The rise and fall of Cybernetics as seen in the evolution of the Dewey decimal system

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I have been interested in cybernetics for a long time, but it only occurred to me recently that what I do for a living might have some bearing on it. What I do is work in the cataloging department of a library. We use the Dewey classification system, and recently began using a revised numbering system for computer books. This revision, I soon discovered, also changed the numbering for cybernetics, systems theory, information theory, artificial intelligence, and so on.

The fact that the Dewey classification changes often and radically is not necessarily apparent to a library user. However. as recently pointed out at a meeting of Dewey people, change in the structure of knowledge requires a corresponding change in the classification that reflects that knowledge. Most changes can be handled by adding to the system as it stands--office practice is 652, add .5 for word processing. Pollution of the environment is 363.738 -add 6 for acid rain. American history has a number for each presidential administration. The current number is 973.927. This Tuesday we will decide whether this number will also cover the years from 1985-1988, or whether 973.928 will be a new addition to the system.

Most changes can be accommodated in this simple way, but some fields of knowledge have changed so drastically over the years that there has seemed to be no solution but complete revision. This has been done recently with math, law, and the social sciences, and is currently being done with computers and information sciences in general. But before I get into the revised system, a little history is required.

Cybernetics first appears in Dewey edition 16, in 1958, in the broad class 000, General Works. It appears as a note, like this:

> 006, Information and Communication Theories (including cybernetics)

By the next edition, 17, in 1965, there had been some second thoughts. 006 and 007 (research) had never been used before, and it was decided that these numbers had better be saved (a good move, as it turned out). The number 001, Knowledge, Learning, and Scholarship, is renamed simply Knowledge, and subdivided this way:

> Intellectual Life
> Humanities
> Research
> Communication
> Controversial knowledge

Communication is 001.5, and is subdivided this way:

> Theories
> Cybernetics.
> Communication through records

Cybernetics itself is subdivided this way:

> Prototypes (bionics)
> Self-organizing systems
> Perception theory
> Artificial Intelligence
> Information theory

So what we see is the idea that the main subject is communication, with cybernetics part of that, and information theory part of that.

Edition 18, in 1971, is unchanged, except that the main heading, Communication, becomes Information and Communication. In the 19th edition, in 1979, comes the high water mark for cybernetics. The main heading for 001.5 is renamed Cybernetics and Related Disciplines, and under it are included all the categories mentioned before (AI, information theory, etc.) plus decision theory.

While all this is going on, there are some interesting developments in 658, the number for management. Appearing in edition 17 (1965) for the first time, between 658.3, personnel management and 658.5, management of production there is a new category, 658.4, management at executive levels. In management of production there is also a new number, 658.502. It is called Systems Analysis.

Six years later, in edition 18, management at executive levels is now Principles of Management. It has a new subdivision, 658.403—Decision Making—and systems analysis has been moved there, as 658.4032. There it remains in edition 19 with elaborations and subcategories. but no major changes.

Now we come to the new schedule, which is what got me started on this in the first place. This is supposed to become official some time next year. What it mainly involves is taking everything that was in 001.5 and 001.6 and spreading them through a tremendous expansion across the numbers 003 to 006, fortunately never used or used only briefly in the past. When I tell you that 001.6 is currently the number for computer science you can understand that keeping pace with knowledge weighed far more heavily in this change than integrity of numbers, and with good reason. So now we have 004, Computer Science; 005, Programming and Programs; and 006, Special Hardware and Programming Applications, all elaborately subdivided to sort out the books on these subjects instead of having them all jumbled together as under the previous numbering. But there are numerous side effects of this rearrangement of computer books. 001.5, which was cybernetics, is back to being Communication again. Cybernetics is no longer there, nor are AI, self-organizing systems, and so on. Where are they? AI has been shifted to 006, that new number for special hardware and program applications. Everything else is distributed around as various sub-categories of 003—and the main heading for 003 is Systems Theory, Analysis and Design. No longer considered simply a management tool. it counts cybernetics among its subdivisions. and while cybernetics still retains the subordinate categories bionics, perception theory and decision theory, both self-organizing systems and automata theory are classed as part of systems theory but don't count as cybernetics any more.

What does all this rearrangement signify? What has changed, that has made information theory go one way, AI another, and cybernetics lose its popularity as a unifying concept?

I think there are two major explanations. One is simply that time has passed and science has evolved. The people who came together as cyberneticists in the '40s and '50s were not information theorists, systems theorists, AI, or computer people. They were in the process of inventing and developing these fields, which at the time had no names and no identity as separate disciplines. Now these fields have grown so much that new generations of scientists working in them have their hands full mastering each specialty in its own right. As in any science, very few people are at the boundaries between disciplines, taking interest in the cross-connections that may exist. Cybernetics, from this point of view, may no longer be a science (if it ever was—has there ever been a department, or even a chair, of cybernetics at any university?) It is simply the name of an intersection point between sciences, where people meet to talk to one another about what they've been up to the past year. Unfortunately there is an awful lot of talking at and past one another as well.

My second thought is that cybernetics is losing Its edge because its fans don't do their homework. I use the term "fans" advisedly, because it's one thing to be enthusiastic about a subject and another thing entirely to sit down and learn it. I don't think cybernetics would have been swallowed up by systems theory if cyberneticists hadn't focused on the communication side of things and let the control side slide. Many people in cybernetics seem to learn control theory from reading what other cyberneticists have to say about it. What they are getting is 30- or 40-year-old control theory. Imagine learning about electronics this way. You can learn more today about control theory by reading a 1984 text on automotive electronics for car mechanics than Wiener and Ashby and the whole lot of them ever dreamed of.

Is control theory important? Many cyberneticists don't seem to think so. I think it's a reflection of this attitude that never in all the editions of Dewey is there a note or a guideline suggesting a link between cybernetics and the whole booming field of automatic control engineering. It's there, in 629.8, and that's where the books are, on control theory itself, on servomechanisms, adaptive control systems, robotics, and so on.

Shortly before he died, Derek de Solla Price wrote that it is a misapprehension that new technologies are merely a consequence of scientific discovery. He asserted an opposite causal connection: advances in technology inspire and enable sciences to move into new areas. Cybernetics was born when Wiener and his colleagues recognized that the technology of control theory opened up an exciting new approach to understanding the organization and behavior of living systems. Wiener opened the door, but he did not step through it. Few cyberneticists have. Few life scientists have. Cybernetics, as the science of living control systems, is so radically at odds with the conventional wisdom that in 40 years it has gained only the smallest of beachheads. There are possibly no more than a couple of dozen people at this meeting with a real grasp of control principles, and a real sense of the kind of impact on the scientific community that is the potential still sleeping in cybernetics.