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# What is ‘reference science’?

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It was born at a one-day conference at the University of Exeter in England in the spring of 1996. The birth was on time, the baby was small but in excellent health, and hardly made any noise. As a result, very few people knew that it had arrived. At the same time, however, there has been a steadily increasing interest in the new arrival, and in September this year [1997] I talked to the Iwasaki Linguistic Circle about it in Tokyo. I believe it is a subject whose time has come, but it will take a little more time before the precise nature and relevance of ‘reference science’ become clear.

Before I go on I’d like to look at a rather basic issue — the actual matter of inventing a science. Can one just invent a science when one feels like it? And if you do, how does it stay invented? Does a new science occupy new semantic or conceptual space, does it ‘steal’ space from other sciences, or does it overlap, flowing in and out of them? Or are these the wrong metaphors? And if you do invent a science, when and how do you know if you’ve succeeded — ten, twenty, a hundred years later? I would argue that these questions are not just interesting in general terms; they are questions for which reference science could itself provide a framework for answers — and further questions.

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Looking back over the year since we launched our fledgling science, four things particularly stand out for me:

- Reinhard Hartmann creating the Dictionary Research Centre, which has proved successful in getting lexicographers and other interested people to talk to each other.
- Study programmes at Exeter, from the doctoral level to the one-week InterLex course, that allow open-ended consideration of everything relating to lexicography. Nothing referential was arbitrarily excluded, and minds could extend themselves.
- The formulation over time of first EuraLex then AfriLex, then this year, AsiaLex. These organizations, alongside the Dictionary Society of North America, provide a firm base for lexicographical debate, without which one could not contemplate anything more fundamental.
- The publication by Cambridge in 1986 of my *Worlds of Reference: Language, lexicography and learning from the clay tablet to the computer* [WoR]. The book was widely and constructively reviewed, and the most enthusiastic reviewers were not lexicographers but librarians and computer people who seemed to feel that it gave them a history and even a charter. Lexicographers generally responded well, but some considered that I did not give enough attention to ‘proper’ lexicography. But then, the book wasn’t about any single art, craft or science. It was about how we refer and inform, how we communicate, and how we know.

One of the most powerful developments since WoR was published has been our understanding of DNA. In a few short years humankind has uncovered and begun to map a referential software system that is built into us and all other life known to us. It seems to me that we need a framework within which we can ask such questions as ‘How similar are human language and DNA?’ and ‘How similar to and different from DNA are our systems of information storage and retrieval?’ It is not enough to talk about ‘the language of the genes’ and ‘genetic letters’. Are these simply metaphors, or do language systems and gene systems share a basic pattern that could also underlie some third system that we have not yet encountered? This is just one of the possible areas that reference scientists might in due course look at.

We can consider next something not quite so cosmic, but nonetheless large: what at the end of WoR I described as a ‘global nervous system’. In just ten years, that nervous system has immensely, almost incalculably, increased — a vast multiplex of old copper cable and new fibre-optics, older ground TV and newer satellite TV, and

many other things. Technology is one thing; however, content and use another, and part of that content and use relates to asking for information either from other humans by e-mail or from the system itself on, say, the World-Wide Web. Reference science has a place in observing and reporting on this largest and most integrated reference service humanity has ever known, into which many of the resources of the world's great libraries are currently being woven, to form the largest work of reference that has ever existed.

When pushed, users and observers of works of reference will concede that both the dictionary and the telephone directory have much in common, as do indexes, concordances, atlases, manuals, and catalogues (whether the mail-order kind or in libraries). It is hard, however, to conceive of the circumstances in which the compiler of a telephone directory, an atlas, a computer manual, or a catalogue would be accepted as members of Euralex or the DSNA. Yet these varied products are linked by their reference function and a range of common techniques and technologies. The current computerization of all such materials only serves more fully to emphasize this point.

Indeed, they belong within something larger than, but closely associated with, traditional lexicography, have never had any generic names, and at the close of this century they need such names. On offer since at least 1986 have been, for the practical business of producing artifacts, such terms as reference art and reference technology, and since 1996 the term for their assessment has been reference science, the study of all aspects of organizing data, information, and knowledge in any format whatever, for any purpose whatever, using any materials whatever. The lack of such a level of study may be due in part at least to a historical current which, in the terminology of postmodernist literary theory, has 'privileged' the position of dictionaries and to some extent also encyclopedias, gazetteers, chronologies, concordances, and indexes (all in archetypal A-Z order) and along with them privileged the position of lexicography and its practitioners.

Lexicographers might, in Johnson's term, be 'harmless drudges', but their drudgery has for centuries been held in higher esteem than that of makers of catalogues, directories, time-tables, ready-reckoners, and travel guides. It might be wise in McLuhan's age of information overload to seek greater egalitarianism in the worlds of reference, by focusing on reference itself rather than on language and alphabeticism (significant as these are), and to examine and exploit all techniques and insights associated with all works of reference from any time, place, language, and writing system.

Of course, it is only relatively recently that lexicography has been systematically critiqued, a development that has however proved both successful and useful. Nowadays, lexicographers no longer simply compile dictionaries according to formulas that seldom change but are liable as they work to develop theories about what they do and novel practices tied to those theories. Given this advance, is it asking too much to say now: Look beyond this recently-raised consciousness and recognise a greater link with other professionals and products.

It is not surprising that the academic world has paid little or no attention to the making of directories and catalogues. So crucial, however, is the business of organizing information in our time, and on a global basis, that it may soon be difficult — impossible — to avoid bringing all the tools and vehicles of reference together within one subject area with one name. This will happen, I suspect, if for no other reason than that anything informative and referential, when stored in a computer, becomes quite simply a database, regardless of whatever name or function or prestige or lack of prestige it might traditionally have had. The electronic revolution is a leveller.

At the moment, however, I feel that we can identify three areas of immediate concern to reference science, the first with a traditional name, the second with a new name, and the third with no name at all:

- The first is lexicography, that aspect of reference art and technology which deals wholly or mainly with language and pre-eminently with words, regardless of the format used (in the main alphabetic, thematic, or a hybrid of the two).
- The second is encyclopedics, that aspect of reference art and technology which deals with information about the world, and for me includes atlases, gazetteers, almanacs, and manuals (and ties in with textbooks).
- The third covers tabulations (such as time-tables), directories (as for telephone subscribers), and catalogues (among other things). It may prove to be several areas and require us to conclude that certain divisions of reference science necessarily overlap with other disciplines and activities, such as library science and social and business life, because they have common concerns.

Fairly obviously, the bulk of research and commentary in reference science in the immediate future will concern dictionaries and probably also encyclopedics. I anticipate, however, that increased interest in databases, hypertext, multimedia, and information structures at large — from satellite linkups to DNA — will ensure that more attention is paid to my third, unnamed element, which to date has been the part of the iceberg below the referential waterline.

It seems to me that there are all sorts of fertile possibilities within the framework made possible by the concept reference science. I will close by looking at only one of these, a contrast that has become important in lexicography in recent years: macrostructure and microstructure. This dichotomy is usually interpreted as covering on the one hand the overall ('macro') organization of a dictionary and on the other any single entry within such a work (the 'micro' organization). I would argue here, however, that the contrast is valuable not only in terms of dictionaries and their entries (and by extension library catalogues and whatever their constituent units may be) but also in other levels of organization among information, knowledge, and communication structures.

Thus, just as an entry is microstructural within the macrostructure of a dictionary, so such a dictionary is microstructural within a publisher's list of dictionaries. Such a reference list is in its turn microstructural within the macrostructure of all publisher's reference lists everywhere. The same is true with each bibliographical catalogue in a library, which is microstructural within the macrostructure of all bibliographical collections within all libraries and similar institutions in a city, state, or the world — especially if such resources are linked electronically. Again, within such a system as the World-Wide Web, each website is microstructural within the WWW at large.

Such matters can become discussable if we have such a framework as reference science, whose findings and postulations can feed back into the practical business of making books and other artifacts. Reference science could be a liberating and integrating discipline, in which lexicography would not be eclipsed but strengthened, not downgraded but upgraded, in intriguing theoretical and practical ways. The term proposed is, I suggest, neither a cute neologism nor a novelty for its own sake, but at the close of this century a necessity.

