The Electronic Hypermedia Encyclopædia

Transcending the Constraints of the «Authoritative Work» ?

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1. Preamble

The two competing notions of encyclopædic *versus* dictionary models of cultural competence have long been a central issue in modern semiotics and semantics. According to Umberto Eco [Eco, 1984] a dictionary model of a language is a series of items explained by a concise definition, usually composed by a finite set of semantic universals, that cannot be further analysed. In this perspective for instance, *man* means "animal human male." Such items can be combined according to a finite set of syntactical rules. Some earlier semantically oriented research in Artificial Intelligence [*e. g.* Minsky, 1974 ; Winston, 1977 ; Schank, 1975 ; Schank, Riesbeck, 1981 ; Van Dijk, 1977] has demonstrated that in order to understand a text a machine must be provided with information structured in the format of an encyclopædia (see also [Eco, 1979 ; Eco *et al.*, 1988] for further discussion of these topics). Eco's encyclopædic model of cultural competence is based on the assumption that every item of a language must be interpreted by every other possible linguistic item which, according to some previous cultural conventions, can be associated with it. Every sign can be interpreted by another sign that functions as its interpretant. The interpretants of the verbal item *man* can be a synonym, a simple definition, a long explanation which takes into account the biological nature of human beings, the history of our species, every piece of information connected with the past, present, and future of mankind, every inference that can be drawn from the very idea of man. For the meaning of every lexeme there has to exist in memory a node which has as its parent the term to be defined — a type. The ideal structure of a complete memory would form a vast aggregation of planes, each consisting entirely of token nodes (in this case, lexemes which are interpretants of the type in question) except for its head node (the type itself). Eco's model is based on

the principle of unlimited semiosis which implies that :

> "From a sign which is taken as a type, it is possible to penetrate, from the center to the farthest periphery, the whole universe of cultural units, each of which in turn can become the center and create infinite peripheries" [Eco, 1984, p. 143-144].

> "A dictionary may consequently be considered a form of disguised encyclopædia : a potentially unordered and unrestricted galaxy of pieces of «world knowledge» [*ibid.,* p. 46-86].

From a purely pragmatic perspective, the purpose or function of conventional (paper-based) encyclopædias is to make accessible for some kind of broadly defined potential readership this kind of "world knowledge". In real terms this involves the materialization of systematised, taxonomically organised summaries of current (canonical) culturally, textually and linguistically constituted norm systems which represent and explicate some "core" sample or "canon" of accepted understandings of word-meanings, historical and current affairs and various domains of scientific knowledge, situated in what we may call an "authoritative" context. Interpretants are activated intentionally by the empirical reader during an interactive semiosis with the encyclopædia whereby information made accessible there, and perceived as salient in relation to his or her own reader-specific contexts and areas of usage is accessed, interpreted and reinterpreted as he or she "navigates" through the work at hand. The idea of authority seems necessary here in order to explain why such a reader might choose to give priority to this particular form of representation of knowledge over other possible sources such as other people, literature, television, films, radio, newspapers, public libraries or the Internet.

2. Constituting the authoritativeness of the encyclopædia as reference work

2.1. Genres of knowledge representation and their «authoritativeness»

If we look cursorily at the international market of commercially available encyclopædias and similar kinds of lexica in book form, we find that there are a number of fairly central works that seem to some extent or other to already be culturally constituted as "authoritative". One such example of this is the well-known *Encyclopædia Britannica.* Claims to authoritativeness for this particular type of "canonical" knowledge

representation are, however, often grounded in an earlier period in history where the general conceptualisation of what knowledge is, and how it is constituted was more "static" than today — as genres, many of the text, interactional and representational norm-systems framing works of this kind are products of a pre-modern or enlightenment concept of knowledge representation. Today we can see signs that these conceptualisations of what knowledge is, and how it is created, represented and communicated, are changing, and that this process of change is being mirrored over time in changes in the ways in which editors of such works choose to select and categorise items of knowledge and to present them for their perceived readership.

In his book *Fragments of Rationality* Lester Faigley [1992] quotes what Jane Flax [1990] has called "beliefs still prevalent in [especially American] culture but derived from the Enlightenment", as examples of those aspects of knowledge representation within enlightenment thinking which postmodernist criticisms have taken issue with. These beliefs are :

1. The existence of a stable, coherent self.

2. Reason and its "science" – philosophy – can provide an objective, reliable and universal foundation for knowledge.

3. The Knowledge acquired from the right use of reason will be "true" – for example such knowledge will represent something real and unchanging (universal) about our minds and the structure of the natural world.

4. Reason itself has transcendent and universal qualities. It exists independently of the self's contingent existence.

5. There are complex connections between reason, autonomy and freedom. All claims to truth and rightful authority are to be submitted to the tribunal of reason. Freedom consists of obedience to laws that conform to the necessary results of the right use of freedom.

6. By grounding claims in the authority of reason, the conflicts between truth, knowledge and power can be overcome. Truth can serve power without distortion : in turn, by utilising knowledge in the service of power, both freedom and progress will be assured. Knowledge can be neutral.

7. Science as the exemplar of the right use of reason, is also the paradigm of all true knowledge.

8. Language is in some sense transparent [Flax, 1990, p. 41-42].

In our present context at least two of these claims are of interest. The third claim is quite central. The formulation "the right use of reason" here, implies for instance a strictly normative, platonic or kantian understanding of the sphere of reason/ideas as something transcendental and/or universal which exists beyond or outside of the sphere of everyday existence (cf. point 4. above). The sixth claim ; that conflicts between truth, knowledge and power may be overcome, that truth can serve power without distortion and that knowledge can be neutral, reflects the more optimistic, liberating aspect of enlightenment thought that has been

questioned most strongly by "pre-postmodernist" philosophers of language, science and culture such as Rorty, Kuhn and Geertz, who first introduced the conceptualisation of knowledge as a social construct [Rorty, 1979 ; Kuhn, 1970 (1962) ; Geertz, 1973] generated within a wider scientific community ; and more recently by "postmodernist" thinkers such as Lyotard [1984], Foucault [1976, 1984] and Baudrillard [1983], some of whom who have even gone so far as to claim that concepts such as "universal values", "truth" and "objectivity" , "rights" and "freedoms" no longer have any real existence outside of the specific socioculturally constituted discourses to which they belong, and that they are, as such, merely contingent on the resolution of negotiatory conflicts between the (self-) interests of a multiplicity of actors belonging to these discourses. Knowledge representation of any kind is then seen within the post-modern perspective as being intimately and immutably intertwined in a web of complex social and political relations which means that any postulated realisation of universal truths, understandings or values in culture automatically becomes the subject of what some thinkers perceive of as an extreme and (possibly destructive) scepticism and relativism.

In a less apocalyptic analysis, while it is probably correct to say that today we generally accept and respect the general view that the development of (scientific) world knowledge has to do with the gradual emergence of different sets of paradigms [cf. Kuhn, 1970 (1962)], we are also beginning to understand it in some way as being a by-product or artefact of evolutionary selection processes. Knowledge (or in the wider sense, meaning) is constantly being produced and developed through our own (human) interactions with, and within, complex environments of other natural, cultural, social and textual semiotic systems and processes, constituted at a macrolevel through what Prigogine and Stengers [1984] have referred to as our "dialogue with nature". According to Hilary Putnam [1975] meaning is *interactional*. Interactions between human organisms and the physical and biological environment necessarily play a central role in determining what the meanings of words in fact refer to for speakers or communities of speakers. This means that no *a priori* inclusive descriptions of how meaning is produced are really possible in terms of any kind of procedural model. The biological environment, like the human organism, is open-ended, and comprises many levels of dynamic open systems with a non-determinable ability to, or tendency to self-regulated development and change towards greater levels of complexity (see below). Since each individual brain develops, and is structured by, the organism's behaviour and interactions with this environment, the body of the organism will also come to play an important role in determining meaning (see [Edelman, 1989, 1992], [Sheets-Johnstone, 1990]). For human beings to learn what things mean, they must develop and grow in a society and use language to create meaning by moving among, and communicating with others.

Evolutionarily, ecologically and biologically grounded systemic perspectives on the evolution and development of language, consciousness and meaning in culture (and in science) forwarded by semioticians such as Michael Halliday [1987] and Jay Lemke [1993] have shown us that language, science and culture must be understood as dynamic open systems. Dynamic open systems are metastable ; that is, they persist only through constant change which results from their interactive exchanges with their own environments. During these interactions the system exports disorder and this increases the entropy of the environment. Changes in the environment thus cause a renewal of the exporting system, which gains new information and in doing so creates a new kind of order. Metastability is achieved by statistical processes whereby actualised instances affect probabilities, which from time to time rise from one or fall to zero. Quantitative effects become qualitative and the system continues its evolution, changing from moment to moment. Knowledge conceived as culturally encoded (and managed) meanings about the world we live in is then from this kind of perspective a "by-product" of ongoing evolutionary processes, and as such becomes a kind of environmental "waste matter" which may, or may not, serve as a basis for the further development and growth of new, more precisely defined and categorised knowledge of these self-same processes.

At the present time we are seeing a rapid growth in complexity in the whole area of representation and communication of scientific knowledge. New knowledge is being instantiated, constituted and communicated, not only through language in culture, but also by means of many other types of semiotic systems and codes. This is increasingly being made possible by modern computer and telecommunication technologies which facilitate communication through, and within, networked (distributed) digitally created environments ; often referred to collectively as "Cyberspace", "Cyberculture" or "Virtual Reality" [see Søby, 1994]. This particular area of human culture is characterised at the present time by processes of extremely rapid growth and change, and also by a considerable lack of conventionality with regard to how the various sign systems and codes, with their associated types of iconic, indexical and symbolic sign relations are used to translate and represent various kinds of knowledge. These nascent digital environments are in a state of rapid flux, and it often seems difficult to see how any kind of metastability or emergent order may develop there. This prescient condition of instability and constant change is reflected in the developing textual and interactional norm systems of Cyberculture, but this does not in my view preclude the possibility of transient, or even more lasting conditions of metastability emerging there at some time during the future. What we can expect to see, however, is the constitution of a number of new kinds of textual and interactional norms ; leading to new ways of "doing" science, and developing, representing and communicating scientifically generated knowledge.

In my own research I have chosen to focus on the ways in which textual and interactional norms change when (novice) scientific authors begin to collaborate in distributed virtual environments ([Coppock, 1994b, 1995a, 1995b] ; see also [Coppock, 1995d] for a discussion of the concept of "novice" in this particular connection). The documentation and study of the (inter)subjective experiences and on-going reflections of young scientists who are beginning to explore and collaborate in these kinds of digitally created distributed collaborative environments, as well as the study of the diachronicity (i. e. their characteristic tendency to change over time) of their interactional and textual norm systems (reflected as changes in the various modes and genres of scientific writing and discourse) will allow us to learn more about how scientific knowledge is created and constituted through mediated interactions in language and culture. They will also allow us to study the mediating and regulatory role of the technology used for such collaboration.

In designing and producing conventional encyclopædias it would seem that the main focus of interest is in offering what we have referred to above as a "core" or "canon" of accepted understandings, rather than expanding upon and integrating more peripheral issues and themes that might not even be fully resolved and articulated (i. e. instantiated and actualised in "the real world of culture") at the time of production and distribution of the work. A closer examination of how the authority of encyclopædic works is textually instantiated and construed may throw some light on the very basic (and very complicated) problem that editors of encyclopædias always have to try and cope with, namely the fact that knowledge and understanding are constantly subject to, and part of, the above-mentioned continuous process of evolutionary, non-linear development and change.

As technological advances facilitate increased inter- (and intra)cultural collaboration, knowledge is not only being instantiated and construed but also disseminated more rapidly too. Not only is the rate of production of new knowledge at both local and global levels increasing, but also the ways in which representation, communication and dissemination of this knowledge is "done" by those producing it are continually changing. Increased access to the Internet for publishing and communication for what used to be considered culturally marginal groups means that areas of culture previously considered peripheral to the developing "core" of cultural knowledge have begun moving faster towards this core, resulting in a more rapid expansion of this core as more and more peripheral knowledge is incorporated and integrated into it. From this perspective, any authority of the conventional encyclopædia that is built upon a legitimation of it as some kind of a "completed" work through reference to the thoroughness, currency and actuality of the "canonical" knowledge "contained" in it and made accessible through it, may be threatened. I shall

go on to examine the interplay between the notions of completeness and openness in relation to the cultural constitution of authority of encyclopædias as tokens of the genre of "the reference work" in the next section.

2. 2. The notions of completeness and openness

So let us go on and examine for a moment how encyclopædic works of any kind may come to be constituted as "authoritative". What might we mean when we choose to refer to some token of an encyclopædia as an "authoritative" work ? In Collin's *COBUILD English Dictionary* "authoritative" is defined as follows :

> **authoritative** /ɔː'θɒrɪtətɪv/
> 1. Someone or something that is **authoritative** gives an impression of power and importance and is likely to be obeyed. EG ... *a deep authoritative male voice... The name was written in large authoritative letters.*
> ◊ **authoritatively**, EG *"Don't do that," he said authoritatively.*
> 2. A person, book etc. that is **authoritative** has or shows a lot of knowledge or understanding of a particular subject. EG *This is the most authoritative study of the subject.*

There are then two main connotations or senses attributed to the word "authoritative" which seem to correlate "power and importance" with large amounts of knowledge or understanding of particular subjects. We shall not comment further on the particular choice of gender in the first example given for definition 1 and the one given for "authoritatively", although this might reflect some important sociocultural realities with regard to the ways in which authority and power is distributed across genders. Neither shall we discuss the implied relationship between loudness of voice and largeness of written characters as expressions of power and authority in the examples given above for the first definition, which nonetheless may give us cause for reflection[1]. Definition 2 seems then, to be the most useful one for our present purposes. In order to encompass the conventional encyclopædia, however, this definition will obviously need to be extended (*i. e.* beyond the range of "a particular subject") in order to cover the wide range of topic areas and subjects that such works try to encompass, albeit at a "global", and subsequently a fairly superficial level of treatment due to various sets of spatial and temporal constraints implicit in the collocation and publication process.

One pragmatic criterion for this kind of authority may be the perceived "completeness" or "completedness" of an encyclopædia as a token of the genre "reference work". That is, whether it as a text or genre token not only satisfies the condition of providing sufficient quantities and depth of knowledge and information for the potential requirements and needs of a

[1] *In this case I am thinking specifically of a semi-conventionalized norm within the electronic discourses of Usenet News and on-line discussion groups on the Internet, where the use of capital letters has has come to represent "shouting" in texts that otherwise tend to shun capital letters even for proper names (this again has to do with the spontaneous nature of this kind of discourse that places high status on the 'unedited' message). But of course there are also other more conventional discourses, such as those of public posters or the daily press with sensational headlines in letters 15 cm high, and advertising, where large letter-size in texts is often used to 'shout' the name of the company, in order to attract the attention of possible consumers as 'readers'.*

postulated model reader, but also whether this information is organised in such a way as to make access to this information easy for the empirical reader. Another criterion for such authority may be tied in with the idea of the "openness" or "closedness" of the encyclopædia considered as a cultural artefact, which relates amongst other things to its particular representational mode and style (see below).

In the case of a conventional encyclopædia which is considered authoritative there might also be some expectations that it will in some way constrain the development of multiple interpretations of its content by potential readers. Generally speaking, works endowed with a strong culturally constituted authority are associated with limitations on the number and nature of possible interpretations (see Eco's discussion of this in relation to possible readings of the Scriptures in the Middle Ages in *The Role of the Reader* [Eco, 1987 (1981), p. 50-52]). Another aspect of an encylopaedia's openness or closedness might be the extent to which (and in which ways) it incorporates pointers from its own "center of authority" to other "authoritative" texts (or even more interestingly, to other more "peripheral" works which may well be relevant for readers, but which generally will not be integrated in full into the work itself because the editors have to work within certain sets of cultural, technological, spatial and temporal constraints). We shall discuss how such constraints may be operative during the collocation and publishing process later on.

In his essay *The Poetics of the Open Work* [*ibid.*, p. 47-66] Umberto Eco discusses the notions of "completeness" and "openness" in relation to works of art. He points out that both these expressions refer to a standard situation of which we are all aware in our reception of a work of art : we tend to see it as the end-product of an author's attempt to arrange a sequence of communicative effects in such a way that each individual addressee can refashion the original composition devised by the author. The addressee is bound to enter into an interplay of stimulus and response which depends on his unique capacity for reception of the piece. In this sense the author presents a finished product with the intention that this particular composition should be appreciated and received in the same form that he devised it. A work of art is therefore "a complete and *closed* form in its uniqueness as a balanced organic whole, while at the same time constituting an *open* product on account of its susceptibility to countless different interpretations which do not impinge upon its unadulterated specificity. Hence every reception of a work of art is both an *interpretation* and a *performance* of it, because in every reception the work takes on a fresh perspective" [*ibid.*, p 48-50].

The same considerations as regards openness for refashioning of content by the reader, completeness or closedness, as well as the above-mentioned bifurcation of reception into "interpretation" and "performance" can usefully be applied in a discussion of conventional encyclopædias. Reading an encyclopædia, the reader will not only draw

on the text as it presents itself for his or her interpretation of it, but also during his or her own "performance" of reading the work contribute interpretants that have originated in interactions with signs produced by other forms of media that may provide more "on-line" groundings for his or her interpretation of what is being read. These media may be the local and international press and media, as well as the reader's own day-to-day involvement in culturally constituted discourses in his or her immediate environment. In phenomenological terms the ground of the reader's life-world is constantly changing relative to some wider horizon of culture and nature.

Encyclopædias designed and implemented as hypermedia systems with an implicitly and explicitly realised navigational architecture (a so-called "hyperstructure") would seem to be open to an even greater degree than conventional encyclopædias since they invite the reader to create their own readings and interpretations of content elements as they "navigate" interactively through links that structure the work. A hypermedia system consists essentially of a distributed database containing a large number of "nodes", each of which might for example represent different types or domains of knowledge. Each node is seen as a concentration or clustering of (semantically, or perhaps functionally) categorised information elements encoded digitally as different media types (texts, images, sound-bites, video-clips, animation and graphics). Hyperstructures are generally supposedly designed so as to allow easy navigation through very large amounts of information by offering the reader access to a number of (pre)programmed "links" between various types of informational elements or "texts". In advanced hypermedia systems it is also theoretically possible for the user to make "free" searches through the information stored in the database so long as special tools for this purpose are integrated into the system.

The sequence of communicative effects designed into this kind of work will in fact tend to "guide" the reader in his or her readings in rather different ways than a more traditional encyclopædia where the reader can choose to dip into the content from *any* possible point on taking it down from the shelf. In practice, however, the user of a conventional work such as *Encyclopædia Britannica* will often utilise the alphabetical key-word registers and other organisational and referential subsidiary works such as the Propædia and Macropædia as entry points to the greater mass of information in the main encyclopædia.

Nonetheless, the fact still remains that any kind of encyclopædic reference work, "open" as they often may seem to be at first glance, are to quite a high degree "completed" and "closed" too, in the sense that they are first of all compiled (as a "product") by some community of authors and editors whose presuppositions about, and perceptions of who the potential readership of the work are, and whose own textual norm systems [Berge, 1993, 1994] implicitly frame and determine the selection and

structuring of content elements, and the genres of presentation that characterise the completed work as an organic whole. Secondly, there are similar types of considerations involved here with regard to the ways in which the editors and programmers (pre)select key-words in terms of types and tokens that can be used to act as anchor points for creating links between the various information "nodes" that comprise the system.

Any pre-programming or organisation of links of this kind in any kind of "completed" product — be it a conventional paper encyclopædia, or a multimedia encyclopædia on a CD-ROM — requires in practice that many predetermined categorisational and organisational choices have to be made (at many different levels of systemic representation) with regard not only to which key-words, images or other kinds of semiotic tokens embedded in the various documents should act as "anchors", pointing to other works, documents, graphics and images ; and in the case of the multimedia encyclopædia, to sound-bites, animations and video-clips that have been imported into the system. The same considerations apply with regard to the functionality of the links, *i. e.* the specific ways in which these links are designed to function.

In hypermedia encyclopædias with "free search" capabilities, the nature of the algorithms that constitute the search tools integrated in the system working in conjunction with the various levels of systemic choices mentioned above will amongst other things determine which degree of *delicacy* of description or *stratification* [see Halliday, Mathiessen, in press] of the knowledge base the user of the system will have access to and be able to utilise during his or her interactive "open" searches of the total unity of information made available by the system. It thus is not possible to see such a system as structure-free or "open", so long as it is designed as a "completed" work and presented as such (for example on a CD-ROM) by the developers. Decisions made during the design and publication process will ultimately always affect the reader's navigational process while accessing the work, and thus which "readings" are in fact made possible. Some navigational paths might for instance be more clearly marked than others. There is thus some kind of deeper relationship between the very (meta)structure of the system and the kinds of interpretations and understandings of the content matter that it facilitates and allows.

2. 3. Coping with changing norms and meanings in revision : the authority of up-to-dateness and consistency

Roland Posner [in press] claims that the concept of "medium" needs to be re-examined in the light of the ways in which modern media affect communication processes. We need to begin to look upon media as *sets of constraints*, he says. Now, this idea of constraints is not necessarily a

negative one, but rather an attempt to understand which types of presentation and production processes in fact belong to the various types of mass media as we know them today. To some extent these constraints are tied to the specific channel of communication that the medium uses, and thus to the technology or hardware that makes possible and maintains this. But constraints in this connection can also be socially or culturally constituted. This is rather important to remember. Certainly new technology sets its own sets of constraints for how new mediums of expression determine the self same sign processes that they facilitate, but just as often it is the received canon of textual and interactional norms currently prevalent in the social fields that constitute various cultural domains which influence the ways in which the potential of new media technologies becomes realised and interpreted in that particular culture.

A medium involves many more things than the channel of communication itself, genres of production and presentation etc., it also involves auxiliary sign processes which it requires and makes possible. Cinema involves for instance the production and distribution of a film to be performed. Theatre and concerts involve the creation of scripts and scores, as well as rehearsals and program production and distribution to announce the event. Radio and television involve the reservation and use of studios for live productions and recordings, as well as radio and television networks for transmission, and the receivers that consumers use to witness the performances. Telephony involves telecommunication networks and the companies that maintain and run these etc. If we consider the encyclopædic genre of reference work as a type of medium for communicating and disseminating knowledge, we have to consider it not only as text, but also in relation to the socioculturally and technologically mediated processes involved in its production and distribution. We also need to examine how the revision of existing encyclopædic reference works is incorporated into these processes and mediated through the encyclopædia as a cultural artefact.

Revision of conventional encyclopædias in the form of new published editions generally involves the removal of some set of content items of knowledge which are considered no longer current, but it consists mainly of the addition of others which are seen to constitute "new" knowledge to the common pool of knowledge or meanings which the work represents. This then is basically a process of pruning, collocation and extension carried on around, and in relation to, the basic "core" or canon of accepted knowledge, which are materially represented by the institutional archives of the publishing house in question and those of its associated contact network of informants around the world.

We can get some idea of how these kinds of understandings are reflected and presented textually in the preface of one of the first large modern Norwegian "conversational lexicons" *(Gyldendals Store Konversasjonsleksikon)*, which was originally published in Norway in

1938. The second edition of this work was published in the early 1960's [Bull *et al.*, 1965]. In the preface to the second edition, the editors cite the mission which was articulated as below in the original 1938 edition :

> "Redaksjonen av *Gyldendals Store Konversasjonsleksikon* har hatt som mål å skape et nyttig og greit bruksverk for de tusen hjem. Derfor har den, uten å forsømme noe emne av mer faglig betonet art, lagt vekt på *et rikt stoff av almen interesse*. I overenstemmelse med dette ønske er det innført *tusener av oppslagsord* som ikke er å finne i noen av de eldre leksika, men som vi tror vil være til stor nytte for mange."

> ["The editors of *Gyldendal's Large Conversational Lexicon* have had it as their goal to create a useful and easy to use work for the thousand homes. Therefore we have, without neglecting any topic of a more specialist kind, concentrated ourselves on providing *a rich content of general interest*. In accordance with this wish we have introduced *thousands of reference words* which cannot be found in any of the older lexica, but which we believe will be of interest for many" (My translation from Norwegian. Emphasis is also mine).]

The authoritativeness of the work is further documented by the list of contributing authors, where each is represented with a full professional title ; here we find amongst others university professors, senior public servants, doctors, lawyers and leading figures from industry. The editors then go on to explicate the process of producing the 1965 edition in the following way :

> "Verkets omfang har øket, men som førsteutgaven er også denne utgaven *trykt i løpet av noen få måneder,* under medvirkning av flere store trykkerier, for å sikre *den størst mulige samtidighet og overenstemmelse i fremstillingen* gjennom alle verkets bind. Allikevel har jo ikke verden stått stille i disse måneder heller, og opplysninger om dødsfall og andre viktige hendelser som er inntruffet under trykningen, etterat hovedartikkelen om emnet var passert, vil finnes som *et tillegg i siste bind*".

> ["The size of the work has increased, but like the first edition this edition has also been *printed in the course of just a few months,* with the assistance of several large printers, in order to assure *the greatest degree possible of currency and correctness of presentation* throughout all volumes of the work. The world, however, has not stood still during these months either, and details of deaths and other important events which have occurred during printing, and after the main article on that particular theme was completed, will be found as *an appendix in the last volume*".]

So here the claim to authority is closely and explicitly tied in with the basic process of information collocation, selection and publishing, where criteria such as currency, and correctness of presentation across subsequent volumes is central. This leads to the need for the appendix in order to document the seriousness of the editors' attempts to maintain and actualise these qualitative criteria as far as possible into the very heart of the publishing process.

When the editors of the *Gyldendal's Store Konversasjonsleksikon* state there that they "have had it as their goal to create a useful and easy to use

work for the thousand homes", they are referring indirectly to a pre-publishing process of discussion and planning which is both embedded in, and contingent upon, their own culture-specific perspectives on how knowledge and an identity as "knower" are created that are prevalent in their own culture, which is where, and in relation to which, this particular work has been created, legitimized and distributed. These perspectives are actualised in Norwegian culture (as they are in all other cultures) as specific sets of textual norm systems and genres of expression and production. The expression "the thousand homes" ["de tusne hjem"] is for example a quite powerful and evocative metaphor within Norwegian social-democratic culture. It has connections to a similar expression from Sweden, namely "folkehjemmet" – "the home of the people", and in the case of the Norwegian expression, it is also part of a line at the beginning of the Norwegian national anthem :

> "Ja vi elsker dette landet/som det stiger frem/furet, værbitt over vannet/med *de tusne hjem*".

> [Yes we love this land of ours/as it issues forth/furrowed, weathered from the waters/with *the thousand homes.*]

This idea of "de tusne hjem" encapsulates the national ideal of the nation-state of free individuals, and the editors of the encyclopædia acknowledge their responsibility to this ideal in the way in which they choose to present and legitimize this family encyclopædia for the home market. This represents a situating of the knowledge contained in the work in a more "localised" cultural context of situation, and as such involved a translation of globally constituted knowledge into the terms and genres applicable within this set of culturally constituted norm-systems.

Let us now go on for a moment and look at one more recent, more internationally or globally oriented reference work in terms of cultural, mediational, technological and other constraints, namely the *Encyclopædia Britannica Book of the Year* for 1988 [Daume, Watson, eds, 1988]. This is one of the yearly issued collections of new information which are designed to supplement and update the *Encyclopædia Britannica Macropædia.* The *Macropædia* is itself a minor collection of thematic articles that refer to the core *Encyclopædia Britannica.* In the introduction to the section entitled "Major Revisions from the 1988 *Macropædia"* the editors state that :

> "The purpose of this section is to introduce to continuing *Book of the Year* subscribers selected *Macropædia* articles or portions of them that have been completely revised or written anew. It is intended to update the *Macropædia* in ways that cannot be accomplished fully by reviewing the year's events or by revising statistics annually, because the *Macropædia* texts themselves — written from a longer perspective than any yearly revision — supply *authoritative interpretation and analysis as well as narrative and description.* (...) Each is the work of a *distinguished scholar,* and *represents the continuing dedication of the* Encyclopædia Britannica *to bringing such works to the general reader"* (All emphasis is mine) [p. 38].

The authoritative nature of the work is strongly instantiated here in lexico-grammatical terms ("authoritative interpretation and analysis"), and also backed up (as in the case of the *Gyldendal's Store Konversasjonsleksikon*) by reference to the distinguished nature of the contributors ("distinguished scholars"), as well as to the dedication of the *Britannica* organisation to an ideology of creating authoritatively substantiated works for a general readership ("the continuing dedication of the *Encyclopædia Britannica* to bringing such works to the general reader"). Further on in this work we find the following text in the introduction to the section entitled "Bibliography : Recent Books" :

> "The following list encompasses some 180 recent books that have been *judged significant contributions to learning and understanding in their respective fields.* (....) The citations are organised by subject area, *using the ten parts of the* Propaedia *as an outline*" (p. 61).

Here we can notice the continued emphasis on the quality, and thus the "authoritativeness" of the product by reference to the fact that the selected books have been "judged significant", and this (albeit implicitly) by qualified members of the socioculturally constituted fields where real authority resides in relation to the domains of literature and literary criticism ("in their respective fields"). Furthermore, the systematic and thoroughgoing nature of the whole *Britannica* project is emphasised by the reference to the links to the ten parts of the *Propædia.*

The authority implicit in this systematicity is further explicated and formulated by the editors as an ideology which entails legitimization through the up-to-dateness and comparability of the information selected and included in the work, in their introduction at the beginning of the section entitled "1988 Britannica World Data". Here we can read :

> "Two principal goals in the creation of the *Britannica World Data* were *up-to-dateness and comparability,* each possible separately, but not always possible to combine (...). In general, the editors have opted for maximum up-to-dateness in the country statistical boxes and maximum comparability in the thematic tables, so as to take the best advantage of late information, published and unpublished.
> Comparability, however, resides in the meaning of the numbers compiled, which may differ greatly from country to country (...). *Every effort has been made to obtain the best combination of comparability and up-to-dateness from available sources, and, when the completeness of a country's published data permitted, to analyse it further for better agreement in coverage, scope and datedness* (...)" (p. 532).

All in all, on this one page, we find the words "up-to-dateness", or synonymical variants of it, such as "most recent", "the latest", "updated continuously" and "datedness" as many as 13 times. The comparability issue too is discussed at great length. The legitimization of the authority of this particular work is then to a large degree determined and defined by

such claims to up-to-dateness. The total length of the *1988 Britannica Book of the Year* is just over 900 pages. The enormity of assuring that every item in even such a small work (also seen in relation to the same issue for the whole of the *Encyclopædia Britannica* which encompasses several thousand pages) is up to date in a world where new meanings and knowledge is constantly being generated (both within and outside of the discourses of what we know as "science") will of course be immediately apparent.

3. Encyclopædias into the age of hypermedia

Today it is possible to access the *Encyclopædia Britannica via* the Internet [Britannica Online]. The on-line version of Britannica's Pathfinder WAIS[2] search engine allows users to search in the collected files of the *EB* organisation. Below is a search report generated by the system in response to the following question : "What is the Norwegian national anthem ?"

[2] *WAIS stands for Wide Area Information Systems.*

This is the search report for the search you ran on Sep 24 01:17:01 1995.
It is a temporary file, and will expire about an hour after the search.

Searching Articles...

Your query was:
[What is the Norwegian national anthem?]
The database contains 38,182,193 index terms in 109,209 documents.
There are 767,925 different index terms. The plural stemmer was used.

What stems to What, which is not present; trying lowercase what.
what stems to what, which is not present OR present too often to be used.
is stems to is, which is not present OR present too often to be used.
the stems to the, which is not present OR present too often to be used.
Norwegian stems to Norwegian, which occurs 1,240 times in 650 documents.
national stems to national, which occurs 22,807 times in 13,110 documents.
anthem stems to anthem, which occurs 227 times in 120 documents.

The search found 13,670 documents. It took about a second.

The search was performed by a WAIS Inc server: WAIS Server 1-0-11.
For more information send email to info@wais.com.

We can note here that this search found (in one second) in all 13,670 documents out of a total mass of 109,209 documents containing about 38 million index terms (of which 767,925 are unique). The search procedure here is fairly simple. What basically happens is that the sentence or phrase entered by the searcher is analysed sequentially, *i. e.* from start to finish on the basis of the separate lexical items that comprise it. Functional lexical items such as "what", "is" and "the" are rejected on the basis of too high frequency of occurrence (or alternatively non-occurrence) as index terms.

A check is also done for lexical items beginning with upper-case characters to rule out the possibility of them being nominals which are also proper names. In the search above, three lexical items from the initial query are selected as relevant for the search on the above basis, and then the search engine looks for all documents that contain $Item_1$ AND $Item_2$ AND $Item_3$, (and those that contain $Item_1$ OR $Item_2$ AND $Item_3$, $Item_1$ AND $Item_2$ OR $Item_3$ etc.). The resulting list is then weighted, with the highest weight apparently being given to those documents with at least two or three of the items present simultaneously. The weighted list is truncated on the basis of a prior choice *(via* a screen menu) by the searcher to somewhere between 10 and 500 items. A look at the results of a search truncated to ten items (see **Appendix I**), reveals that this type of search produces a great deal of redundant information. Amongst other things we are given a list of people who wrote the national anthems of many other countries than Norway. The fourth item in the search list (Richard Nordraak) contains some of the information being searched for, namely the name of the anthem of Norway :

> [•] Nordraak, Rikard [2,305 bytes]
> Nordraak also spelled NORDRAACH [b. June 12, 1842, Christiania [now
> Oslo], Nor.—d. March 20, 1866, Berlin [Germany]], Norwegian composer
> perhaps best known as the composer of the music for the Norwegian
> national anthem, " **Ja, vi elsker dette landet**" [1864; "Yes, We Love
> This Land"].

The purpose of my search in this case was however to retrieve the full text of the anthem (written by Bjørnstjerne Bjørnson — number five on the search list) in order to check out the lines which I included earlier on in this paper. This turned out not to be available in the *Britannica* database, at least not as far as I could ascertain from a subsequent, more comprehensive search with the truncation point set at 500 items. Indeed, this search only produced a vast number of much more esoteric items, such as the following :

> [•] Lons-le-Saunier [1,250 bytes]
> town, capital of Jura département, Franche-Comté région, eastern
> France, south-southeast of Dijon. Located at 846 feet [258 m] above
> sea level in the valley of the Solvan, it is surrounded by vine-clad
> hills. It is a pleasant spa, owing its original Roman name,
> Salinarius, to the local salt mines. It . . .

> [•] Book of the Year [1995]: Biography: McEntire, Reba [3,127 bytes]
> "Everyone's going to OD on Reba," joked country music singer Reba
> McEntire near the beginning of the year. McEntire, already considered
> the reigning queen of country, did indeed spend more time in the
> limelight in 1994 than ever before. She released Read My Mind, her
> 22nd album; published Reba: My Story, a best-selling . . .

which although interesting enough in themselves, hardly have any relevance in relation to the simple query that generated them. This

experience then reflects quite clearly that at the present time, the search algorithms used in these kinds of systems are still fairly elementary, and require considerable post-search filtering on the part of the searcher to produce the required information, if this is in fact available at all. There is obviously still a lack of knowledge on the part of the search engine developers of how in fact people really do filter and process all the information that is available around them as they orient themselves and move around in the real world, and this seems to have led to a principle which says that all information items with at least one key-word or other corresponding to those words that comprise a query may be, initially at least, considered as important as another. The situated indexical function of "what" is for instance not taken account of at all. This is further illustrated by another search with an even more specific focus that I made, asking : "Who wrote the Norwegian national anthem ?". As seen above, there is only really two items that are truly relevant in this connection, namely those pointing to Richard Nordraak and Bjørnstjerne Bjørnson. The search report below shows however that no real filtering occurred :

> This is the search report for the search you ran on Oct 22 12:22:31 1995.
> It is a temporary file, and will expire about an hour after the search.

> Searching Articles...
>
> Your query was:
> [Who wrote the Norwegian national anthem?]
> The database contains 38,182,193 index terms in 109,209 documents.
> There are 767,925 different index terms. The plural stemmer was used.
>
> Who stems to Who, which is not present; trying lowercase who.
> who stems to who, which is not present OR present too often to be used.
> wrote stems to wrote, which occurs 7,917 times in 5,963 documents.
> the stems to the, which is not present OR present too often to be used.
> Norwegian stems to Norwegian, which occurs 1,240 times in 650 documents.
> national stems to national, which occurs 22,807 times in 13,110 documents.
> anthem stems to anthem, which occurs 227 times in 120 documents.
>
> The search found 18,726 documents. It took about 2 seconds.

> The search was performed by a WAIS Inc server: WAIS Server 1-0-11.
> For more information send email to info@wais.com.

The search gave 18,726 documents, which is over 5000 more than in the previous search for the anthem itself (which gave 13,670 documents). Also with regard to weighting, this second search was less "successful", since the most relevant items (those of Nordraak and Bjørnson) did not appear until number six and eight repspectively in the list of the ten first retrieved items (see **Appendix II**).

4. The problem of selective information retrieval in complex open hypermedia systems

One pressing problem seems, then, to be the need for the development of more sophisticated filtration methods and disambiguation devices for recovering items from large quantities of knowledge and information. Digital communication and media technologies already provide potential gateways to enormous amounts of on-line information, and as human beings we have only limited capabilities of sorting and integrating this into our individual and collective life-worlds. Facilitated informed choice is rapidly becoming a necessity. We still know far too little about the dynamics of the evolution of human knowledge, and about how such knowledge is socio-semiotically constituted and filtered in dynamic open systems like language and culture [see also Coppock, 1995c].

Distributed hypermedia systems, of which the World Wide Web is the best available example may also be considered dynamic open systems, and this necessitates a new understanding of the concept of the "node" mentioned previously in the more traditional conceptualisation of the hypertext structure. From the idea of a node as a more or less static set of semantically organised knowledge representations constituted as texts, we must begin to understand the node as a dynamic gateway or a window onto social fields of culturally instantiated and constituted understandings and meanings which are constantly changing, and which are being constantly revised and updated. This is reflected concretely at the level of the user-interface by the dynamic material links between documents distributed throughout the World Wide Web, often known as "Home Pages". The links made accessible from any given Home Page reflect and index in various ways the interests of the various people and the socioculturally constituted institutions "behind" the page in question. They also reflect the process of meaning-making as it occurs. It is not uncommon, for instance, while "browsing" such pages to find that previous links to other pages of related interest have been removed or updated from week to week, or even from day to day. A common icon to be found in World Wide Web pages is the little "road sign" with a man in a hard hat shovelling dirt symbolising "work in progress". Textual messages such as "This page is still under development", and "Watch this space for more information !" abound. Each page is thus a material representation, instantiated and construed through the use of an increasingly wide range of semiotic systems and codes, of a social field belonging to some area of the wider dynamic open systems of culture and science. Later I shall briefly mention other, even more dynamic material representations of such social fields, namely distributed text-based multi-user virtual environments, or MOO's, where the material instantiation and construal of meaning through interaction in written language may be studied in real time. First, however, I would like to discuss some issues related to the disambiguation of meaning as a social process.

5. Some potentials and limitations
of abductive reasoning systems
as computational disambiguation devices

In a recent report from SRI, *Interpretation as abduction* [Hobbs, Stickel, *et al.*, 1990], Jerry Hobbs and his co-workers discuss some problems related to interpreting texts. In their perspective, interpretation of the text is "a minimal explanation of why the text would be true". One must "prove the logical form of the text from what is already mutually known, allowing for coercions, merging redundancies where possible and making assumptions where necessary" [Hobbs *et al.*, 1990, p. 1]. This group denotes the problems they are working with as "locally pragmatic" ; involving "reference resolution, interpretation of compound nominals, resolution of syntactic ambiguity and metonymy, and schema recognition". Their proposed solution is by means of what is called "abductive inference", inspired by philosopher Charles Sanders Peirce's concept of abduction (or retroductive hypothesis). Hobbs *et al.* define abductive inference as "inference to the best explanation", or alternatively, viewing the process of "interpreting sentences in discourse (...) as the process of providing the best explanation of why the sentences would be true" [*ibid.*]. In their conclusion, they write that :

> "Interpretation in general may be viewed as abduction. When we look out of the window and see a tree waving back and forth, we normally assume the wind is blowing. There may be other reasons for the tree's motion ; for example, someone below window level may be shaking it. But most of the time the most economical explanation coherent with what we know will be that the wind is blowing. This is an abductive explanation".

This definition of abduction is however considerably more simplistic than Peirce's own formulations of abduction, one of which states that :

> "Presumption, or more precisely, abduction (...) furnishes the reasoner with the problematic theory which induction verifies. Upon finding himself confronted with a phenomenon unlike which he would have expected under the circumstances, he looks over its features and notices some remarkable character or relation among them, which he at once recognises as being characteristic of some conception with which his mind is already stored, so that a theory is suggested which would explain [that is render necessary] that which is surprising in the phenomenon" [Peirce, CP 2.776].

and elsewhere :

> "The surprising fact, C, is observed;
> But if A were true, C would be a matter of course,
> Hence there is reason to believe that A is true" [Peirce, CP 5.189].

For Peirce the "surprising fact" does not correlate with previous knowledge, and abduction is a necessary device to focus attention on the relations between aspects of features of the phenomenon which may seem

characteristic of already existing conceptions. Once an exploratory hypothesis is formed (through abduction), the investigator then has to use induction and deduction to formulate and test empirical investigations which might establish the practical consequences of the hypothesis being true. Abduction in the true peircean sense is thus more speculative ("presumptive") and innovative than the mere "filling in" of non-perceived causal relations implied by the example of the tree given by [Hobbs *et al.*] above.

According to Malinowski one must study human interaction in a *context of situation* in order to arrive at any deeper understanding of how cultural meanings are developed and constituted through language. As he points out :

> "(...) it should be clear at once that the conception of meaning as *contained* in an utterance is false and futile. A statement, spoken in real life is never detached from the situation in which it has been uttered. For each verbal statement by a human being has the aim and function of expressing some thought or feeling actual at that moment and in that situation, and necessary for some reason or other to be made know to another person or persons – in order either to serve purposes of common action, or to establish ties of purely social communion, or else to deliver the speaker of violent feelings or passions. Without the imperative stimulus of the moment, there can be no spoken statement. In each case, therefore, utterance and situation are bound up inextricably with one another and the context of situation is indispensable for the understanding of the words" [Malinowski, 1949, p 307].

In order to disambiguate situated complex meanings much more contextualisation of each utterance (*i. e.* accounting for the *situation of the utterance)* obviously seems necessary. There is also the issue of the interactions of the interpreter with the environment to take account of. Since Hobb's method [Hobbs *et al.*] seems grounded in what Vološinov has referred to as an *abstract objectivist* view of language [Vološinov, 1973], and the idea that it is possible to disambiguate meanings merely on the basis of "language internal" phenomena like reference resolution, compound nominal interpretation, syntactic ambiguity, metonymy resolution and scheme recognition etc., this is obviously problematic. Though they go on to outline further work with local pragmatics problems (*i. e.* lexical ambiguity, metaphor interpretation and resolution of quantifier scope ambiguities), recognition of discourse structure and the relation between the utterance and the speaker's plan and the drawing of quantity and similar implicatures, none of these approaches will be able to address the issue of how meanings are attributed by interpreters to situated utterances, for instance on the basis of on-going estimations of the relative importance of the utterance in relation to other on-going socio-semiotic processes of meaning-making occurring more or less simultaneously.

In order to solve disambiguation problems in language use I believe we need to move beyond an abstract, logically based semantics and

pragmatics and into studies of what Umberto Eco has referred to as principles of "decimation" [see Coppock, 1995c]. By decimation means the ways in which experts reduce the number of search choices they have to make in large amounts of information through knowledge of the norms, history and development of the field and the indexing to high quality information provided by established cultural norms and institutions. This means we have to find out more about how meaning is socially and culturally instantiated, actualized and construed, and how meanings are disambiguated by experienced researchers in specific contexts, as they often must be in new interdisciplinary fields of science where people with rather different intellectual, experiential and cultural backgrounds collaborate to reach common scientific goals.

7. Studying the development and the disambiguation of meaning in interpretative communities in distributed text-based multi-user dialogues

One place where meaning-making phenomena of this kind may be studied dynamically is in text-based Multi-user Object-Oriented environments (MOO's) such as Media-MOO[3] which is being developed at Massachusetts Institute of Technology[4] and Diversity University MOO at Marist College[5], as well as many other such educational and research environments sited at various locations around the world[6]. MOO's are basically object-oriented distributed database systems that facilitate on-line written language communication in textually created virtual environments between multiple users who are logged in simultaneously from anywhere in the world. What is novel about these environments, which are similar in many ways to the multiple communication channels available to users of IRC [Internet Relay Chat] and other kinds of multi-user communication media such as more conventional telephone, video-telephone and teleconferencing systems[7], is that participants "meet" one another in a virtual "space" which contextualises their written interactions by means of written language texts that use spatio-visual metaphors and other kinds of lexico-grammatical devices to describe the surroundings and objects which "furnish" and comprise the virtual environment.

To give a brief taste of how such environments manifest themselves for the end-user, here is a snippet of a session I had recently with Ulf Kastner, one of the "architects" on the Diversity University staff while I was in the process of making some preparations to bring some students to a series of on-line seminars I would be holding in the MOO-environment. Ulf was in the USA, and I was at home in Norway, logged on *via* a portable computer with a modem. The session began in this way (after I had passed through the initial logon screen which is included in the longer

[3]MOO means Multiuser dialog (or dimension) Object-Oriented.

[4]To reach Media-MOO, telnet to purple-crayon.media.mit.edu 8888 and log on as "guest".

[5]To reach Diversity University MOO, telnet to moo.du.org 8888 and log on as "guest".

[6]Today there are well over one hundred of these virtual environments around the world, all reachable via Internet. See for example the World Wide Web pages at TECFA [http://tecfa,unige.ch] and the MOO-lists at [http://www.ncsu.edu/u nity/users/a/asdamick/w ww/moo.html]; [http://lucien/berkely.ed u/moo.html]; [http://uu-gna.mit.edu:8001/uu-gna/schools/index.html] for more information on this.

[7]See [Coppock, 1993a, 1993b, 1993c, 1994a], [Coppock, Greftegreff, 1993], [Coppock, Greftegreff, Schröder, 1992] for discussion of some limitations of video-telephone and televideo conferencing systems.

transcript from this particular session in **Appendix III**) to the main entry point (The Student Union Center) :

Student Union Center

You are standing in the Student Union of Diversity University. There is an
old red couch in the corner, usually occupied by sleeping students. Several
halls lead from the room, and large glass doors on the southern wall lead
outside.

Warning: Anything said in this room is subject to being logged for research
purposes. Research is vital to the continued survival of DU so we hope you will
understand.

Exits include: [west] to Learning Hall [1-2], [south] to LSU Street [200 block],
[east] to Underground corridor [SU ↔ Admin], [north] to Entertainment Hall,
[northeast] to Student Union Elevator, [northwest] to Universities Room, [Up] to
Help Desk, [southeast] to S.U. robot-testing room

JasonG [Pessimistic Philosopher/musician/Physicist] is standing here.
You see Test Survey, DU Directory, EVENTS [9 notes], Yellow Pages!, Aquarium,
Diversity Survey, Help Desk Sign [hd], MOOList, DU Places of Interest [POI], and
DU AIDS Memorial Quilt Poster here.

Last connected Mon Oct 9 13:59:10 1995 EDT from anvpc.avh.unit.no

*********** ATTENTION: There are new news items to read! **********
*************** Type 'news' for more info. ********************
There is new activity on the following lists:
*General [#1017]   200 new messages

@go icde
I see no "icde" here.
[from Ulf's Office [working]] Ulf waves to you.
@go icde
I see no "icde" here.
page ulf hello, where has icde gone?
Somewhere in Ulf's Office [working], Ulf listens up as you talk to him.
@join ulf
Looks like Ulf's Office [working]..

Empty. Gray walls, linoleum floor and a lightbulb hanging from the ceiling.
You see a note and raum lying in a corner of the room.

```
Ulf [steelworker] is sitting on the linoleum floor. You are standing
amidst the
emptyness.

From here you can go:              [north] to a test of newbie
facilities
[out] to Administrators' Hall [1-2]

You join Ulf in Ulf's Office.
You say, "hello"
Ulf bows to you.
You say, "did you get my page"
Ulf says, "it should now be referred to with `conference center'"
patcop smiles and bows
Ulf decided to rename the public room handle for it after he was
done refurnishing.
Ulf says, "let's go there right away..."
Ulf says, "ok?"
You say, "fine, so I write @go conferance center"
Ulf says, "or simple> @go conf or something, yes"
Ulf gets on his feet.
Ulf disolves into a mass of ones and zeros and vanishes.
You say, "OK fine, see you there"
@go conf
```

When I arrived at the main entry point I had in fact planned to go directly to the ICDE conference center that I had visited on a previous logon at Diversity University MOO, where I intended to stage the virtual meetings with my graduate students. As the sequence of events shown above, and my subsequent conversation with Ulf reveals, the virtual conference center had in fact been "rebuilt" and "renamed" since the last time I was there. My call to the system @go ICDE then resulted in an error message ("I see no «icde» here") from the system to me. What I then did was to seek some help from Ulf who had already made his presence felt by waving to me from his virtual office. To initiate my query I used the paging function which allows communication with other people even if they are not in the same room to ask a question ("page ulf hello, where has icde gone?") before I joined Ulf with the help of the @join function in his office. After some social niceties (bowing and smiling etc.) we went together to the conference center and continued our discussion there (see **Appendix III** for some more of the discussion).

The potential of such distributed multi-user dialogues is large, but I do not have time to discuss this issue in depth here. The functionality (in terms of the communicative functions and discourse norms facilitated by the system) is as yet fairly elementary, and there are still some problems with the representation of other languages than English, since the virtual discourse is mediated as text by means of the restricted ASCII set of characters which do not allow the use of conventional diacritic markers as in French and Spanish, and extended ASCII-set characters such as [æ], [ø] and [å] in Norwegian. The most important aspect of such environments,

and the one which I find especially interesting in the present context is the fact that all communication in the virtual environment may be logged in real time, as I did above. This gives unique possibilities for more profound research into the question of how (scientific) knowledge at many levels of complexity is socioculturally constituted and instantiated. There is no need for transcription in a MOO, which often causes problems when one is working from audio or video tape-recordings of interactions, since the participants themselves actualise everything that they say or do as written texts as they interact in real time through writing their utterances and actions to one another in the virtual environment. The fact that participants can also take part in constructing and designing the virtual physical environment while they are simultaneously interacting with one another in the self-same environment that they are creating means that one avoids to some extent the problem of the context of situation being experienced as "artificial", something can be a considerable methodological problem in conventional experimental studies designed and carried out within such fields of science as sociology, pedagogy and psychology. Since this is a new, emerging area of human culture with rapidly changing norm-systems, the researcher too will be at the same time both participant in, and observer of (also of his or her own processes of interactional and textual norm development and change) the processes of constitution of the virtual culture [see Coppock, 1994b, 1995a, 1995b].

8. Continuing the trajectory

In this paper I have tried to show how the authority of the traditional paper encyclopædia as reference work based on the notions of completeness and up-to-dateness in relation to some set of "canonical" knowledge base is challenged by the dynamicity of the evolution and representation of knowledge in emerging network-based interpretative communities in the digital virtual environments being made accessible by means of the Internet. With increasing degrees of integration of the above-mentioned MOO-environments with other, more asynchronic kinds of networked discussion forums such as UseNet News and e-mail discussion groups and with the global hypermedia environment offered by the World-Wide-Web, the multimedia encyclopædia will probably be transcended as we come closer and closer to a globalized and truly "open work", where we will be able to retrieve, study and interpret new knowledge *as it is in the process of developing*. The borderlines between the sphere of so-called canonical knowledge and more peripheral areas of culture where new knowledge is still emerging will become less and less clear. For this to be a fully functional environment for end users, however, more sophisticated

navigational, information filtering and participational devices and systems will need to be developed. Attempts to transfer conventional models of authoritative encyclopædic works to the Internet may fail because there is still too little knowledge about how knowledge is socioculturally constituted in such environments, and about how human interactions in dynamic open systems of language (and other semiotic systems) function to disambiguate and clarify knowledge in the process of it emerging. Research into the constitution, representation and disambiguation of knowledge in distributed virtual environments can provide important new insights into the dynamics of the evolution of these and other areas of human culture, and change the ways in which we think about the authority of knowledge, and how it is constituted, represented and communicated. Recently, the Hubble telescope gave us images showing us the birth of a new star over time. These images have already been made accessible all over the world *via* the Internet. In the longer term it is conceivable that the question of the up-to-dateness, comparability, openness and closedness of encyclopædic works will gradually become a non-issue, as we gain more and more direct access to material representations of the dynamic processes of meaning-making in the environment, and among ourselves, as they are going on.

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Appendix I

Results of a truncated [10 items] search in the Online Encyclopædia Britannica

Query: "What is the Norwegian national anthem?"

Britannica Online contains at least 10 items relevant to this query. If you don't find what you're looking for below, you may wish to expand your search [up to 300 hits]. Alternatively, you may wish to restrict your search to those articles containing all the terms in your query.

[•] national anthem [3,741 bytes]
> hymn or song expressing patriotic sentiment and either governmentally authorized as an official national hymn or holding that position in popular feeling. The oldest national anthem is Great Britain's "God Save the Queen," which was described as a national anthem in 1825, although it had been popular as a patriotic song and used on . . .

[•] Brun, Johan Nordahl [1,790 bytes]
> [b. March 21, 1745, Byneset, Nor.—d. July 26, 1816, Bergen], poet, dramatist, bishop, and politician who aroused national consciousness in Norway before it became independent of Denmark.

[•] Heiberg, Gunnar [Edvard Rode] [2,217 bytes]
> [b. Nov. 18, 1857, Christiania, Nor.—d. Feb. 22, 1929, Oslo], dramatist, exponent of Expressionism, considered the most noteworthy Norwegian playwright after Ibsen.

[•] Nordraak, Rikard [2,305 bytes]
> Nordraak also spelled NORDRAACH [b. June 12, 1842, Christiania [now Oslo], Nor.—d. March 20, 1866, Berlin [Germany]], Norwegian composer perhaps best known as the composer of the music for the Norwegian national anthem, " Ja, vi elsker dette landet" [1864; "Yes, We Love This Land"].

[•] Bjornson, Bjornstjerne Martinius [5,145 bytes]
> [b. Dec. 8, 1832, Kvikne, Nor.—d. April 26, 1910, Paris], poet, dramatist, novelist, journalist, editor, public speaker, theatre director, and one of the most prominent public figures in the Norway of his day. He is generally known, together with Henrik Ibsen, Alexander Kielland, and Jonas Lie, as one of "the four great ones" of. . .

[•] God Defend New Zealand [2,627 bytes]
> Maori AOTEAROA, one of the two national anthems of New Zealand [the other being God Save the Queen, national anthem of the United Kingdom]. The words to the anthem were written in the early 1870s by Thomas Bracken, who offered a prize of [{poundsterling}]10 for the best musical setting of it. The . . .

[•] Rouget de Lisle, Claude-Joseph [1,185 bytes]
> [b. May 10, 1760, Lons-le-Saunier, Fr.—d. June 26, 1836, Choisy-le-Roi], author of "La Marseillaise," the French national anthem. A lowly army officer and only a moderate republican, Rouget de Lisle never wrote anything else of significance. He composed both the words and music of "La Marseillaise" for his comrades in 1792 while stationed at . . .

[•] Advance Australia Fair [2,183 bytes]
national anthem of Australia, adopted on April 19, 1984. It was first officially proposed in 1974 to replace "God Save the Queen," which had been the national anthem from 1788 to 1974 and which, in 1984, was designated the royal anthem, to be played at public appearances of members of the British royal family.

[•] Key, Francis Scott [1,907 bytes]
[b. Aug. 1, 1779, Frederick County, Md., U.S.—d. Jan. 11, 1843, Baltimore], U.S. lawyer, best known as the author of the U.S. national anthem, "The Star-Spangled Banner."

[•] Heiberg, Johanne Luise [1,726 bytes]
née PFTGES [b. Nov. 22, 1812, Copenhagen—d. Nov. 22, 1890, Copenhagen], Danish actress and manager, lionized by the intelligentsia of her day.

[•] Query Report for this Search [1,276 bytes]

Appendix II

Results of a truncated [10 items] search in the Online Encyclopædia Britannica

Query: "Who wrote the Norwegian national anthem?"

Britannica Online contains at least 10 items relevant to this query. If you don't find what you're looking for below, you may wish to expand your search [up to 300 hits]. Alternatively, you may wish to restrict your search to those articles containing all the terms in your query.

[•] Brun, Johan Nordahl [1,790 bytes]
[b. March 21, 1745, Byneset, Nor.—d. July 26, 1816, Bergen], poet, dramatist, bishop, and politician who aroused national consciousness in Norway before it became independent of Denmark.

[•] national anthem [3,741 bytes]
hymn or song expressing patriotic sentiment and either governmentally authorized as an official national hymn or holding that position in popular feeling. The oldest national anthem is Great Britain's "God Save the Queen," which was described as a national anthem in 1825, although it had been popular as a patriotic song and used on . . .

[•] Rouget de Lisle, Claude-Joseph [1,185 bytes]
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[•] Key, Francis Scott [1,907 bytes]
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[•] Heiberg, Gunnar [Edvard Rode] [2,217 bytes]
[b. Nov. 18, 1857, Christiania, Nor.—d. Feb. 22, 1929, Oslo], dramatist, exponent of Expressionism, considered the most noteworthy Norwegian playwright after Ibsen.

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Nordraak also spelled NORDRAACH [b. June 12, 1842, Christiania [now Oslo], Nor.—d. March 20, 1866, Berlin [Germany]], Norwegian composer perhaps best known as the composer of the music for the Norwegian national anthem, " Ja, vi elsker dette landet" [1864; "Yes, We Love This Land"].

[•] Internationale, L' [1,429 bytes]
English THE INTERNATIONAL, Russian INTERNATSIONAL, former official socialist and communist song. It was the anthem of the First, Second, and Third Internationals and until 1944 the national anthem of the U.S.S.R.

[•] Bjornson, Bjornstjerne Martinius [5,145 bytes]
[b. Dec. 8, 1832, Kvikne, Nor.—d. April 26, 1910, Paris], poet, dramatist, novelist, journalist, editor, public speaker, theatre director, and one of the most prominent public figures in the Norway

of his day. He is generally known, together with Henrik Ibsen,
Alexander Kielland, and Jonas Lie, as one of "the four great ones" of
. . .

[•] Star-Spangled Banner, The [3,901 bytes]
   national anthem of the United States. Francis Scott Key, a lawyer,
   wrote the lyrics after watching the British attack Fort McHenry,
   Maryland, in 1814, during the War of 1812. The melody was taken from
   "To Anacreon in Heaven," a drinking song of the Anacreontic Society
   [of London] that was written by the British composer John Stafford . ..

[•] Southeast Asian Arts: Literature: EUROPEAN COLONIAL AND MODERN
PERIODS:
   The Philippines. [2,731 bytes]
   Philippine literature had its beginnings in great epics that were
   handed down orally from generation to generation and sung on festive
   occasions. When the Philippines became part of the Spanish Empire in
   the 16th century, printing was introduced, and all the early published
   works in the vernacular [Tagalog] were of Christian religious . . .

[•] Query Report for this Search [1,276 bytes]

Appendix III

Logg from the beginning of an interaction at Diversity University MOO

WELCOME TO
DIVERSITY UNIVERSITY East Campus
Address: MOO.DU.ORG [192.101.98.5] 8888
World Wide Web: http://www.du.org/places/du/

Diversity University MOO campuses are Internet locations for serious
experimentation in network-based, interactive teaching, learning and
social
services. Those wishing to further this community development are
welcome!

Free MOO Basics lessons: contact CindyT or MattWright online, or
du@du.org

The DU administration would like to thank the many volunteers
contributing
time and effort to further this vision. We would also like to thank the
Internet Multicasting Service, Embry-Riddle Aeronautical University
[ERAU],
and the Annenberg/CPB Project for their support in this venture.

Supporters of this project are not responsible for the content of any
material
 which may be found on this system.
 | @who - to see who is online
co guest - to have a look around
 | @quit - to exit Diversity University

co patcop
[Please enter your password]

*** Connected ***
Student Union Center
_____

You are standing in the Student Union of Diversity University. There is
an
old red couch in the corner, usually occupied by sleeping students.
Several
halls lead from the room, and large glass doors on the southern wall lead
outside.

Warning: Anything said in this room is subject to being logged for
research
purposes. Research is vital to the continued survival of DU so we hope
you will
understand.

Exits include: [west] to Learning Hall [1-2], [south] to LSU Street [200
block],
[east] to Underground corridor [SU↔Admin], [north] to Entertainment
Hall,
[northeast] to Student Union Elevator, [northwest] to Universities
Room, [Up] to
Help Desk, [southeast] to S.U. robot-testing room

JasonG [Pessimistic Philosopher/musician/Physicist] is standing here.
You see Test Survey, DU Directory, EVENTS [9 notes], Yellow Pages!, Aquarium,
Diversity Survey, Help Desk Sign [hd], MOOList, DU Places of Interest [POI], and
DU AIDS Memorial Quilt Poster here.

Last connected Mon Oct 9 13:59:10 1995 EDT from anvpc.avh.unit.no

*********** ATTENTION: There are new news items to read! ***********
*************** Type 'news' for more info. *********************
There is new activity on the following lists:
    *General [#1017]   200 new messages

@go icde
I see no "icde" here.
[from Ulf's Office [working]] Ulf waves to you.
@go icde   `
I see no "icde" here.
page ulf hello, where has icde gone?
Somewhere in Ulf's Office [working], Ulf listens up as you talk to him.
@join ulf
Looks like Ulf's Office [working]..

Empty. Gray walls, linoleum floor and a lightbulb hanging from the ceiling.
You see a note and raum lying in a corner of the room.
Ulf [steelworker] is sitting on the linoleum floor. You are standing amidst the
emptyness.

From here you can go: [north] to a test of newbie facilities
[out] to Administrators' Hall [1-2]

You join Ulf in Ulf's Office.
You say, "hello"
Ulf bows to you.
You say, "did you get my page"
Ulf says, "it should now be referred to with `conference center'"
patcop smiles and bows
Ulf decided to rename the public room handle for it after he was done refurnishing.
Ulf says, "let's go there right away..."
Ulf says, "ok?"
You say, "fine, so I write @go conferance center"
Ulf says, "or simple> @go conf or something, yes"   ·
Ulf gets on his feet.
Ulf disolves into a mass of ones and zeros and vanishes.
You say, "OK fine, see you there"
@go conf
DU Conference Center Foyer

A spacious foyer kept in dark shades of pastel colors and white. On the carpetfloor you see shoeprints [the kind you get on freshly vacuumed carpet]
that accummulate to a straight track leading from the northern conference room
to the one in the south and back. An enormous couch which curves around a round

table in a semicircular shape occupies most of the southwestern area.
From here you can go: [north] to Conference Room [North]
[east] to Grand Hotel Main Entry [south] to Conference Room [South]

Ulf [steelworker] and you are standing here.
Ulf says, "'@go con' is good enough as well, apparently"
You say, "Fine, I'll have to gen my students on that then. No problem"
Ulf says, "but that's only because the conference center comes before the
contractor's trailer in the alpbhabetized list :>"
Ulf lowers himself down onto the couch.
You say, "Now, the next question is, will there be a lot of activity there in october"
You say, "Do I have to reserve room times?"
Ulf thinks he finished fixing the conference center up
You say, "Any big improvements or innovations?"
Ulf says, "i think not...there will only be occassional meetings of groups that
are preparing for workshops in november, at the next DU conference in west virginia.."
Ulf says, "you have priority to those, in any case. you were the first to express interest in using these facilities during that time."
Ulf says, "and if we should ever run into room problems."
You say, "OK, that's fine."