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Imaging, Computing and Designing Minds

by Klaus Krippendorff

Sometimes stories can say it shorter:

The evening before the design management conference at which this paper was delivered, I was introduced to a Swedish presenter. He observed, having read my paper, that we had much in common: he interested in perception and corporate strategy, I working on communication and design and both sharing a concern for meaning. Discoveries of such mutualities are nice. But when they are asserted I often experience that people read into a text their own predispositions, what they already know not what is said. In this case he wasn't wrong but I had not written my paper yet. The place in the program where it or its abstract could have appeared was blank! So, seeing has little to do with what is there but much with what we want to see.

In what follows, let me examine two conceptions of mind, then turn to theories of meaning that have nourished my interest in product semantics and finally, based on these, develop a different notion of mind appropriate for design and for design management. The topic is complex and the space available here leaves room only for rough strokes.

But what is mind? Marvin Minsky's definition, "mind is what the brain does" (The Society of Mind, 1986), leads us to look for evidence of mind not in the neuro-physiology of the brain but in the kind of human behavior we are conscious of and call intelligent. Seeing, believing, reasoning, designing surely are mental categories, not physiological ones, and are as such already embedded in the theories we hold about us, what our brain can and does do for us, and how we believe other people mind their own practice.

Seeing

The most popular notion of mind relates to seeing, to forming images of an external world and to imagining things we wish to bring about. With this notion of mind in mind we think thinking is about the world as represented in the images we become conscious of. We most naturally say and are unshakably convinced we

see things that exist outside our body as if we had nothing to do with them. To capture this notion we tend to use optical metaphors for what our eyes are thought to do for us, to understand the stuff on which we think thinking is based: images.

While seeing undoubtedly is a mindful process, next to speaking perhaps the most important one, and while most of us talk about visions, believe we think in images, dream, imagine, visualize, etc. I would argue that neither seeing nor thinking is as simple as the optical metaphor might make us think. The equation of minding with imaging (in the sense of mapping, seeing representations) is seriously misleading on at least two accounts:

First, it leads us to believe we could see what is in front of our own eyes before and independent of our seeing it when all we can become aware of is the phenomenon our brain brings forth after something has passed our eyes. Whereas photographic pictures always are of something we can see as well, what we see does not have a reference point we can know. As difficult as this might be to imagine: our brain in fact makes the images we see. (As in the story at the beginning).

Second, If we believe we see images of things outside ourselves, similar to what a camera does, and if we think we think in terms of such representations in our head, we are begging the questions of what minding is for we are inevitably led to look for someone or some intelligent agent inside our brain who must then look at these images, like a photographer might do, with his or her own eyes, sorting, selecting, enhancing or even altering, in any case minding them, analogous to how our eyes are thought to do this. This little observer inside our brain is called a homunculus and in order to explain what it does we need another homunculus in the first homunculus' brain, etc., etc. This leads us into an infinite

regression that pushes the understanding of mind the further away from us the harder we try. It prevents us from imagining what the brain does.

Although the notion of minding as imaging (describing, mapping, depicting, representing, etc.) an external world is popular and seems to simplify our ordinary life tremendously, although we think we think in images and images of images, etc., this cannot possibly be the way we think.

Metaphor

Let me make brief detour and comment on the notion of metaphor here for taking a camera as a way of conceptualizing what our eyes do in conjunction with our brain constitutionally involves metaphors and renders them central to my understanding of mind.

Previous work by myself and others has convinced me that a metaphor is not a mere rhetorical figure of speech, an ornamental embellishment or a value added to a message or a product. It does not resemble a symbol that stands for something else. It does not highlight the similarity among two things which is what analogies do. It is neither a thing nor a property of something. A metaphor is a process that organizes one domain of experiences in terms of pattern derived from another usually more familiar domain. It makes us see one thing in terms of something else.

All metaphors have entailments, surreptitiously import additional cognitions into the domain they organize. Under the guise of metaphorical coherence, we pursue these entailments often unconsciously which makes metaphors an important window into minding processes. Three examples will suffice:

(i) The metaphor "head of the household" comes to us from biology and reorganizes the way we see a family living together. In popular biology, the head is thought to be the most indispensable part of an organism: it houses the brain,

it is the center of bodily control, without it an organism dies. A family has several members, parents, children, relatives, all living together and with others in society. "Head of the household" makes us see the family like an organism and identifies one of its members as its head. The metaphor entails that there can be only one head, only one source of intelligence, only one decision maker and this stereotypically is the income earning male. If an interviewer wants to know about the family s/he undoubtedly wouldn't ask someone in the role of a foot or its stomach, someone with inferior intelligence, but go directly to the head who is the only one that counts, the only one that can speak for all others. The use of the metaphor effectively reorganizes what a family is.

(ii) The metaphor "the computer is a typewriter with a TV screen" is a useful way of understanding an inherently complex technology. Before it came to be, computers were for experts only. Who else would understand binary arithmetic, Boolean logic, switching nets, algorithms, control panels with magical qualities and what could computation possibly add to everyday life? It is said that an early study of the potential users and benefits of computers concluded the need for no more than five or six computer in the U.S. The metaphor changed all this. The computational aspects receded into the interior of the machine. The use of the first personal computers conformed to our experiences with typewriting, producing text line by line, just as in our familiar paper world. This has slowly shifted to color displays, computer graphics, moving images (hypertext) and now sound, gradually approximating our experiences with television with one important exception: the interactivity of writing if not conversing. Thus, once the metaphor was adopted, its entailments determined the unfolding of technical development.

(iii) The metaphor "minding is imaging" (i.e. the mind is making representations of an existing world outside similar to how cameras capture

images) naturally emphasizes visual experiences at the expense of others. In design it means conceiving good design as visually appealing. It entails a sharp distinction between an artifact's visual form and its internal function whose sensory modality becomes secondary if not irrelevant. Designers become creators of covers, surfaces and outside appearances at the expense of how users interface with them. Some designers' work seems to be done primarily for picture taking, publication or exhibition in museums where touching is prohibited. Image driven advertising makes symbolic satisfaction more important than competent involvement. I am amazed to see how much of the concern for corporate identity focuses on logos, graphical expressions of managerial styles, creating favorable visual props that distract interest in what is going on behind the scenes. Where covers cannot be achieved, the emphasis on creating favorable visual impressions leads to the idea of adding value by visual means: adding non-functional control knobs to a boom box, adding studs to a garment, adding color to an otherwise boring product...all symbols borrowed from elsewhere.

When metaphors enter and thereby (re)organize an empirical domain, the three examples show an unfolding of their entailments. The inventors of metaphors, if they can be identified as such, may not be aware of these entailments but find themselves with all subsequent users faithful persuaders of the coherence such metaphors bring forth, hence their significance.

Computing

Probably the most recent and at this moment widely adopted notion of mind stems from our understanding of how we reason logically, from forming rational arguments, from making decisions based on premises, goals and available information, and from doing mathematics. This understanding gave rise to digital computers or sequential logical machines that now return to us as a

metaphor for understanding the very mind that created these machines in the first place. Indeed, computers are capable of performing numerous heretofore considered mindful human activities like identifying events, tracking targets, retrieving data from memory, proving theorems, playing chess, scheduling production processes, flying airplanes and other activities previously reserved for human intelligence. In many of these tasks computers do well or even exceed human capacities in volume and speeds.

It is important to note that computers run on very precise algorithms for doing things, not on representations. In fact, no computer knows or cares about the meanings we attribute to their inputs or outputs. When responding to a character sequence, which we might interpret as a question, with another character sequence, which we consider an appropriate answer, computers seem to operationalize or mimic quite well what is meaningful for us. A homunculus is no longer needed to explain what a computer-equals-brain does. Successes of this kind have made a wealth of vocabulary available to design these machines and to describe intelligent behavior of humans in their terms: encoding and decoding of messages, operational interpretations, information retrieval and processing, data handling, scripts, schemas, etc. all of which has enriched our understanding of mind. But despite of these remarkable achievements, (also see R. Penrose, The Emperor's New Mind, 1990), this metaphor of mind has easily discernable limits which might not serve us well.

- Computers are utterly uncreative (not to be confused with searching at amazing speeds through large but finite combinational possibilities as in chess playing computers or in systems that evaluate alternative travel routes). Computers are structure-determined machines that run prescribed paths. Even randomness and chaos that may emerge is governed by systems of instructions. There is no transcending of opposites, no new synthesis, no invention.

- Computers are notoriously bad at recognizing pattern, whole gestalts or images. (Recognizing images is not the same as displaying arrays of pixels or generating what appeals to us as interesting geometrical pattern). In contrast we seem to connect things, see pattern in variables that we correlate with meaningful experiences which makes these pattern the product of a highly creative or constructive pursuits.
- Computers do not have emotions or dispositions so central to much of minding, including design. These notions, however vague they may be, seem to escape contemporary computer logic and are therefore difficult to simulate.
- Computers are unable to reflect on themselves, create metaphors of themselves, be self-reflective, which I take to be a fundamental ability of mind and in fact all that I am doing here.

Adopting optical metaphors of mind makes us emphasize images over processes and optical properties of forms over individual contributions to seeing. Adopting computer metaphors of mind entails a commitment to determinism at the expense of contingencies, a preference for logic at the expense of emotions, an emphasis on stimuli at the expense of meanings, a reliance on control and instruction at the expense of play and interactivity. The computer metaphor renders humans as unreliable machines, as imperfect robots, a topic that has fascinated numerous science fiction writers including for Startreck. The computer metaphor provides the fuel for research and development in artificial intelligence. One must therefore not dismiss it lightly.

Moreover, and this applies to all metaphors of mind, we may not (in fact) think the way we think but we always act on our understanding of how we think. The choice of (or contingency of coming to) metaphors of mind is therefore crucial not only for our own understanding of what our brain does for us in or with our environment, but more importantly, for seeing ourselves, for creating our own

self-understanding and for interacting with others we construct similar to ourselves. As Gregory Bateson suggested, we act in our own metaphor (M. C. Bateson, Our Own Metaphor, 1972). The fact of our first inventing a computer and then using it to understand the very mind that created it is an example of the kind of cognitive closure that arises in self-reflection and becomes self-limiting when the metaphor is unduly restrictive.

With this criticism in mind, let me aim at another metaphor that is more in tune with current thinking (in cognitive science, communication, epistemology and hermeneutics, to name but few and) especially in design and management and begin with what we are learning from product semantics.

Product Semantics

The word "product semantics" formally emerged in 1984 (see Innovation 3.2, 1984) out of the loose collaboration among a group of designers who realized that the traditional functionalism in design no longer provided adequate guidance for what designers were facing. Let me sketch four challenges to functionalism.

- Electronic products whose shapes are no longer derivable from what they do have rendered the old determinism of form from function obsolete. A radio or a computer can be built into a beige box, into a plastic bucks bunny or invisibly into a wall, yet the choice between a neutral container, a symbolic figure or oblivion is surely governed by criteria, but criteria that are no longer based on the visualization of actual performance.

- Smart products, that can be programmed to perform difficult tasks or be reconfigured to fit a user's own needs have made users into the designers of the functionality of their own artifacts, are on the way to democratizing decision making in design and erode the ultimate authority by which designers could determine how users must use their products.

- Flexible production facilities and profitability at lower volumes have increased the number of similar products on the market and gave rise to non-utilitarian decision criteria (social, ethical, ecological) previously regarded as secondary (like aesthetics). The creation of corporate images as a product differentiating strategy is only one (economic) response to these conditions. We do not buy a Porsche for transportation or for its name but to express who we are or what we want to project. Many people use computers not because they increase productivity but because there is intrinsic motivation in interacting with them.

- The corporate world has become complex with management having to coordinate more and a greater number of variables from research and development to ecology and from communication to international politics. Yet, designers have not been able to develop a language, a discourse to describe their work as irrefutable in logic and as communicative of knowledge as that in engineering and marketing to name but two. This renders design vulnerable to dismissal through the discourse of others and assigns designers to organizationally inferior roles.

In response to these challenges, we realized that form need not follow function but meaning and that design should not produce things but enable users to make sense (of things). This reorientation provides a new paradigm for design, a new vocabulary for accounting for design practice and entails a different notion of mind. I cannot go too deeply into the emerging vocabulary of product semantics (see: Design Issues 5.2, Spring 1989) but will clarify below what is relevant to appreciate the paradigm shift this invokes.

What does it mean to say "Design is making sense (of things)?" We say that something makes sense when we understand the role it plays in a particular context of application, when we have a satisfactory explanation of what it does,

when we correlate our actions with a resulting effect. Making sense is what the brain does when coupled to a world in which we see us acting, achieving objectives, avoiding obstacles, enjoying engaging encounters. The connections are not there, we make them. Making sense arises from a creative effort. It is invention not discovery. It makes sense to write with a pencil. It makes sense to pile bricks on top of each other to build a wall. It doesn't make sense to write with a brick wall (even so one can never rule out someone overcoming cultural stereotypes and imagining doing just this).

Any one thing may make different senses in different contexts, for different purposes, from different perspectives, for different people. A pencil can be used not just for writing but also as a projectile, as a ruler, as a marker in a telephone book, as a finger nail cleaner, etc. It can be seen, touched, tasted and chewed on. The sum total of all the contexts in which something makes sense to someone is its meaning. Meanings are clusters of possible experiences conditional on one's actions.

But since we can never know what "something" is independent of the many senses it can make, independent of what it means for us, we might as well consider "it" to be a cognitive model, a mental construction, we take to be viable in interaction with an otherwise unknowable world. We always act on what we understand, know or interactively experience, on the cognitive models that make some sensory experience meaningful and provide us options, not on physical stimuli, visual or otherwise. This is why an understanding of the meanings people create is central to designing user interfaces with products for people as opposed to designing devices in support of the mechanical functions within a machine.

J.J. Gibbons (Reason for Realism, 1982) taught us to think of artifacts as affordances of actions. A chair must afford sitting and a pen must afford writing.

In our terms, for a cognitive model to remain viable in use, the thing modelled must afford what the model implies. Otherwise, the cognitive model we hold leads to errors, consequent dissatisfaction if not a breakdown of cognition.

It follows that designers must design those affordances into their (proposals for) products that support the cognitive models users have in mind in approaching them. In product semantics we aim at self-evident products that are immediately understandable and afford acting on it without prior instruction, products can also be self-instructing when they guide their users through its use or lead them out errors.

RichardsonSmith's xerox machine is an example of the kind of product I have in mind. It affords several layers of meanings. The user can approach it with a desktop metaphor for handling paper flows from left to right. Locations where originals are placed and copies are removed are obvious and so are the drawers where paper is stored. A next layer of meanings becomes available on opening the doors, revealing the passage of paperflows through the machine, affording repair by untrained users, following very simple instructions. A third layer is accessible only to expert repair persons. The action each layer affords changes with what the user needs to do.

Human-computer interfaces can go much deeper in this regard, providing worlds within worlds, each with their own semantics, feel and interactivity.

Now, what happens to the old functionality? Can we assume that designers are objective about what their products are capable of doing whereas all others are relegated to see only their meanings? Could designers have privileged access to a reality denied to all others? I think not!

From the point of view of product semantics, functions are nothing other than meanings as seen from the usually narrow perspective of an objectivist designer. Objectivists believe that things are the same for everyone and that their

"nature" therefore is either objectively measurable or at least describable without reference to observers' or users' perceptions as is customary in engineering, ergonomics and geometry (including objectivist aesthetics). It is the perspective of designers who, by talking about the meanings OF a functional product, divide their world into an objective and a subjective realm. It is the perspective of designers who blame misusers for failing their well intended designs. It is the perspective of architects who are appalled by the miserable tastes the tenants of their buildings display. Functionalism reveals an authoritarian stance that denies product users their own creative contribution in seeing things in their own equally valid ways and in arranging their world in ways not intended by designers. It is this rigid conception of mind that product semantics seeks to overcome by suggesting that the affordances designers need to provide are nothing but the designer's conceptions of meanings that must, moreover, support users' cognitive models. If there is a difference between designers and the users of their products, as there should be, designers' meanings must embrace the multitude of users' meanings. Product semantics implies an awareness of differences in understanding and the ability to support these by affordances.

Thus, in product semantics we neither think products to have a fixed and singular "function" nor that it be conceived the same for everyone. Not only will there be variations in meaning, for example, between the owner of a racing car and someone who merely admires one, but we also expect entirely different perspectives from which meanings are organized. For a repair person, cars may differ in how easy it is to fix them. For a sales person a car means a possible commission. For a child a car maybe something only adults are allowed to play with. For a driver a car may be an act of self-realization. In a museum a car may need to be instructive but not drive at all. Designers may want to chose which and whose cognitive models their affordances should support.

Meanings are not only different for different users, they are not invariant for any one person either. They may change with experiences causing small evolutionary adjustments in cognitive models. They may also change through metaphorical and metonymical processes, especially in communication with others.

Metonymy is taking a part for the whole like the crown for a kingdom, a place setting for a restaurant or the corporate logo for the corporation. Metonymies simplify identification leaving other details out of view. Just which part comes to identify the whole is not entirely controllable.

Metaphor is, as I said, a process of reorganizing perceptions in one domain of experiences in terms of patterns taken from a different and familiar domain. Referring to a van as a refrigerator on wheels makes one look at a vehicle with somewhat different eyes in the course of which it becomes no longer that desirable. Referring to Ronald Reagan as the Teflon president invokes a great many entailments otherwise not considered. Adopting the metaphor of a flower garden for a corporation may be good for its employees, busily nourishing new products to come on the market, but not so desirable for consumers who are led to believe they have to replace their appliances each season. Metaphors can create new understandings, destroy previously successful products or entail new uses. Prediction of new metaphors is not easy. Some insists it is downright impossible. Traditionally, the invention of metaphors has been the trademark of poets. We are learning now that even ordinary consumers of products have metaphorical competences as well and designers have to accept that their products are subject to and must hence survive various metaphorical transformations.

Product semantics is developing such notions of sense, meanings, cognitive models, types, signs, perceptions and motivation for designers to

dialogue among each other, to ask user-enabling research questions and to participate in corporate decision making as coequals with engineering, marketing and management. It is my contention that design is more than the subjective component of engineering, the artistic aspect of marketing and the unspeakable part of management. Design can develop a coherent discourse of its own.

Designing

Product semantics manifests a notion of mind that is inventive of meaningful connections in the world, constructive of cognitive models that remain viable in interaction (from the perspective of users) and creative of new affordances (from the perspective of designers). I maintain, this is not a far-fetched idea but a reality designers have to cope with professionally. It also signals a paradigm shift from design as making things visually appealing and design as responding to new technically realizable functionalities to design as a process of creating meaningful interfaces in the practice of living with artifacts. But it also means reconfiguring what the brain does for neither imaging nor computing can account for the human capabilities of sense making.

Let me finally consider what this minding is designing metaphor has to do with design management (by which I understand the coordination of people supportive of design processes) inclusive of designers' own minds. For lack of remaining space, allow me to be a bit more programmatic than I prefer to be and overdraw the contrasts I see. Five examples might suffice here:

(1) The minding is designing metaphor entails respect for the cognitive autonomy of people (designers and users alike). Whereas the computer metaphor depicts people as information driven mechanisms, as having to adapt to existing informational conditions, including to artifacts whose functionality is determined elsewhere, as having to be instructed to correctly perform appropriate

tasks, the designing metaphor acknowledges that people cannot but construct their own world including the cognitive models with which to anticipate the consequences of their own actions. I already mentioned the necessity to appreciate the variety of senses different people can make of any one situation and the variety of cognitive models with which people may approach what designers propose. Whereas the imaging metaphor focuses on meanings associated with visual representations, the designing metaphor does not deny the importance of visual phenomena but recognizes that meanings are multi-sensory, multi-contextual and constitutively linked to individual actions, anticipated consequences and motivations. What a designer might see as one thing is different for different people. Each has their own language coordinated metaphorical understandings and each sees in them their own interaction. This is true not only for particular products but also for corporate identities and even for one's own self-understanding.

(2) The minding is designing metaphor entails creating affordances that encompass users' understandings. It shifts attention from the design of products with singular functionality or from signs with prescribed meanings, which the computer metaphor encourages, to the design of potentially meaningful interfaces with artifacts that can be approached with the cognitive models variously available to or acquirable by users. In a way, one can say that designed artifacts are communications that enable those willing to attend to them to unfold their own cognitive processes without leading to significant errors or breakdowns. It also emphasizes intrinsic over extrinsic motivation. Experiencing the space within which to develop one's own interfaces with artifacts resembles playing an instrument or game, is engaging and gives a feeling of competence in living through these processes in one's own terms (often despite the objective reward ultimately offered). Witness how children play and why electronic games can be

so involving. Whereas the computer metaphor renders communications as instruments for inducing functionally desirable attitudes and beliefs or as instructions that control individual behavior, the designing metaphor suggests that people cannot be forced to do what they are unable to understand but can be provided the resources to act out their predispositions, to fuel their motivation in interaction with others and to create their own practices of living.

(3) The minding is designing metaphor entails the need for user-centered research into the cognitive resources for understanding and interfacing with others. Traditional market or consumer research seeks to predict market trends, thus focussing on deterministic aspects of purchasing behavior at the expense of understanding the creativity involved in everyday life. It seeks to ascertain consumer preferences among predefined alternatives that tend to stay within the domain of a corporation's or its researchers' limited imagination, and it seeks to determine shared interpretations of symbolic qualities and thereby reify existing conventions which enhances averages over deviations and strengthens the dominance of majorities over minorities. In contrast, designers need to know the range of cognitive abilities by which users can explore providable affordances. Perceptual predispositions, metaphorical capabilities, sources of motivation (especially intrinsic ones) and dynamic notions of self exemplify some dimensions that designers can unwittingly frustrate (particularly by subscribing to inadequate notions of mind) or consciously enable. This kind of research does not seek out exploitable consumer weakness but ways of enabling individuals to unfold their cognitive strengths perhaps under the guidance of cognitive deep structures (e.g. myths about self, others and the world) already there.

(4) The minding is designing metaphor entails conceiving design as embedded in a recursive process. Recursive processes are basic to mindful behavior: perceived opportunities invite actions whose consequences alter the

very perceptions of opportunity that gave rise to them, thus closing the circle. Although metaphorical capabilities and creativity in general can change perceptions and contingencies may alter the consequences of actions, this does not change the basic recursivity. Having no beginning and no end, recursive processes feed themselves. Gregory Bateson (Steps to an Ecology of Mind, 1972) considered this a basic unit of mind. In contrast, and owing to our computer metaphor, we tend to conceptualize only linear segments of this process, for example, when declaring design processes to terminate with a solution to the problem which the imaging metaphor suggests to be a visual one and industry interprets to be an end-product sold to an end-consumer. This prevents us from assuming responsibilities for what follows, the ecology for one example, or our own role in it for another. With the designing metaphor in mind, one can see the determinisms in such linear segments to be rational perhaps, but also as incomplete descriptions of a circular process. Since this prevents an understanding of the continuous unmaking and remaking of material culture, it is fair to conclude this view to be a "mindless" one. Continuing the interpretation of products as communications, the designing metaphor may lead us to see artifacts as "messages in circuit" (Bateson op. cit, 1972), as temporally frozen patterns that may be useful to participants, bear fruits, are reframed, rephrased, reconfigured to suit different practices, different perspectives, etc. that must ultimately return in some form for designers to understand the process they have set in motion, including how they themselves participate in it (which must be true for all those involved in the recursion). The following figures may illustrate the point.

(5) The minding is designing metaphor finally entails a concept of social organization and a management style in which design responsibilities are distributed over the participants in a circular network of production and consumption. The management of a corporation including its designers does not need to adopt the preposition "control or be controlled" and design does not need to be limited to a select few. Design not only can be infused into the spirit of an organization and expressed in its corporate identity, in fact, without allowing it to be distributed over those involved in production, dissemination, use, research and (re)design, without granting all participants involved in this circularity some cognitive autonomy, some ability to design their own sphere, the whole process, including the corporation, could not be viable for long.

Within a corporation, it is possible and has traditionally been the practice to centralize design near the top and impose a plan on the remainder. The hierarchical architecture entailed by computer metaphors of mind and the old functionalism in design encourage the growth of such inherently oppressive structures even into the world of consumers and often despite good intentions. But it is also possible to decentralize, to democratize or to delegate design and to manage an organization by reaching consensus on policy rather than by

imposing a plan. One can encourage a shared vision to emerge within a corporation that allows its employees to make sense of their own role and inspires their creative contributions. Within limits, one can project this vision outward, in the form of corporate identities to the people involved in the circular network of production and consumption but not formally parts of the corporation. If design management is to succeed in keeping alive the circularities in which a corporation thrives, then it must provide, beyond the symbols of corporate identities, rich affordances that enable those outside its formal reign to continuously expand their own cognition, to configure and fit their artifacts into their own practice of living, to sustain their participation in material culture, to design their own world. Mature designers and design managers, like good parents, must let their creations grow up by themselves, monitor or at least remain interested in the processes they provoked and perhaps improve on their ideas of how to motivate those that were left out to get involved in a continuous process of collaboratively redesigning society, its material content, including themselves.

I think "minding is designing" is a better way of thinking about thinking and acting, a better metaphor of mind than those we have pursued for much too long. It is a way of thinking that motivates poets, designers, computer hackers, kids playing video games and the most ordinary folks making themselves at home with meaningful things. It is a way of creating enthusiasm for a new class of products or looking at traditional ones from a new perspective that enlivens our participation in social organizations and in material culture. Why not making it come true by designing it into our own recursion of minding with others.