Design is the Alternative to *Tradition*

Dino Karabeg

Abstract

***Design* is a *cultural paradigm*, alternative to *tradition* which is no longer functional. The transition to *design*, however, will not develop in the *traditional* way; it must be *designed*. *Information design* (creation and use of information which suits the *design paradigm*) is identified as the key step in this transition. The Polyscopic Modeling *information design methodology* is proposed as a prototype based on which *information design* may be developed.**

KEYWORDS: Design, information design, information design methodology.

Introduction

There are good reasons to consider design as more than just a profession (Simon, 1969), (Nelson and Stolterman, 2003).

The definition I would like to propose identifies *design* as not only a profession, but also as a certain manner of thinking and acting, and as a principle according to which most other things in a culture can be recreated. I will call such manner or principle a *paradigm* and argue that the *design paradigm* has become natural and necessary, because it needs to replace the older *paradigm*, the *tradition*, which can no longer be relied on (my *main point*).

The challenge I am facing is that if design is indeed a *paradigm* in its own right, then it might be difficult or even impossible to establish its methods and its values on the terrain of the old *paradigm*. The same challenge, to embed the 'design way' solidly in the academic tradition, is reflected in many of the discussions and in the very purpose of the PhD-Design Internet discussion list, among others. In response to this challenge I will argue that the traditional academic approach is not as solid as it may seem, that it has fundamental difficulties, and that those difficulties can be resolved by using the *design* approach.

This, however, leaves us with a seemingly impossible task of establishing the 'design way' in an academic way. I will show how this vicious cycle can be broken by *bootstrapping*: By first designing a small, relatively self-contained part of the *design paradigm*, and then using it to *design* whatever else that is

needed. I call this initial piece *information design. Information design*, as I am using this term, is the way of creating and using information which suits the *design paradigm.* I use italics to distinguish the *designed* concepts from the *traditional* ones, and ask forgiveness for using those concepts before they are properly defined. Their new meanings are sufficiently similar to the *traditional* ones to allow for good-enough initial understanding. If there are differences in meaning, they will become clear as we go along.

I call my prototype *information design* design "Polyscopic Modeling methodology". In what follows, Polyscopic Modeling will both provide the methods for definition and *justification*, and serve as example illustrating the *design* approach and its value.

I will use some of the questions posed by EAD6 conference as benchmark to test my approach by outlining the way how they can be answered by using Polyscopic Modeling. More precisely, I will sketch an argument, which combines Polyscopic Modeling and evolutionary thinking or memetics, and establishes (in the Polyscopic Modeling sense of the word) my *main point*.

This entire article may be thought of as a *design* sketch. My intention is to outline the main ideas in terms of brief notes, and make them available for discussion.

Epistemological underpinnings

In this section I would like to point to fundamental epistemological insights, which have been developed within science during the past century, in order to explain why I believe that the *design* way needs to replace the *traditional* academic (scientific or philosophical) approaches as the foundation for establishing facts, and more generally in information making.

Based on experimental insights (see, for example, Feynman, 1967), during the20th century the leading physicists shifted from the view that science is discovering the true picture of reality to the view that scientists are constructing *a* version which best explains the experience. Although this shift is relatively well known and well recognized, I will still take a moment to illustrate it by quoting one of them, Albert Einstein, because the epistemology change is crucial for what I am about to propose.

Einstein was well aware that the project of 'discovering reality' was laden by illusion: *During philosophy's childhood it was rather generally believed that it is possible to find everything which can be known by means of mere reflection. (…) Someone, indeed, might even raise the question whether, without something of this illusion, anything really great can be achieved in the realm of philosophical thought– but we do not wish to ask this question.*
This more aristocratic illusion concerning the unlimited penetrative power of thought has as its counterpart the more plebeian illusion of naïve realism, according to which things "are" as they are perceived by us through our senses. This illusion dominates the daily life of men and animals; it is also the point of departure in all the sciences, especially of the natural sciences.
(Einstein, 1944).

About our ability to arrive at the conclusive picture of ‘reality’ Einstein was quoted as having said: *Physical concepts are free creations of the human mind, and are not, however it may seem, uniquely determined by the external world. In our endeavor to understand reality we are somewhat like a man trying to understand the mechanism of a closed watch. He sees the face and the moving hands, even hears its ticking, but he has no way of opening the case. If he is ingenious he may form some picture of a mechanism which could be responsible for all the things he observes, but he may never be quite sure his picture is the only one which could explain his observations. He will never be able to compare his picture with the real mechanism and he cannot even imagine the possibility or the meaning of such a comparison.*
(Einstein, 1938)

The popular culture still identifies the ‘scientific worldview’ as whatever can be explained by causal reasoning in terms of ‘scientific concepts’ which, it is believed, correspond to reality. Einstein stated his epistemological position as follows: *I shall not hesitate to state here in a few sentences my epistemological credo. (…) I see on the one side the totality of sense experiences and, on the other, the totality of the concepts and propositions that are laid down in books. (…) The system of concepts is a creation of man, together with the rules of syntax, which constitute the structure of the conceptual system. (…) All concepts, even those closest to experience, are from the point of view of logic freely chosen posits, just as is the concept of causality, which was the point of departure for this inquiry in the first place.*
(Einstein, 1949)

The mentioned epistemology shift made the key developments in modern physics possible. Einstein’s legendary breakthrough, for example, was in essence a redefinition or redesign of the key concepts of traditional physics such as ‘mass’, ‘velocity’ and ‘distance’.

Most of the scientists did not argue their epistemological position within the philosophical tradition; they simply continued doing their job in a new way. Those who did, said that the scientists were not discovering the reality but constructing it. In the philosophical tradition this position was called ‘constructivist’ and was given a somewhat controversial status.

Although the constructivist position has been more than sufficiently established through physics, and then also through cognitive science, linguistics and sociology, there is still room for controversy because this position leads to two problems, one theoretical and one practical.

The theoretical problem is as fundamental as “What do we really mean when we write something, say, in philosophy or in science?” This question becomes problematic if we give up the assumption that we are saying ‘how the things really are’. Even the statement ‘we are constructing reality’ is problematic because if it is ‘really true’ then it cannot be ‘really true’, it must be only a construction.

The practical difficulty that constructivism leads to is relativism. If we accept the constructivist position, then it appears that everyone has the right to say "If we all are constructing reality, what makes you believe that your constructed reality is better than mine?"

Polyscopic Modeling epistemology and approach

In Polyscopic Modeling the constructivist controversy is avoided by consistently using *postulation*. *Postulation* means creating a convention ("this is what I mean when I say X") rather than a claim ("X *is* this").

The methodology itself is *postulated*. The *postulated* methodology never says 'this is how the things really are'; it is a convention for communication, something which can be read, agreed upon and used.
Within the methodological approach to information there are no dictates and no hidden assumptions.

Within the Polyscopic Modeling methodology, the epistemology is also postulated. The Polyscopic Modeling epistemology says "Within the context of this methodology, we make no claim that what we say corresponds to reality. We are simply modeling human experience, in order to communicate it and to make sense of it."

'Reality' or whatever is reflected by experience is not assumed to have any a priori structure. By convention, we are imposing a structure on experience by making models.

Information making is considered as modeling of experience. The resulting models are considered as ways of looking or *scopes*, which are offered to the reader in order to look through them at a certain theme or issue. The Polyscopic Modeling *approach* is defined as *scope design*, that is, as *design* of new ways of looking at things.

Postulated definitions are the technique of choice for *scope design.* When we *postulate* the definition of a concept, we *design* the concept.

Postulated definitions are the sword which can cut through the Gordian knot of obscure concepts and questions. (Consider, as a salient example, the question of the existence of God.) Polyscopic Modeling requires that we *postulate* the meaning of concepts in such a way that the relevant questions *can* be answered. *Scopes* are *designed* so that we can communicate what is essential in human experience.

This approach provides a natural way for resolving the mentioned theoretical difficulty. Instead of claiming that the model 'corresponds to reality', the *designed scopes* are offered to the reader as the way to reach a certain *view.* The goal is to communicate. The communication is successful to the degree in which the offered *scope* leads to the intended *view*.

In the same way, the relativism issue can also be resolved. The mentioned procedure resembles the experimental method in science, where the communication 'experiment' is successful to the extent that it is 'repeatable'. By creating clear and solidly *justified* views, 'shared truth' can be created in general as it is now created within the sciences.

As explained in more detail below, the purpose of creating and using *information* is also postulated, and so are the criteria for prioritizing *information*. Roughly speaking, the postulated purpose of *information* is to communicate what is essential in human experience so that we can live better.

In Polyscopic Modeling we consider our 'constructed realities' as adaptation tools, as Ernst von Glasserfeld suggested (von Glasserfeld, 1981), and we evaluate them based on pragmatic concerns.

The methodological approach to information has a historical precedent in the so-called Hilbert's program, which was offered as resolution of the foundations crisis in mathematics in early 20th century, when the discovery of paradoxes showed that the presumed correspondence between mathematics and reality, according to which mathematical objects were derived by abstracting from the real ones, needed to be abandoned as the foundation for mathematics. David Hilbert proposed that mathematics should be developed as a completely formal discipline, based on postulated axioms and definitions.

When Kurt Gödel showed that Hilbert's program was impossible, our belief in 'truth' as revealed by our perfect reason diminished even further, having realised that reason has clear limits even in a completely ideal, rationally constructed domain such as mathematics. This fading belief in reason marked the intellectual mood at the end of the 20th century.

In the construction of the Polyscopic Modeling methodology these epistemological insights were taken as good news: If absolute precision and certainty are impossible even in science and mathematics, then we can extend the approach of science and mathematics beyond their present limits, and in that way increase the level of precision and reliability in information making in general. That can allow us to produce an antidote not only to post-modern relativism, but also to various persistent traditional and modern absolutisms which no longer serve us.

By proceeding in this way, we follow the direction that Stephen Toulmin has advocated (Toulmin, 2001), and even add rigor and precision to it.

How to *design information*

I have reserved the term 'polyscopy' for real-life applications of Polyscopic Modeling. What follows is a very brief and intuitive sketch of how the practice of polyscopy is founded in the methodology. A more precise description and definitions can be found in the References.

Polyscopy begins with an attitude: To consciously counter the tendency of the human mind to construct a certain worldview and consider it the reality. The credo of polyscopy is that more than one way of looking at things is always possible. Polyscopy requires that we consciously let go of our habitual ways of looking at things and give a chance to new ones, so that we can see more and understand better.

Specific criteria, such as *perspective,* are provided to reorient the information making and use in this way (Karabeg, 2000a).

In *polyscopy,* the *scopes* are depicted metaphorically as viewpoints on a mountain, where the *high-level views,* like the view from the top of a mountain, are more holistic and synthetic, while the *low-level views* are more analytical and precise, showing different sides and details. The 'view from the top of the mountain' naturally provides broad insights which are necessary for choosing directions. The *low-level views* provide the technical know-how which is necessary for following the chosen direction.

For a variety of wrong reasons (because we considered the *low-level information* as more 'objective' and more 'real', or because we lacked the methods for constructing *high-level information*), we have been consistently neglecting the *high-level information* and overproducing on the *low-level* one. The result is that we have massive amounts of information and a crisis of meaning (Postman, 1990), (Wurman, 2001). One of the central aims of polyscopy is to remedy this problem. The motto of polyscopy is "We can come out of the information jungle by climbing to the top of a mountain." The Polyscopic Modeling methodology offers the required general-purpose methods for creating *high-level information* , and a number of examples showing that the 'mountain-top view' leads to a completely different vision (Karabeg, 2001b, 2003b, 2004c, 2005).

The Polyscopic Modeling methods for 'climbing up the mountain', i.e. for developing *high-level information* based on the *low-level one* are designed by generalizing and combining the approaches of mathematics, science, art and other traditions (Karabeg, 2003a).

Mathematics is generalized by using the notion of a *pattern.* The *patterns* are defined as "abstract relationships". They generalize mathematical functions. As a mathematical function tells us how *x* and *y* are related, so does a *pattern*; but unlike the language of mathematics, the language of *patterns* is completely general. Any relationships can be expressed, including qualitative and even emotional ones. Artistic techniques such as metaphors, narratives and pictures are freely used to define *patterns* (Karabeg, 2001a).

Science is generalized by using the *patterns* to make claims about how the postulated concepts are related to each other, and by providing *justification* methods for verifying those claims, as already explained. This allows us to create *results* beyond the confines of traditional scientific disciplines (Karabeg, 1999b, 2001a, 2001b, 2004c).

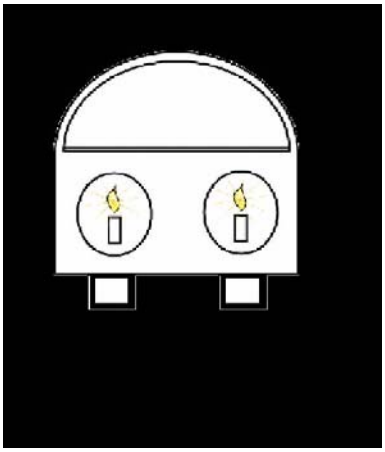
Art is generalized by allowing for the use of artistic tools (metaphors, narratives, pictures etc.) to define and present *results* and *patterns*. In the Polyscopic Modeling prototype, mainly ideograms are used for this purpose.

The initial Polyscopic Modeling *results* suggest that myth and prejudice reign in the domain of *high-level information*, very much as they did in our understanding of nature in pre-scientific times, and that radical changes may be expected to result from *high-level information design* (Karabeg, 2003b, 2005).

Information design challenge (an example result)

The Information Design Challenge ideogram (Figure 1) serves as a succinct statement of a Polyscopic Modeling *result*. The bus in the ideogram represents our *modern culture*, its candle headlights represent our *traditional informing*. The ideogram states that adopting the *traditional informing* (the ways of creating and using *information* which we have inherited from the *traditional culture*) as the *information* source in *modern culture* would be like taking the traditional candles to serve as the headlights in a modern bus. The ideogram claims that, to fulfil its vitally important role in our *culture*, our *informing* needs to be *designed* (tailored to its purpose, by using available knowledge about information making and state-of-the-art technology).

Information Design Challenge Ideogram



Modern culture with *traditional informing* is like a bus with candle headlights.

Figure 1

This example illustrates the intended use of *high-level information* in *polyscopy*. Like the view from the top of a mountain, this *result* clearly points to the course of action which needs to be taken.

This example also illustrates the Polyscopic Modeling techniques. The ideogram metaphorically defines the *pattern*, which is then used for stating how our *culture* and its *informing* are related. The described relationship has a variety of connotations, some of which are rational and some emotional.

The structure of this *result* resembles the structure of a result in physics (Figure 2).

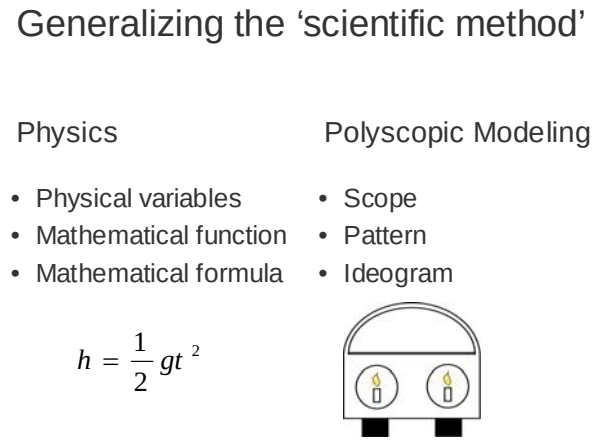


Figure 2

To *justify* the claim expressed in the ideogram, the definitions of the main concepts need to be *postulated*.

Culture is defined as "*cultivation* of well-being", where the word *cultivation* is further defined by analogy with the cultivation (sowing and watering) of plants.

Information is defined as "recorded experience".

These definitions assign purpose to both *culture* and *information.* We may then use them to see what sort of *information* is suitable for any specific *culture.*

By the above definition, *culture* is the extension of our natural evolution. We are no longer living at the mercy of the elements; like domestic plants, we can be *cultivated.* But *cultivation* (of people as well as of plants) requires suitable *information*: By only looking at the seed we would not know that it needs to be planted and watered. Similarly, we need suitable *information* to be able to *cultivate* our well-being.

Recording experience in terms of books and customs is much faster than recording it genetically. *Information* allowed us to in effect greatly speed up our evolution. The question remains, "In what manner and in what direction does this evolution proceed?"

There are in principle two ways how *information* and *culture* can develop: *tradition* and *design.*

Design and ***tradition*** are defined as alternatives to each other, where *design* is to *tradition* as creation is to evolution. Evolution and creation are the two alternative ways in which any functional whole (such as an organism or a mechanism) may originate. By definition, *design* and *tradition* are respectively creation and evolution in *culture.* (This does not at all mean that *design* and

tradition are in opposition to one another. *Design* simply means that the integrity and the function of the whole are consciously secured.)

The ***traditional culture*** is characterized by reliance on *tradition* as the modality of development. It is the *culture* which evolves spontaneously, through incremental changes, trial and error and competition with other *traditional cultures* and struggle against harsh nature.

The ***modern culture*** is characterized by reliance on reason and rational values as the modality of development. Obedience to tradition is not required. Things are allowed to change much faster than in a *traditional culture,* where every change must meet the resistance of the tradition and the test of time. In *modern culture,* whatever is rationally understood as good or useful is valued and preserved.

To argue that *modern culture* requires *design* as the manner or principle of development, we need one more concept which will allow us to describe what happens if *design* is not used.

The ***power structure*** is the Polyscopic Modeling concept for the power holder or power monger (Karabeg, 2000b, 2004b). A king, a corporation and a political organization are special cases of *power structures.* The general cases are *structures*, consisting of both physical entities (such as businesses, governments and advertising agencies) and abstract entities (such as people's worldviews, values and subtle work-related pressures).

The *power structures* can evolve spontaneously. They compete with each other for dominance. The more powerful ones prevail.

By using the concepts just developed, we can now sketch a *justification* of the claim conveyed by the Information Design Challenge ideogram and in that way complete our *result.* Both theoretical and empirical justifications are possible.

Since the *postulated* concepts are ideal, we can develop theories in a similar way as we do in mathematics or physics. For a theoretical *justification* it is sufficient to notice that *modern culture* is no longer equipped to evolve spontaneously as *culture* (as it suits our well-being). But the *power structures can* evolve spontaneously. Therefore if in the *modern culture* we should continue to rely on *tradition,* our culture will less and less be as our well-being requires, and more and more as it serves the interests of the *power structures.* Without *design,* the *modern culture* will eventually cease to be a *culture;* it will become a *power structure.*

The empirical *justification* identifies the ideal concepts with things in experience and shows that the relationships there are as predicted by the ideal model. It is not difficult to see that our increasingly global, rapidly changing technological culture less and less resembles the *traditional* one (Giddens, 1994), that it is becoming increasingly *modern.* We may quote the futurologists (Meadows, 1972) or the studies of the influence of modern lifestyle on health and well-being (Price, 1939), (Kollath, 1952) or sociologists

(Giddens, 2000) to *justify* the claim that our culture is unable to use its powerful resources in a safe and meaningful direction. And we may again quote the sociologists to show that our culture is developing as it suits the *power structures* (Baumann, 1989), (Beck, 1997), (Castells, 2000).

Much in our socio-cultural condition may be understood as a consequence of living in a particularly sensitive moment in human history, characterized the transition from the *traditional culture* to *modern* or *post-modern,* where the still persisting but no longer functional traditional memes prevent us from becoming fully aware of our situation and acting accordingly. Both the incongruity and non-sustainability in our condition are the consequence of the fact that we are no longer *traditional*, but not yet *designing.* The Information Design Challenge ideogram is an illustration of this condition.

Concluding remarks

One of the key ideas in polyscopy is to use the *high-level views* as one would use general principles or 'scientific laws': To deduce from them a variety of details and to derive ways of handling specific situations. Based on the *high-level view* of *tradition* and *design* that has just been described, we can conclude how the *design paradigm* differs from the *traditional* one in a variety of specific areas, and we can explain those differences. Here are some examples.

- **Social responsibility.** By the *traditional* view, our main responsibility is to fulfil the specific role (in work, society, family etc.) given to us by the tradition. From the *design* point of view, our primary responsibility is to act in the way which supports the integrity and the function of the large wholes we belong to, such as the planetary ecosystem, the *culture* or the university. This difference is easy to understand when we recall that in the *traditional* scheme of things the *culture* evolves spontaneously, and that such evolution will naturally produce the idea of social responsibility which best supports such evolution. In the post-*traditional* world, however, there is no reason to believe that the integrity of large wholes will still be spontaneously secured.
- **Way of thinking.** The *traditional* person focuses on the details of the situation at hand, and handles it by thinking conventionally. The *designer* uses the holistic *high-level views* to *contextualize* her priorities and actions. An example of this approach is the Information Design Challenge ideogram as *high-level view* and *information design* as the corresponding course of action.
- **Academic research.** The goal of the *traditional* researcher is to discover facts within his area of specialization. The goal of an academic *designer* is to develop or create whatever is needed in order to make our world functional and safe.
- **Research organization.** The *traditional* research thrives through specialization. *Design* requires a combination of many talents and backgrounds.

The transition from the *traditional* to the *design paradigm* is a unique development in the history of our civilization. In the shadow of known and

undiscovered hazards reside even more spectacular opportunities. The next, *design* phase of our *cultural* evolution may bring as profound changes and as spectacular benefits as the Scientific and Industrial Revolution. This time, however, we cannot expect that the new *paradigm* will result by spontaneous evolution. The *design* way requires conscious action, which in turn requires a new sort of consciousness. Before all, we need to design a foundation based on which this new consciousness may be developed. I submit the Polyscopic Modeling methodology as a prototype solution.

References

(Baumann, 1989) Zygmunt Baumann, *Modernity and the Holocaust*. Cambridge: Polity Press, 1989.

(Beck, 1997) Ulrich Beck*: What is globalization*? Polity Press, 2000.

(Castells, 2000) Manuel Castells: *Information Technology and Global Capitalism.* In Will Hutton and Anthony Giddens (Ed.): On the Edge. Living with Global Capitalism. Pp. 56-57. London: Jonathan Cape, 2000.

(Einstein, 1938) Quoted in Ernst von Glasserfeld, *Homage to Jean Piaget* (1896-1980). http://www.oikos.org/Piagethom.htm

(Einstein, 1944) Albert Einstein, *Remarks on Bertrand Russel's Theory of Knowledge* . In A. Einstein: Ideas and Opinions, Open Court, Illinois 1992, pp. 19,20.

(Einstein, 1949) Albert Einstein, *Autobiographical Notes.* Open Court, Illinois 1992, p. 11.

(Giddens, 1994) Anthony Giddens, *Living In Post-Traditional Society*. In Reflexive Modernization, ed. U Beck, A Giddens, Scott Lash. Cambridge: Polity Press, 1994.

(Feynman, 1967) Richard P. Feynman, *The Character of the Physical Law*. MIT Press, 1967.

(Giddens, 2000) Anthony Giddens, *The Runaway World*. Routledge, 2000.

(Karabeg, 1999a) Dino Karabeg, Prospectus for Polyscopic Modeling. In Aerts et al.(Ed.): "World Views and the Problem of Synthesis." Kluwer, 1999.

(Karabeg, 1999b) D. Karabeg, Polyscopic Study of a Basic Cultural Pattern. In World Views and the Problem of Synthesis,, Aaerts et al. Ed. Kluwer, 1999.

(Karabeg, 1999c) Dino Karabeg, Role of Ideograms in Polyscopic Modeling. International Visual Sociology Conference, Antwerp, July 1999.

(Karabeg, 1999d) Dino Karabeg, Definitions of 'culture', 'information', 'design' and 'information design' . International Institute for Information

Design, Online Dictionary of Information Design Terms. Tokyo, Oct. 1999. http://www.visionplus7.com/DICTIONARY

(Karabeg, 2000a) D. Karabeg, Ideograms in Polyscopic Modeling. Proceedings of the IEEE Infovision2000 conference, London, England, July 19-21, 2000.

(Karabeg, 2000b) D. Karabeg, Two-step Marketing. Infodesign2000 conference, Coventry, England, July 10-11, 2000.

(Karabeg, 2001a) D. Karabeg, Addiction Pattern. In Exploring the Visual Future: Art Design, Science & Technology, R. Griffin et al. Ed. `International Visual Literacy Association, 2001.

(Karabeg, 2001b) D. Karabeg, What's *Gong On? A Cultural Paradigm Change.* Book manuscript.

(Karabeg, 2003a) D. Karabeg, Designing Information Design. Information Design Journal, vol. 11(1), Fall 2003.

(Karabeg, 2003b) D. Karabeg, *Information Design Is The Key*. Poster and lecture on Visions Of Sustainable World conference, Milano, Italy, December 2003. The text of this lecture is available at www.holiscope.org.

(Karabeg, 2004a) D. Karabeg, *Polyscopic Modeling Definition*. In Griffin at al (Ed.): The Turning of the Tide. Selected Readings of the IVLA, 2004.

(Karabeg, 2004b) D. Karabeg, *Information for Conscious Choice*. Information Design Journal 11(2/3), Spring 2004.

(Karabeg, 2004c) D. Karabeg, *Information Design – The Informing For The 21st Century.* Keynote speech. Proc. IPSI conference Stockholm, September 2004.

(Karabeg, 2005) D. Karabeg, *Polyscopy*. (Subtitle: *We can come out of the* information *jungle by climbing to the top of the mountain*.) Book manuscript in preparation.

(Kollath, 1952) Werner Kollath, *Civilization-induced Diseases and Death Causes.* (In German). 2nd ed. Haug, 1962.

(Meadows, 1972) D. Meadows et al., *The Limits To Growth.* A report for the Club of Rome Project on the Predict of Mankind. Universe Books, 1989.

(My references) Temporarily omitted to preserve anonymity.

(Nelson and Stolterman, 2003) *The Design Way*. Harold G. Nelson and Erik Stolterman. Educational Technology Publications, 2003.

(Postman, 1990) Neil Postman, *Informing Ourselves To Death*. Keynote speech at German Informatics Society conference, Stuttgart, October 11, 1990.

www.eff.org/Net_culture/Criticisms/informing_ourselves_to_death.paper

(Price, 1939) Weston Price, *Nutrition and Physical Degeneration.* 6th Ed., Keats 1997.

(Simon, 1969) Herbert Simon, *The Sciences of the Artificial.* MIT Press, 1969.

(Toulmin, 2001) Stephen Toulmin, *Return to Reason.* Harvard University Press, 2001.

(von Glasserfeld, 1981), Ernst von Glasserfeld, *An Introduction to Radical Constructivism.* In P. Watzlawick: The Invented Reality, Norton &Co, 1984.

(Wurman, 2001) Richard S. Wurman, *Information Anxiety 2.* QUE, 2001.

Dino Karabeg has a doctorate in computer science/algorithm theory from the University of California at San Diego. Since 1992 he is an Associate Professor at the Department of Informatics, University of Oslo, where he is developing a system of results and ideas about information and culture under the common name 'polyscopy'

Dino Karabeg, Institute for Informatics, University of Oslo, POB 1080 Blindern, 0316 Oslo, Norway. (+47) 22 85 27 02. dino.karabeg@ifi.uio.no.