Science and Knowledge Organization
An Editorial

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This special 'science' issue of Knowledge Organization is intended to showcase some recent longer entries in the ISKO Encyclopedia which address some aspects of science and knowledge organization. Together they provide an overview of the relationship, and of the nature of science, and what constitutes the scientific regimen.

The selection begins with Birger Hjorland's excellent treatment of basic concepts and methods in science, including some discussion of the relationship between science and philosophy, and the way in which the term science is differently used and understood. A brief history of science paves the way for development of scientific method in the modern world, and a proposed classification of theoretical positions or philosophies of science. This is supported by a detailed analysis of the principal exponents and arguments of rationalism, empiricism, historicism, and pragmatism.

Furner's study of the classification of the sciences in the ancient classical world throws some further light on the perceived meaning of science and demonstrates how these ancient models influence us today. We can see how the perceived relationships between subjects have emerged, affected not least by the curricula of medieval and modern universities through the notions of the trivium and quadrivium. Such philosophically derived world views are of course influential in the development of modern bibliographic classifications with their primary division into disciplinary main classes.

In contrast, Petrovich's paper on science and science mapping brings us into the twenty-first century with its discussion of computationally derived models of scientific fields and their literature. The paper covers a brief history of science mapping, together with a discussion of the rationale behind mapping, and a detailed survey of various techniques and varieties of maps. The author also addresses some epistemological aspects that support the interpretation and assessment of such maps.

The final paper, by Dedrick, looks at the phenomenon of classification as it occurs in a specific scientific field, that of colour classification, not with respect to the organization of the field or its literature, but as a methodological process within the domain.

The relationship between knowledge organization and science is a complex and fascinating one, particularly given the importance of classificatory method in the sciences themselves. A fundamental question is whether one can make a viable distinction between the scientific and other disciplinary approaches to knowledge. Historically, as we can see from Furner's paper, science was regarded in a very different way from our own understanding. The historian of science, Frank James (2016, 110), points out "that terms such as art, science, architecture, etc. had rather different meanings in the Renaissance than those that apply today." As an example, in Bacon's 1620 analysis of the general distribution of human knowledge, Physics is subordinate to

Natural Theology, both being driven by reason rather than by memory or imagination.

The idea of a direct clash between scholarly methodologies or cultures is of nineteenth century origin (Timmons 2007), but the tension between science and the arts was put most provocatively by the novelist C.P. Snow in his Rede lecture *The Two Cultures*, later published as *The Two Cultures And The Scientific Revolution* (1959). For decades afterwards this perceived division into two quite separate worlds, each uninformed about the other, and unable to communicate, would constitute a significant public view of intellectual life.

The two cultures thinking was accompanied by the idea that there was a predisposition among individuals to either a scientific or an artistic cast of mind, more formally identified as convergent or divergent thinkers (Hudson 1966). Hudson (1966, 19) attributes his research on schoolboy intelligence directly to the two cultures:

> When the time came to apply for a postgraduate research grant, I proposed, therefore, to look into the question of verbal, numerical and diagrammatic biases in intelligence. It was pointed out to me that the problem of the Two Cultures was fashionable, and that my application would be more favourably received if my interest in intelligence was tied to the problem of the arts and sciences.

Other studies around this time extrapolated the work to include a correlation with introversion and extroversion, or to demonstrate a gender bias with males dominant among scientists (Hudson 1968).

Over the years the two cultures concept has been regularly revisited (James 2016; Kimball 1994; Markl 1994; Massey 2018). The beginning of the debate dates back to Leavis's 1962 counterblast to Snow, published in the *Spectator*, which was regarded by many as more than intemperate in its tone. James (2016, 108) observes that 'the virulence of [his] language still shocks to this day', and *The Spectator* of 16 March 1962 records that the reaction to Leavis was 'quick and copious.' Among these responses Gerhardi (1962) describes Leavis's approach as "gangster warfare ... flushed with rising bile ... seven times seventy devils splatter their spleen through one loud orifice". More recently Snow's views are also rigorously, if more restrainedly, rebutted by Markl (1994, 346) in an essay which claims that, some decades on, there is little difference in the methodological approaches of the arts and sciences.

> Since 1959 it has also been explained time and again that the image of the 'two cultures' does not in any way describe the real multiplicity and interconnectedness of the intellectual structures of communication in the arts and the sciences.

Markl (347) explores various classifications of academic disciplines, notably Talcott Parsons and Platt (1973) who "distinguished at least four academic 'cultures' .... These authors also stress the manifold overlaps and intersections among their four categories, and the finding that some special fields can be assigned to more than one category".

An interesting knowledge organization parallel here can be found in the notion of fundamental disciplines promoted by Langridge (1976), and formally acknowledged in the Introduction to BC2 (Mills and Broughton, 1977-, 5.53):

> ... [a] stricter and probably more accurate way of regarding disciplines is to see them as reflecting different 'forms of knowledge', or ways of looking at the phenomena of the world. The concepts and methods of enquiry of the scientist, the philosopher, the historian, the artist and so on are very different, although the phenomena they consider may be to some extent the same.

Langridge (1976, 33) takes a conservative view of attempts to integrate academic methods across the disciplines, stating that there are "very obvious and marked differences between the sciences and the humanities" and that "some well-meaning attempts to close the supposed gap between the sciences and the humanities ... have also tended to obliterate the important distinctions".

We can perhaps discern such a difference in world views in the broad traditions of classification in library and information science, as epitomised by Bliss and Ranganathan. Bliss (1929) largely equates 'science' with 'discipline' (as exemplified in his use of the term 'anthropological sciences' to include folk-lore and jurisprudence (1929, 301)), and his methodology for arriving at his overall sequence is largely relativist, dependent on a humanistic and philosophical approach informed by wide reading of philosophy and the nature of knowledge, and focusing on establishing a linear sequence and an abstract association between classes. Ranganathan takes a scientific and mathematical view, essentially rationalist, with his main classes organized through categorical analysis and a more formulaic and generalisable approach based on close structural and analytical analysis.

Today a position based on the existence of fundamental disciplines would be more difficult to sustain, even as BC2 itself makes allowance for classification by phenomena as opposed to discipline; and recent work by Szostak, Gnoli and Lopes-Huertas (2016) stress the priority of phenomena as a basis for knowledge organization and retrieval, to a degree dismissing the disciplinary divide and its relevance.

Within the broader sphere of academe the two cultures debate continues to the present day, although it is now largely discredited. Typical positions are demonstrated by

James (2016). and Massey (2018), who points to interdisciplinarity and the rise of computing as factors in closing the divide:

> In my opinion, there are a number of reasons why the culture gap as described in Snow's paper has narrowed over these past 60 years. In particular, there has been a substantial increase in interdisciplinarity *within science*, which I think makes scientists more willing and capable of studying across other areas. .... Also, humanists have become more sophisticated in their use of technology. Information technology and computer usage within the humanities means that scientists and humanists now use common tools and share a common language.

Massey does, however, raise a serious issue in highlighting the opposition to science of some contemporary groups, notably post-modernists, which he feels poses a more substantial threat to common understanding than Snow's two cultures ever did. The problem here is well demonstrated in Sokal and Bricmont's 1999 publication *Fashionable Nonsense: Post-Modern Intellectuals' Abuse of Science*. The book originated from the furore around Sokal's 1996 parody of post-modern philosophy, submitted to the journal *Social Text* and taken at face value by its editors, who subsequently earned for their efforts the 1996 Ig Nobel prize for literature (Dawkins 1998). The article, entitled "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity", was, in Sokal's own words "chock-full of absurdities and blatant non-sequiturs", and, ironically, it was published in a special issue of *Social Text* devoted to countering the criticisms levelled against postmodernism and social constructivism by a number of eminent scientists.

Nowadays, Snow's position, and that of his antagonists might be regarded as simply typical of the immediate post-war situation in Britain. For example, Stray (1994) reflects that much of this kind of thinking was occasioned by the influence of American educational policy, and British concerns about scientific education and scientific progress during the Cold War period.

> Latin, still widely regarded as a prime source of mental discipline, continued to be compulsory for Oxford and Cambridge entrance until the end of the 1950s, when the pressure for science teaching generated by the Cold War led to its abolition as a general entrance requirement.

It is known that there was concern about the position of Britain in the world, particularly with respect to its scientific research and its capacity to compete globally. These worries gave rise to the Royal Society Conference on Scientific Information of 1948, and, indirectly, to developments in the field of modern information retrieval. One significant outcome of the Conference was the identification of an immediate need for better organization and dissemination of scientific information, and a number of papers dealt with issues such as scientific literature, journals, indexing and abstracting. One suggestion was the formation of a working party, led originally by the physicist J. D. Bernal (interestingly, Bernal was one of the immediate responders to Leavis's anti-Snow polemic). The working party did not make much progress in its first two years and was subsequently reconvened under the leadership of the information scientist, B. C. Vickery. The working party thus became the UK Classification Research Group, and the rest, one may say, is history.

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