornell-fine-arts-library/>.

52 Ibid.

searching for information through either form or function, not both. Thus, where is a discussion of both form and function in design to be located, Fine Arts or Engineering? Perhaps this is why software engineers and user experience designers go to different classification locations in the library, and in research institutions, such as Syracuse University, they are located in physically separate library branches. This division reifies the arbitrary divide between art and technology that design breaks down—would it be a stretch to hypothesize that it has contributed to an increasing separation of form and function and why technological products today do not have the aesthetic considerations of the past?

### *Design Is Subserving to the Product*

In these classification systems, design is often classified in conjunction with specific artifacts and outcomes (e.g., automobiles and roads in the DDC; airplanes, locomotives, and pipelines in the LCC). By systematically dispersing design throughout the cultural artifacts it results in, design is fundamentally subordinated in these classification systems. Organizing knowledge and resources about design according to product-based applications not only results in a lack of overarching disciplinary treatment of design, it also may potentially stifle creativity and innovation. On a practical level, design as a subclass of specific products may limit the resources to which a user is exposed. For instance, in the DDC, people seeking resources about the design of automobiles will only find books about automobile design and not about architectural aesthetics, and vice versa, thus creating a self-reinforcing filter bubble.<sup>53</sup>

Design research shows that designers make better design decisions when they can draw from a broader repertoire of knowledge,<sup>54</sup> and broadening one's repertoire beyond traditional field-specific and applied design knowledge can "expand the basis of the future designer's professional expertise."<sup>55</sup> Exposure to resources outside one's specific applied design area has the potential to stimulate new ideas. Although a car manufacturer may not need to envision sewer systems to create the next luxury car, a collocation of such design systems could inspire and provide inspiration to the flow of the water coolant system of the engine. Yet instead of supporting diverse repertoire-building, the structure of the DDC and the LCC potentially lead designers to fixation, or the adherence to a set of familiar existing concepts that limit innovation.<sup>56</sup> Without exposure to additional alternate knowledge, design practitioners can find it difficult to move away from preestablished ideas based on field-specific precedents.<sup>57</sup> Purcell and Gero have shown how exposure to additional subjects, such as aesthetics, helps designers develop more innovative solutions.<sup>58</sup>

53 Eli Pariser, *The Filter Bubble: What the Internet Is Hiding from You* (New York: Penguin Press, 2011).

54 Daniel Christian Wahl and Seaton Baxter, "The Designer's Role in Facilitating Sustainable Solutions," *Design Issues* 24, no. 2 (Spring 2008): 72–83.

55 Mark Salmon and Glenn Gritzer, "Parallel Content: Social Science and the Design Curriculum," *Design Issues* 9, no. 1 (Autumn 1992): 78–85.

56 David G. Jansson and Steven M. Smith, "Design Fixation," *Design Studies* 12, no. 1 (1991): 3–11.

57 A. Terry Purcell and John S. Gero, "Design and Other Types of Fixation," *Special Issue: Design Cognition and Computation* 17, no. 4 (October 1, 1996): 363–83, doi: 10.1016/S0142-694X(96)00023-3.

58 Purcell and Gero, "Design and Other Types of Fixation."

In addition, as design aims to develop new products that may have never existed, classifying design knowledge according to preexisting products essentially makes an ontological statement disavowing the possibility for these new and innovative products. In this manner, we argue, the DDC and LCC may actually be doing harm to the design discipline in terms of stifling creativity and erasing acknowledgment of innovation.

### *Practical Implications*

In addition to these intellectual implications, analysis of design in these classification systems reveals some practical challenges. The main purpose of classification in libraries is to connect patrons to information resources.<sup>59</sup> Library classification is often considered largely practical, developed not through theoretical and ontological understandings but through methods like common sense and subject expertise.<sup>60</sup> Thus, both classifications would seem to function with the goal of helping library users find library resources about design.

Dividing design into multiple disciplines and fields may make it easier for people working in those fields to find resources about design. However, this division is problematic for people seeking general works on design. Books on design are never physically collocated, due to the conceptualization of design as a subset of art or technology or education or philosophy. To find a book on design, one is immediately presented with the need to choose a product or field.

Although collocation via application may make sense to design practitioners with field-specific information needs, a well-established body of research shows that browsing and looking for inspiration are major means by which artists and designers seek information, especially in library collections.<sup>61</sup> The multiple appearances of design in each classification system correspond to multiple physical locations in library book stacks. In smaller collections this may be a minor issue, but in large ones resources may be spread throughout a building or across multiple buildings. If a person must go to one building to peruse the design resources classed in arts and another to review resources classed in technology, it significantly affects their ability to browse a diverse range of resources.

### **Conclusion**

As invisible information infrastructures, classifications shape our lives and work in ways we may never realize. This article helps surface some of the ways two of the most widely used library classifications shape epistemological and ontological perspectives of design. It perpetuates the duality between form and function,

59 Francis L. Miksa, *The DDC, the Universe of Knowledge, and the Post-Modern Library* (Albany, NY: Forest Press, 1998).

60 Birger Hjørland, "What is knowledge organization (KO)?" *Knowledge Organization* 35, no. 2-3 (2008): 86–101.

61 William S. Hemmig, "The Information-Seeking Behavior of Visual Artists: A Literature Review," *Journal of Documentation* 64, no. 3 (2008): 343–62. <https://doi.org/10.1108/00220410810867579>.

rather than the intellectual consolidation that has been a recent trend in design. It perpetuates the idea that design is an applied field—and nothing but. It positions design as atheoretical, which readers of *Design Issues* know it is not.

As ontological perspectives on design continue to evolve away from specific applications toward a more holistic perspective reflecting design as a unique discipline, classification systems must evolve accordingly. Otherwise they risk perpetuating outdated perspectives and stifling new innovations, as well as preventing designers and other interested parties from connecting with a diverse range of information.