

## CATALOGING GEOMETRY

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*A scheme is suggested for the physical arrangement of the contents of a library, in which the library as well as the books are considered as three-dimensional entities, and classification is revised to reflect this concept.*

Don Juan needs no bed, being far too impatient to undress,  
 nor do Tristan and Isolda, much too in love to care  
 for so mundane a matter, but unmythical  
 mortals require one, and prefer to take their clothes off,  
 if only to sleep. That is why bedroom farces  
 must be incredible to be funny, why Peeping Toms  
 are never praised, like novelists or bird watchers,  
 for their keenness of observation: where there's a bed,  
 be it a nun's restricted cot or an Emperor's  
 baldachined and nightly-redamselled couch, there are no  
 effable data. (1)

Libraries are not beds—but the images are revealing and useful. That there is an information explosion going on, we are told too often by the impatient. And the very grammar of the situation reassures us: unlike Tristan and Isolda or a bomb, the information explosion can never explode or be exploding. For all its information (or is it just the patterns and inscriptions of a nominalist?) the library is so mundane it hardly merits a Peeping Tom. The information needs of the Dons are seldom met by the library. Unmythical mortals, however, swear by the local branch. The repositories of effable library data are small—and still far from full or accurate. Perhaps most surprising is that information processing machines are still essentially foreigners in the repositories of information. And that is incredible.

Given this background I would like to make a suggestion based on some ideas from computer processing with a very mundane practicability—a workable compromise between the catalog and the possible computer manipulation in N dimensions. I take it that the “linearity of the catalogue”

is an abstraction; “. . . linearity is dictated by the physical form of the book and the characteristics of library architecture. In effect, a library is one continuous shelf of books, and each particular book represents a specific point in that line. It must follow, therefore, that any classification that can be applied to such an assemblage of units must necessarily exhibit a linear sequence of its terms.” (2) The crucial words are “in effect.” Few libraries are in fact one continuous shelf. I know of one—it is my daughter’s and suffers from a long shelf and only thirty-seven volumes.

Both the best and the worst of this view are exhibited as it is pushed to the extreme: “The failure of our present systems of book classification in no way condemns the act of classification as a fundamental bibliographic technique. Book classification, as we have used it in the past, has failed for two reasons: one, because it has been based upon the book as a physical entity without taking into consideration the inherent character of the book as a composite intellectual product; two, because of limitations arising from the properties of our hierarchical systems of classification. Jevons was right, for library classification as he knew it, was indeed “a logical absurdity.” By this he meant, of course, that the content of books is poly-dimensional, which is logically incompatible with the traditional hierarchical schematization of knowledge, which is a linear progression from general to specific. The book, then, as a physical unit, and irrespective of the dimensions of its content, must be forced into a monodimensional system in which it has only linear position. This limitation alone destroys most of the utility of traditional book classifications as instruments for the effective subject organization of library materials.” (3)

The best is this I think—the current schemes are inadequate and one of the major limitations is the notion that each book must be classified only as a linear position. More generally, this idea of linearity points to the absurdity in classification schemes.

And now the worst—linearity is not just an abstraction; it is a myth and a fraud. It has not adequately represented the book as a physical object and has been constrained by the error, not the book.

Let us look more closely at the geometry of the book. That aspect apparently most startling to the classificationist (but not the librarian who never has enough room) is its solidity—its three dimensionality. It is impossible to build a book of less than three dimensions! The same problem exists for unmythical libraries—three dimensions are essential.

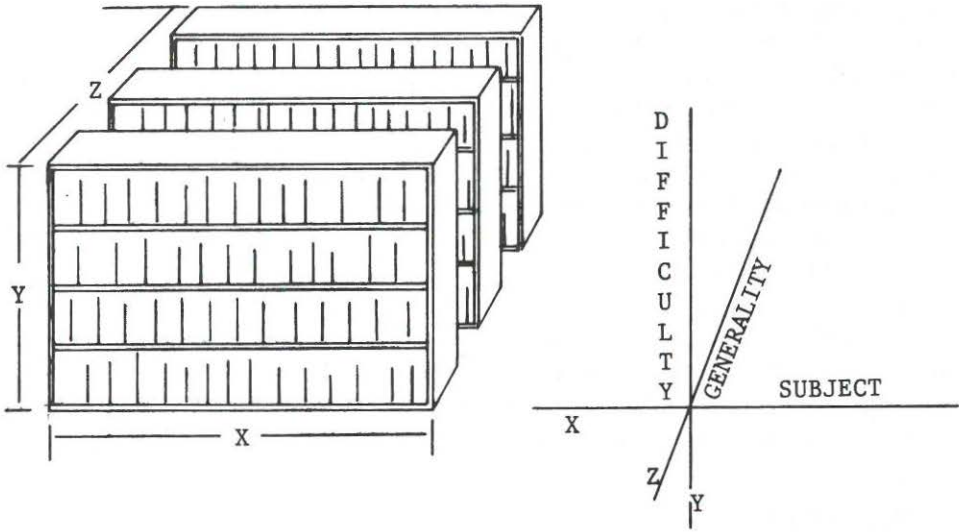
Practice does not easily square with the theory of one-dimensional libraries. The points on the line are far more arbitrary than you imagine. Why does that line start on floor one, jump to three, back to one, up to two, and die in the basement? And having traversed the line, we will usually not have found any newspapers, any fiction, any children’s books, and few journals. Does that line ever flash through the shelf of brightly colored new books resplendent in the lobby impressing the children and trustees?

Allow the line to run through every shelf now. What most characterizes the scheme? For all the complexities, for all the work of Dewey, La Fontaine, and Ranganathan, it is simplicity! Books about the same subject or in some congenial category are insofar as possible physically proximate. By congenial category I mean a grouping according to a concept which is not a subject classification.

The difficulty encountered in one dimension is purely physical. Logically, any finite number of dimensions can be mapped into the integers (i.e., one dimension) as long as the members of each dimension set are denumerable. Ordered pairs are easily mapped into the integers by the following formula:  $I(X, Y) = \frac{1}{2}(X+Y)^2 + 3X + Y$ . This yields the progression of pairs  $\langle 0, 0 \rangle$ ,  $\langle 0, 1 \rangle$ ,  $\langle 1, 0 \rangle$ ,  $\langle 0, 2 \rangle$ ,  $\langle 1, 1 \rangle$ ,  $\langle 2, 0 \rangle$ ,  $\langle 0, 3 \rangle$ ,  $\langle 1, 2 \rangle$ , etc. Ordered triples are ordered pairs of ordered pairs and the integers:  $T(X, Y, Z) = I(X, I(Y, Z))$ . And so on. Because we have a denumerable set of books we can accomplish a linear mapping by both subject and category. In fact, the problem is trivial because there are only a finite number of books. Physically, however, neither subject nor category will remain together. To suit the library the mapping must be physically simple, but can be abstractly complex. For all his protestations, the classificationist cannot eschew the physical library. If he could—or wished to—the way is open.

As I understand classification, it is vacuous without reference to its ability as a finding tool. It must concern itself with the polydimensional aspect of content but cannot disregard the codex. In answer to the question form "where is the book about . . . ?" an appropriate and total response type is "at location (X, Y, Z)." Here X, Y, and Z are the spatial coordinates relative to a particular library both as to origin and values. The Dewey or LC numbers of the book are incomplete answers in that they presume a knowledge of the classification structure *as well as* knowledge of the architecture of the building.

I have suggested that a classification scheme must not disregard the codex, but must insofar as possible not be subservient to physical form. The following scheme takes advantage of the codex form, is as easily automated or computerized as current one-dimensional schemes, advances beyond one dimension, and is very relevant to finding: A library is considered as a three-dimension entity. Conventions are adopted for run-on from room to room and floor to floor as for the linear scheme. Each book is classified in all three dimensions—the dimensions being independent. The interpretation of each dimension is left to the discretion of the individual library. Thus each book has a relative position in each dimension. (This is *not* an Alexandrian scheme relying on absolute location.) The following example illustrates the relevant concepts: Choose a subject classification (as commonly understood) for the X dimension. For example, let Dewey numbers be arranged from left to right on the X axis. Choose a category scheme for the Y dimension. One could assign degrees of dif-



difficulty from one to seven, for example. Choose a category scheme for the Z dimension. One could assign numbers between one and seven running from most general to most specific. This has the following effect: standing in front of the near shelf (i.e.,  $Z=1$ ) one can choose a subject by moving laterally. The general books will appear first with difficult items at the top, easy ones at the bottom. If the items are too general, merely move one stack forward and try again.

This approach presents an unusually usable instructional layout for circular libraries. A reading lounge can be put dead center with the most subject specific books ranged about the circumference. Level of difficulty is easily adjusted by looking up or down. Given this apparatus you may wish to change the subject classification scheme. Why not put solid state physics behind general physics instead of to the right or left?

The card catalog can now be used with greater meaning. There is no reason why it cannot be a map of the shelves. The axes can be translated for ease of searching (e.g., interchange X and Y for the card catalog).

Of particular interest is the relation between this scheme and those of A. D. Booth (4) where access time is minimized by arranging books in the inverse order of their frequency of use. Further refinements consider nonstandard shelf layouts (radial, circular, spiral). One misgiving about shelving by inverse frequency expressed by librarians is that one no longer knows where to look for a particular book in the sense that one knows when using standard schemes. This objection is easily overcome by combining the three-dimensional and frequency schemes. One dimension can be used for frequency, leaving two dimensions in which to group books by subject, difficulty, generality, color, length, or whatever you please. Access time is reduced while physical grouping is retained.

One difficulty that will be encountered is the classification of books that are not subject-oriented—poetry and fiction, for example. These areas are not adequately dealt with in linear schemes and they could easily be left as they are. That is, two dimensions could be constants. On the other hand, it seems plausible that, given three dimensions in which to work, someone could discover congenial physical groupings that would be reasonable yet impossible in one dimension. Rather than being a problem, three-dimensional classification offers opportunities to cope with literatures that are not subject specific.

Each dimension of this scheme can be criticized on the same grounds as the current linear classification. But, taken as a whole, it provides a more powerful, much needed tool for the classificationist while allowing new approaches by automaters. Its simplicity is assured because it is closer to our intuitive notions of information storage. Three dimensions are necessary!

#### REFERENCES

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