

A (Cybernetic) Musing: Encyclopaedias and the Form of Knowing. A Celebration of Charles Francois’ ‘International Encyclopaedia of Systems and Cybernetics’, a Sort of Self-referential Work of Reference.

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I

I'd like, in this column, to celebrate Charles Francois' astonishing 'International Encyclopaedia of Systems and Cybernetics' (Saur, Munich, 1997). This mammoth undertaking, already reviewed in *Cybernetics and Human Knowing* (and other journals) is the outcome of an act of the greatest generosity towards our field and community. I believe, therefore, that it is an essentially cybernetic act: because, for me, cybernetics can only exist where generosity is the presumed mode of behavior. Cybernetics requires generosity: it requires generosity from us in our behavior, and, if we wish to benefit from having it, cybernetics also requires that we behave generously to get that benefit..

In form, Francois's Encyclopaedia is more like an extraordinarily rich dictionary than Encyclopaedia Britannica (which I have used as my main source for insights into what might constitute an Encyclopaedia), but the difference between the two is no longer easy to pinpoint, nor is it very important — as Encyclopaedia Britannica readily admits.

I want to thank Charles Francois for this generous gift. The way I chose to do this is not by writing, straight forwardly, yet another critical review — which I could do no better than has already been done. I would like, instead, to reflect on what the notion of Encyclopaedia has to offer us, how Francois' Encyclopaedia does this (in this respect I am, of course, writing a view), and how we may use what he does — that is, to consider the International Encyclopaedia of Systems and Cybernetics *qua* Encyclopaedia — to place his work in a context where the form of what is said is considered as important as the content. To do this, I shall dig back to my student experience at the Architectural Association in London,

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where I first began to get an inkling of the riches available, when one thinks this way.

In the remainder of this text, I shall differentiate between two Encyclopaedias. Francois' one will be referred to as either IESC or Francois' Encyclopaedia. The general notion of Encyclopaedia will be referred to as Encyclopaedia.

II

One of the most impressive books I read when an architecture student was Erwin Panofsky's 'Gothic Architecture and Scholasticism'. Panofsky argues that Scholasticism consists in, amongst other things, a scheme for arranging (and disputing) knowledge: scholastic knowledge is organized according to Augustinian Christian theological principles, and knowing any one piece of knowledge and where it exists in the scholastic scheme permits the knower to re-create any other part, and hence, eventually, the whole of (scholastic) knowledge.²

Panofsky argued that the Gothic Cathedral actually and literally embodied the scheme of the Scholastic method. The structure of the cathedral plan can be interpreted in variants of the Trinity (through division by 3), as can the vertical division of the wall space. The walls indicated a hierarchy. On the walls, carvings indicated the structure of the scholastic notion of hierarchy. And so on.

It is of no concern here whether Panofsky was right or wrong in his interpretation of Scholasticism. (In fact, mediaevalist scholars from the Courtauld Institute in London have told me his understanding was profoundly in error.) What interests me (inevitably, since I am a cybernetician) is the effort to show a parallel between a way of thinking and of organizing knowledge at a particular time and in a particular culture, and the artifacts produced by members of that culture — a tradition maintained in architecture by the Norwegian scholar Christian Norberg-Shulz (in particular in his 'Meaning in Western Architecture').³

Panofsky made another claim in his little book. He asserted that the other great product of the scholastic method was the Encyclopaedia, at least in more or less the form in which we know it nowadays. He claimed that the first modern Encyclopaedia, as composed by the monk Bartholomaeus Anglicus (Bartholomew de Glanville), was organized within scholastic epistemology: the structuring of the knowledge contained was, just as in the cathedral, organized through the Scholastic interpretation of the world, and the knowledge contained within his Encyclopaedia was used to support that view. What differentiated Bartholomew's Encyclopaedia from earlier ones was the conscious intention of the structure and the structuring device (the form), which gave a particular and well-understood

- [2] The similarity to self-similarity and other apparently recent concepts recently (often) borrowed by biologists from automata theory will be immediately apparent.
- [3] Whether the parallel Panofsky draws is accurate is of less importance, in my appreciation, than that he tries to draw it, and, in so doing, shows something of his mind's workings on how analysis can help us, giving us an in sight into ways of conceiving the world.

spin to the knowledge (content) it presented. The knowledge was formed into an intentional embodiment of the encyclopaedist's epistemology. Following in these footsteps, the modern Encyclopaedia is a project not only for collecting all knowledge about all things (well, a lot of it about a lot of them, anyhow), but is also concerned with the assembly of these pieces of knowledge so that they fit together in the ('correct' and more or less explicit) epistemic pattern.

So what is crucial about the Encyclopaedia? What is crucial is that it is not just a body of knowledge (with claims at some approach towards completeness or wholeness), but a body that has a structure which explicitly reflects a specific attitude to that knowledge. As well as the content, there is a most specific form (not in the sense of Spencer Brown, for instance, but rather in the sense of musical form). In the case of Bartholomaeus as a Scholastic, Panofsky claimed, the organization of the items of knowledge within the whole was determined by the scholastic structure — with the aforementioned property that, if you knew where any piece of knowledge fitted within that structure, you should be able to re-create any other piece of knowledge, and indeed the whole body.⁴ Thus, each piece of knowledge (bit of content) existed within a framework (form) which, together, made up and even generated the whole. Of course, this (scholastic) whole was God given and reflected God's organization. It was not seen as constructed, but as the discovery of the given.

Let me reflect for a moment on this theme of form and content. In my contribution to the Festschrift I edited for Heinz von Foerster, I introduced the argument that one reason certain pieces of von Foerster's published work were distinctive was because, in those pieces, the form reflected the content, the content the form. (I claimed this as a requirement for art, where, at very least a new whole is made, whether an object or somehow altogether more conceptual — or there are instructions as to how to make one). I claimed that at least certain of von Foerster's papers had the distinction that their form reflected the argument being presented, thus generating a special quality, power and conviction, and I related how when I'd first heard him talk this was what I'd noticed. In this respect, my analysis that von Foerster's work reflects an important aspect of art, finds a reflection in the scholastic form of the (first modern) Encyclopaedia.

What, then, can we expect from an Encyclopaedia — a container of all knowledge — not so much in terms of content, but in terms of form? In his paper 'Beyond Hands-on: Truth-telling and the Doing of Science', James Bradburne (who used these findings as the basis for his recent design of the displays in Renzo Piano's 'New Metropolis' Museum of Science in Amsterdam) indicated that the organization of material in a Museum (and, therefore, to the extent that a building at least provides an envelope to accommodate what goes on inside, its

[4] A remarkably modern concept, now we have (contrastingly) DNA and autopoietic systems.

architectural form)⁵ reflects a specific attitude to knowledge. Following Linneus, the Museum became an Aladdin's cave of taxonomy, a repository for any and every possible collected artifact. These artifacts become organized into classes or groups according to taxonomies discovered through studying them as objects treated as (arti)facts. This approach reflects the notion of the observer (scientist) as impartial and detached, not bringing opinions but revealing the true and incontrovertible scientific facts of the natural world, previously hidden, for all to see.⁶ Thus, the items on display are objectified, reverently displayed in isolation and untouchably remote from the visitor, and organized into groups — the taxonomical classes — rather than as we might find them in Nature, for instance. Current 'hands-on' displays, such as Bradburne's ones in Amsterdam, reflect the inclusion of the observer, the recognition that knowledge is the result of active construction, and a richness of connection and grouping rather than an overriding uniformity.

The analysis presented in Bradburne's paper reflects into the contemporary Encyclopaedia, but with one further step. No longer are Encyclopaedias just thorough, dry collections of authoritative summaries of all known (supposedly truthful) facts, for they are now seen as sources of pleasure, play and learning. In this transformation, something more has happened. Dictionaries have begun to resemble Encyclopaedias and Encyclopaedias Dictionaries. In particular, Encyclopaedias have come to resemble Dictionaries in the creation of lexicographical loops of cyclic linkage (for Dictionaries are essentially tautological).

One convenience of words and pictures (and sounds and videos) is that they are relatively reproducible and portable in a way that many objects aren't. This fact goes well with the notion of loops of cyclic linkage. The emergence of Ted Nelson's promotion of 'HyperText' has brought to our attention and extended such possibilities. In effect, this means that a contemporary epistemology, reflecting these understandings would involve not only the observer as active, but as active in creating new paths and particular routes forming groupings from the inconceivable plethora of the potentials provided. We can take, following Nelson, Pask's entailment mesh learning environments (starting from the embodiment of a richly linked subject matter in his system CASTE), semantic nets and, more recently, the World Wide Web, as embodying a concept of knowledge in which the observer is active, navigating routes and each creating his/her own 'totality' of knowledge, as he/she understands it through living his/her own routings and making his/her own groupings. This is not to assert, as seems to be the case in

[5] By way of emphasizing this point, a former architecture student of mine, Dr Annetta Pedretti, once designed a library that was a literal, three dimensional embodiment of the Dewey Decimal system of library classification.

[6] It is amusing to note that Linnaeus's botanical and biological taxonomy, morphological in construction, has recently been found to be terribly inaccurate when the basis of grouping is genetic, and to wonder what resulting changes in Museum exhibits might result.

Post Modernism, that all imaginable routes are acceptable, or even possible.⁷

In a paper to be published shortly, Jacqueline de Jong makes an interesting observation about the nature of ‘HyperText’ (by implication, all Hyper-Media). Her point is that a true HyperText must at least be electronic because the link must appear to the reader immediate and seamless — the nature of Hyper-Media is that links create instant continuity and therefore there are, to a reader, not separate documents: it is one text. This is also very much in keeping with the original specification of the world wide web, where (parts of) documents can be brought to appear through windows within others. However, this purist position is not yet always practicable. For this reason, I am still prepared to consider printed Dictionaries and suchlike as HyperTexts.

III

What I have tried to show, above, is this: first, in the Encyclopaedia (and in buildings and the arts) there is a significant and important link between the content and the form within which the content is integrated, organized and presented; second, that the nature of the link, that is the form the Encyclopaedia, is not fixed, but reflects particular epistemologies associated with particular times and contents.⁸

I would like to look at the International Encyclopaedia of Systems and Cybernetics, in the light of the above, to consider what sort of Encyclopaedia it is. Before I do that, however, let me say that I recognize the vast amount of work Francois has done, and in talking of alternatives and possibly better decisions, and in offering criticisms, I do not wish to take away from his generous act. I know I, for one, could never have approached this task, let alone have realized it so well.

The key to the IESC is that it is what I will call a Dictionary type of Encyclopaedia. By this I mean that it consists of a lexicon of terms rather than a collection of themes or concepts as often embodied in the authoritative article (although it does use a nice system in which the terms defined are related to one or more of 5 themes: 1) general information, 2) methodology or model, 3) epistemology, ontology and semantics, 4) human sciences, and 5) discipline oriented). It would be possible to present a work based around central concepts for instance control, mechanism etc (as is being done by the editor of this journal and his colleagues and in the Principia Cybernetica project); around the work of

[7] It is worth noting that hypertexts were created by artists long before Nelson. For instance, B.S. Johnson wrote a novel in which the sections may be read in any order (unfortunately I cannot trace my copy): and before that, I (together with many others) was composing music in which there were alternatives in the score, or the sequence and inclusion of material was at the performers’ discretion: and I was often merely borrowing devices introduced in the 1950’s by, for instance, John Cage and Karlhienz Stockhausen. The history goes back long before that with isolated examples. Modern dictionaries are, of course, eventually circular hypertexts constructing tautologies through their loops of cyclic linkage.

[8] Maybe I am over-labouring the point, for there can be few, at least among the readers of this journal, who still believe that, given the current state of our understanding, form is (or can be) neutral.

specific leaders in the field (as on the ISSS web site, under the heading of luminaries); through historical development; or by means of schools (eg first and second order, technical and philosophical approaches, etc).

Francois's choice is realized in the following manner. The large number of entries — nearly 3000 — is organized alphabetically, taking up almost 400 pages of A4 paper in 3 dense columns. Entries are typically 'defined' though the use of attributed quotes which are referenced through 1200 reference articles etc. There is a commentary, which may also bring in further quotes. Occasionally, the commentary is an 'opinion'. Occasionally antithetical remarks are introduced. In fact, Francois' Encyclopaedia is in the grand liberal tradition and makes room for many opposing views, contrasting them without favor, another expression of the generosity of his undertaking. The concomitant is that entries may on occasion seem to lack focus. Some terms are also subdivided, so that, for instance, control is presented through several sub-terms (eg. CONTROL (Forms of), CONTROL (Time-lag in)). Within the body of each entry, other IESC terms are highlighted in bold, so the reader knows they may, in turn, be looked up.

The use of the dictionary type of encyclopaedia form, the lexicon of terms, gives Francois the nearest print equivalent to an electronic HyperText, especially through his use of bold type to highlight and promote authorized links. This offers the reader an inducement to explore (and hence to interpret) the field at a level other than the interpretation of words. Whereas the more familiar encyclopaedia, with its 'authoritative' articles, plays to a notion of givenness and authority (Encyclopaedia Britannica (www.eb.com) has a section on how encyclopaedia articles come to be valued as authoritative), Francois's Encyclopaedia is much more open.⁹ In his introduction, he admits that the work is incomplete, that it should be continued in order to cover the gaps of his resources, understanding, insight, etc. In this, Francois is creating, within the limits of printed media, a form that reflects current epistemology — or at least the epistemology that cybernetics eventually requires us to take on board. Of course, this will not prevent those who wish to treat it as authoritative, as Encyclopaedia Britannica shows us we have learnt to do.

Francois chooses (within the limits of the practicalities on offer to him) a form that supports a very contemporary understanding of the observer and his/her role in knowing. That is, he offers a HyperText with the implication always present in HyperText, that there is no complete and authoritative version, only particular interpretations (routes through, connections together): that the observer (reader) is to make (construct) his/her own world of understanding, knowing there are always alternatives and that whatever they find they find now and may not be regarded as complete in the sense that the list of all possibilities has been approached. (If one were to use the IESC as a text book one would, therefore, be faced with the

[9] I have recently discovered that a second, revised and expanded edition of the Encyclopaedia is planned — in the fairly immediate future. Charles Francois is anxious to receive material that will improve and/or enrich the current version. I have offered to help with this, and I hope that readers may also want to.

question that crucially faced Gordon Pask when he developed his ‘Entailment Meshes’ of knowables — themselves HyperWorlds — as to how to test that a student understands a subject matter.) In Francois’s Encyclopaedia the assertion of the form is that we make our own understandings — in effect, we construct our own content.

Nevertheless, there are problems with the content, at least as far as I am concerned. For the purposes of writing this piece I read all the entries associated with those cybernetic ‘fundamentals’, control and communication. Under communication entries (just short of 6 columns) I found the word conversation only once. The entries are essentially based in Shannon and Weaver, rather than more recent dialogical understandings (including understandings of what is necessary for the Shannon and Weaver model to have any sense and become adopted).¹⁰ And yet, to my surprise (given the author’s relatively first order position), under the control entries (7 columns) I found no reference to the control engineer William Powers, who has argued forcefully (if not to my satisfaction) that classic notions of control entirely accommodate the offerings of second order cybernetics: which cybernetics reshapes our notion of control but which is scarcely mentioned under the various headings.¹¹

I don’t believe these are very important, let alone terminal, ‘faults’, however, because the form of the IESC indicates that entries are not to be taken to be authoritative. The fact that there are problems means that the debate which is implicit in the collaboration Francois invites in his introduction is indeed both possible and to be taken seriously. The author requests collaboration, participation, extension, enrichment. Indeed, anyone else reading these entries might well consider my points unfair or even downright inaccurate. And who am I to disagree?

This is the great strength of IESC, and, indeed, tells us of its use. For me it is not, nor does it claim to be, authoritative, albeit that it is composed by someone with, and of great authority.¹² It is a generator of discussion, even a partner in a dialogue or conversation. I shall use it with students as a way to begin discussion and debate, as an agent provocateur that prods them to articulate their ideas and understandings and to explore them in proximity to mine. And, for myself, I shall use it to provoke me to clarify what I think and to remind me to remain sceptical

[10] For any who doubt the pervasive influence of Shannon and Weaver, look at the entry under COMMUNICATION (Physical), which is entirely based in an electromagnetic realization. Not a word on pieces of paper, smiles etc!

[11] I also did the equivalent of ego-surfing the references. I would not have chosen most of the papers of mine that Francois did. Nor would I have chosen the papers that were chosen of those others whose work I believe I know fairly well — but, as Francois points out, he, like all of us only had limited access: access which, in South America, may be more difficult than in some other places.

[12] I know of no other source of reference that is so wide in its language base. Francois, a French speaking Belgian living in Argentina, is a better polyglot than most of us and has used this ability to create a list of references that extends far beyond the limitations of any one language community. This, alone, gives the Encyclopaedia a very special value.

about my own assumptions and understandings, opening them up to examination, refinement and enrichment—against a broader context than I, alone, can provide.

Thus, although one may disagree with the content of the entries, one is aware that each entry is always implicitly open to modification (as Francois notes in his typically modest introduction). I would ask every reader of IESC to bear this, and the other points made in the author's introduction, in mind and take them seriously — even the reader new to the field. IESC can guide, provoke, inform, challenge, extend and join in a conversation even when you read it on your own. What it cannot do is instruct.

As such, this is an Encyclopaedia for our time. Its form explicitly and intentionally reflects its content, which reflects the epistemological ideas shared by this community — that the observer is actively involved; that we construct our world view and the knowledge we populate it with; that each has his/her own view; that we learn and change; and so on. So its relevance is not only in what it tells us but in the way what it tells us is structured — how it tells us, in both its content and its form. A sort of self-referential work of reference.

A last word, then. This is an expensive book (at 398 DMk) and many will not be able to afford it. But it is a real gem, and could, if well used with the generosity of spirit the editor has shown us, contribute enormously to the development of this field. If you cannot afford your own copy, find a way of getting your library to get it for you. And use it to improve it!

Post Scriptum

I have wondered for a long time about the relationship between form and content: the old addage of the Modern Movement in Architecture, that Form Follows Function (i.e., a special form of Content) is one I grew up with. That Content Follows Form was less obvious, although it is clear in at least some classical arts that there are forms which are the givens, and the content must fit in with them (eg the musical fugue).

In reflecting on my piece about Charles Francois' Encyclopaedia, the following occurred to me.

We live, now more than perhaps previously, in a world in which 'anything goes', as Feyerabend told us. This is not just a result of Post-Modernism. It comes, equally, from our understandings of Physics, and from Second Order Cybernetics, to name just two.

Where anything goes, or almost anything goes, there is the problem of where to begin and how to focus. This is demonstrated most clearly when new technologies enter the arts: I think especially of the terrible music made when electronic means of music making were first introduced (in the 1950's, long before synthesisers), in large part, I submit, because since any sound could be made, it was hard to know what to leave out and where to begin: ie, there was no structure!

I would like to suggest that one way we can reflect a structure into the anything goes era we live in is to ask that Form should reflect Content, and (since we do second order cybernetics) Content reflect Form. I think this may be why works which not only say what they are, but say it in a way that reflects what they are, can be so powerful and convincing. Where what is said and how it is said are, essentially, the same.

Of course, I am wearing my artist's hat, in saying this. And why not?

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Web Sites

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Cybernetics and Human Knowing Thesaurus:<http://www.bakery.demon.co.uk/thesaurus/>
Encyclopaedia Britannica: www.eb.com