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Transcending Semiotics: Toward Understanding Design for Understanding

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Abstract

In this paper I intend to examine several epistemological difficulties one quite naturally encounters within traditional semiotics, especially when trying to apply it to design (industrial design and product semantics in particular).

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Transcending Semiotics

TOWARDS UNDERSTANDING DESIGN FOR UNDERSTANDING

Introduction

*i*n this paper I intend to examine several espistemological difficulties one quite naturally encounters within traditional semiotics, especially when trying to apply it to design (industrial design and product semantics[1] in particular).

Whenever a discipline encounters intellectual challenges that it cannot respond to in terms of its own standard practices, it can either exorcise them and withdraw into a smaller domain of increasingly refined but narrow applications, or it can expand its conceptual horizon and embrace these challenges with the prospect of thereby losing its own identity.

I prefer the latter. My plan therefore is to remove those assumptions that lead to untenable semiotic practices, practices that prevent semiotics from participating in solving contemporary social problems, and develop from what remains an alternative approach to the study of meaning in the broadest sense, an approach that can more readily cope with certain intellectual challenges emerging from a variety of scholarly and practical endeavors.

Seeking to understand meaning generally and the meaning of designed objects particularly, we are invariably lead to a point at which we have to make

a critical choice between two alternative paths of understanding (things). The well-trodden path is called objectivism. I will call the other constructivism. Without denying that there are various shades of objectivism and various shades of constructivism[2], just as there also are many variations in approaches to semiotics, I do believe the two paths are epistemologically incommensurable and lead to significantly different social practices.

Roughly, *objectivism* entails a commitment to the belief in a reality that possesses observer- or culture-independent structures, objects, codes and laws waiting to be discovered, enciphered and described. For objectivists, humans are plagued by observational biases, inadequacies, illusions and metaphysical beliefs that scientific observers seek to overcome in order to obtain increasingly accurate accounts of the one universe that exists outside of them. Objective knowledge is representative of what exists and the criterion for accepting a proposition as (empirically) valid is truth by correspondence.[3]

I am suggesting that the mainstream of semiotic scholarship is deeply rooted in the kind of objectivism just described. This already is evident in its foundational concept: the sign. For something to be a sign, there must be a (physically existing) sign-vehicle and what it carries, its meaning, a proposition and what it is about, a symbol and what it stands for, or an artifact and what it expresses. Not only is the essential connection between the two domains presumed discoverable, identifiable, describable and, hence, residing outside the observing semiotician, the product of scientific practice, here semiotic theory, is conceived descriptive of an objective reality as well. I suspect this commitment to objectivism runs so deep that many semiotically informed readers of this paper may not find anything objectionable in this view. Taking language to refer to something that exists independ

ently of it seems so obviously true. Oddly, it is the practice of designing meaningful objects that might constitute a sufficiently strong challenge of mainstream semiotics' received ontology.

Constructivism, the way I see it, takes reality as residing neither somewhere outside or independent of its human observer, of which objectivists are unshakably convinced, nor inside an imagining human mind, as solipsists hold true, but as arising within the circular process of perception and action or of conceiving and making things, in other words, in practice or in social practice when other humans are as well involved.

Consider walking on a beach. We feel the sand between our toes and several inches beneath our feet and soon come to know properties we could not see before we stepped on (or into) it: the softness, the warmth, the sound it makes walking. What objectivists must describe as a reflection from the yellow spectrum of the sunlight becomes for the constructivist meaningful and alive thought individual and multisensory participation. If we cut us once on a piece of glass buried beneath the sand's surface, we are inclined to see glass everywhere and walk accordingly. Understanding has nothing to do with the physics of sensation. It penetrates the visual surfaces of something deep into its interior. It creates a reality on which we act, a reality that becomes manifest in practice.

Consider the notion of a gift. We give all kinds of things all the time, whether as part of the role we are assuming, in exchange for money or in the expectation of a future benefit. However, what constitutes a gift is carefully negotiated between givers, recipients and third parties or judges not to be confused with a bribe, an insult, a burden, an obligation or aid. Objectivists will have a hard time to find the references for what appears to be a

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meaningful gift. Constructivists would consider the notion of a gift as a social construction that arises out of and in turn participates in particular social practices (of giving things).
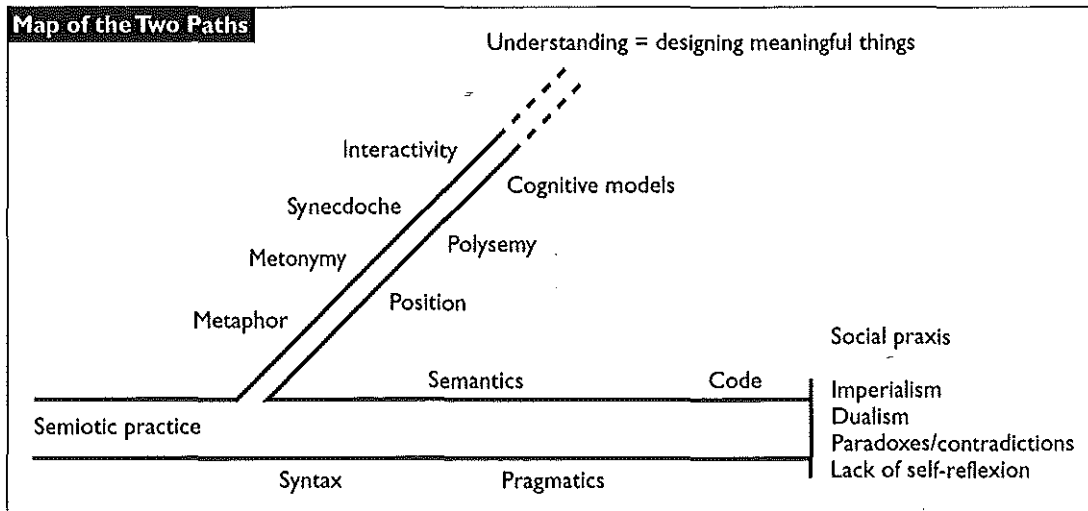
Key to the constructivist approach is not an objective reality but understanding. An axiom of constructivism is that, excepting purely autonomous biological functions and involuntary behavior, individuals cannot see physical stimuli, much less respond to them. They do not act on information from the outside, not even on affordances designed into artifacts by others, but they do behave according to their own understanding of their own experiences, whether this concerns the highly personal construction of sand on the beach or the social construction of a gift. Taking "understanding" literally suggests that it stands beneath or grounds reality in the social practice of people living together. Social practice simply becomes an unfolding of the constructions in the understanding

of participating individuals. Understanding is far from static. We might approach a new product with curiosity but always handle it as a variation from what we already know and what we want it to be.

Radical constructivists moreover apply the propositions they make about others to themselves and consequently see their very own probing into meaning as a social practice arising in their own understanding critically involving the construction of similarly capable others.

Leaving this introduction behind, I will now explore the two alternatives. Let me first proceed along the well known road of mainstream and, as I claim, objectivst semiotics until some of its entailments come in sight and then retract to proceed on the path less travelled, sketching the conceptual milestones I see there in passing. Figure 1 serves as a map of this effort.

Figure 1.

Map of the Two Paths

Understanding = designing meaningful things

Interactivity

Synecdoche

Metonymy

Metaphor

Cognitive models

Polysemy

Position

Semantics   Code

Semiotic practice

Syntax   Pragmatics

Social praxis

Imperialism
Dualism
Paradoxes/contradictions
Lack of self-reflexion

The usual road of mainstream semiotics' objectivism

*b*ased on the famous semiotic triangle whose corners are occupied by sign-vehicle, designatum and interpretant, by utterance, meaning and concept or by related tri-partitions favoured by individual semioticians, Morris' division of the semioticians' labor into syntax, semantics and pragmatics (Morris, 1938) is widely accepted as evident in encyclopedias and dictionaries (e.g. Sebeok, 1986). Let me state their definitions for the sake of laying the ground:

● *Syntax* is the study of the relations between sign-vehicles (to which some physical existence is ascribed),

● *Semantics* is the study of the relations between sign-vehicles and their designata, particularly the objects which they may or do denote, their referents,

● *Pragmatics* is the study of the relations between signs and their users and includes in its domain all the psychological, biological, and sociological phenomena that occur in the functioning of signs.

Although these definitions appear obvious and innocent, I am suggesting that they exemplify a vocabulary that drives semioticians, possibly quite unknowingly, along the objectivist road. Notice in these definitions (1) that they presume an embedded hierarchy whose base rests upon the materiality of sign-vehicles that become signs by virtue of their non-physical, grammatical, semantic and pragmatic ways of functioning; (2) that the various relations being studied here, whether these are based on resemblances, natural laws, or conventions, are presumed to actually exist independent of describing them, descriptions being viewed as representative or a reflection of the relations as observed, and

(3) that the semioticians offering descriptive accounts of their observations in these three areas of inquiry, their own discourse, their intellectual concerns and historical or cultural backgrounds, nowhere enters the semiotic project. Like gods, semioticians keep themselves outside their object of interest. This indeed is a textbook example of objectivism at work.

Allow me to reframe the three areas of semiotic studies to make the nature of the implied objectivism more transparent. Evidently:

● *Syntax is the description of a reality in which humans do not exist* or are not allowed to enter. Compositions, forms, systems and texts are presumed to have their own syntax which semioticians study and discover, whatever their origin, basis or purpose may be. Geometry, grammar, composition rules and mathematics are typical languages for syntactical descriptions of sign-vehicles, but none provide in them a place for their human creators, users or observers.[4]

● *Semantics is the description of a reality in which all humans (within a community) are the same* and can therefore be ignored. This is already manifest in accepting claims of the rather common form "something *means* or refers to something other than itself" or "something *is* a symbol or a substitute for something else," either of which may be said to be part of an *existing* code. Notwithstanding the acknowledgement that some of the semantic relations or codes are established by convention, legislated by authority or, in the case of symptoms, as having to be discovered in nature and learned to be acted upon, describing them without references to human cognition presupposes that semantic relations or codes exist independent of their creators and users and outside of whoever accounts for them. This objectification divorces meanings

from the very "somebody" that Charles S. Peirce, in his definition of sign, made responsible for something to be meaningful. Except for confining semantic descriptions to a speech community or culture, humans turn out to be irrelevant in such objectivist accounts of meaning. Finally:

● *Pragmatics is the description of how humans respond to a reality that is the same for everyone* (*within a community*). Studying "the uses of signs" presumes knowing the signs whose use is being investigated. Inquiring into "the interpretation of a text" presumes the existence of a text that is knowable and independent of its interpretation. By packing into pragmatics all the biological, psychological, sociological and political aspects of signs presumes a non-biological, non-psychological, non-sociological and non-political realm of existence in which signs, their syntax and semantics reside unaffected by their use. Objectivist pragmatics (which almost is a contradiction in terms) here admits individual variation, whether due to biases, incompetencies, misunderstandings or interests, but always in response to or in the use of a common reality, a universe of shared signs, symbols or meanings that are the same for everybody. —How else could one establish biases, incompetencies and misunderstandings but by reference to a standard reality, a known universe common to all?

One may not like this characterization of semiotics, but I suggest it fairly accurately describes mainstream semiotics' epistemological assumptions as manifest in its vocabulary and linguistic practices. Let me elaborate on five entailments of objectivist semiotics, its intellectual imperialism, its predisposition for standardization, it dualism, its paradoxes and inconsistencies, and its lack of self-reference. An example might illustrate where this road takes us.

Its intellectual imperialism. In a recent and unfortunately rather naive article in *Form*, Uri Friedländer (1989), a designer by trade and probably quite unaware of the epistemology he was tampering with, tried to drag product semantics along the very objectivist road it had deviated from by accounting for the meaning of artifacts without any concern for either individual cognition or the social practices of users or designers. To support his contention, that product semantics was already known during the stone age, he presented several images of artifacts. Two examples are reproduced in figure 2 respectively captioned "bronze handle" of a door with the comment "the lion as symbol of protection. Roman 100-300 AD" and "cosmetic spoon. The lion and the eagle as guardian angel of beauty...Egypt 1250 BC."
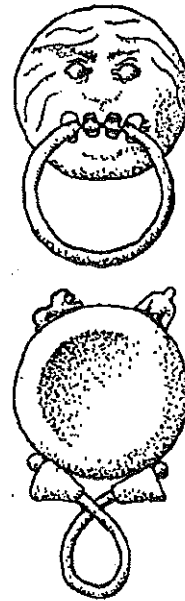
Notwithstanding his rather careless confusion of ages, one is compelled to ask: How does Friedländer know what these artifacts meant? How can he possibly speak for what people had in mind thousands of years ago? Does he have any evidence about how the artifact now called "cosmetic spoon" was perceived, talked about and used by ancient Egyptians? Were there guardian angels? Was the owner of the house with such a bronze handle really so insecure that he or she needed the image of a lion for protection? And did it work?

Let me propose that any assertion of what something means speaks foremost for the speaker, here a 1989 Friedländer. A statement of what something means to someone else is far more difficult to

substantiate. If we happen to find something interesting and meaningful to warrant joint attention or if we see it as a sign of something else, then this takes place in our own contemporary culture, in our own living language and in the presence of our own cognition. Our own and always contemporary perception provides us with no indication of how the ancient maker or users of an artifact saw what we see or was conscious of what we now take for granted. As a discipline, semiotics is about a hundred years old. Its name is said to have been coined by John Locke in 1690[5] and the awareness of a relationship between sound and meaning has been traced no further than to Plato's dialogues (Cratylus). No doubt, people talked long before they knew they did, but there is no evidence that the creators of the cave paintings of Lascaux, for a stone age example, had any notions resembling ours, least of all of product semantics. The claim that one's own perceptions equal those of everyone else, past and future, here and everywhere is an ethnocentrism, or better still, an intellectual imperialism we ought not to tolerate in our midst and certainly not clothe in scientific terms.

I am suggesting that the intellectual imperialism in the above is the consequence of a vocabulary that drives mainstream semioticians to confuse their discourse and their way of seeing with the objectivity of the things seen or talked about and constructs a single, objective and coherent universe in which humans either play no role (in the case of syntax) or are so alike (in the case of objectivist semantics) that their nature does not matter. The imperialists' language here becomes privileged, universal and transparent. This imperialism does not kill people or capture territory (although such could become its consequence). Minimally, it is an act of disrespect for the cognitive autonomy of other individuals, their ability to make their own sense of their own world and maximally, it is an act of oppressing the views of other cultures, ethnic minorities and the less privileged, ruling their identity out of existence to the benefit of the semioticians' own position of authority.

Since there is no easy test for the sharing of perceptions among contemporaries and much less across cultures and ages, an objectivist discourse on meaning that generates assertions like "the lion is a symbol of protection" (without qualifying for whom, when and in what circumstances), implying that everyone must be able to see what so obviously and objectively "exists", claims unquestionable hegemony over the discourses of others. The publication of Friedländer's therewith expressed views implicitly supports the imperialist claims of mainstream semiotics. Even modern market researchers would discredit themselves by not qualifying accounts of the meanings of products.

Its predisposition for standardization. If I were to see a door with a ring held in place by what resembles to me a lion's teeth, I could invent numerous equally plausible explanations ranging from the reputed strength of a lion's teeth (the conviction "a lion will not surrender his prey" maybe an analogue to "the ring can't be pulled out") to that it might be the original home of a traveller, hunter or lion tamer. Collectively we might come up with many more explanations than I can imagine and there is no guarantee that what we can come up with has anything to do with why an ancient craftsman made the door handle in that image, why the house's tenant put it on his or her door and what it meant to those having to handle it. In view of such possible variations of meanings, the objectivist road Friedländer is taking here by asserting, with the authority of an expert, that the lion *is* a symbol of protection blinds him and his readers from recognizing cultural diversity.

The semiotic view of communication as exchanging signs chosen from a common repertoire or as using a common code for translating sign-vehicles into their corresponding designata (or representations thereof) elevates the objectivists' disrespect for cultural diversity and individual autonomy to a theoretically motivated social norm. In this view, only the sharing of meanings, only the invariability of encoding and decoding processes, only the sameness of the senders' and receivers' processing equipment makes communication and by implication society possible. Accordingly, if the image of a lion would not mean the same for everyone it could not induce the fear necessary to deter thieves or offer protection against disasters, just as a message that does not point everyone to the same referent could not have generalizable effects. In this objectivist view, the standardization of signs, their meanings and their use, is a prerequisite of understanding, communication and social orderliness.

It is therefore not surprising that Friedländer is driven to the very same conclusion, calling for the search and use by designers of "culture-independent symbols," implying that they could exist everywhere and for everyone alike. In the same vein, the call for papers for the design section a recent congress on semiotics[6] of laments the lack of uniformity in human-product relationships and warns against a new "Babylonian confusion" in the design of computer interfaces, especially in the icons used for manipulating computer screens. Undoubtedly, there occasionally are good reasons for inventing and institutionally enforcing standardized symbol systems, for example, public traffic signs, whose ability to coordinate human behavior benefits all participants. But such examples are few.

In design, standardization has always supported mass production for mass consumers and enabled mass control. In contrast, whether this is due to an increasing material abundance, to the availability of new technologies, to widespread democratization of culture or to post-modern attitudes, standardization for the sake of theory is increasingly seen as oppressive. For example, personal computers were developed with the explicit intent to counter what was then perceived as a tendency towards centralization of intelligence. This new technology was envisioned as cheap and hence affordable by many, able to undermine hierarchies by supporting networking, negotiation and communication, and freely configurable, thus enabling individuals to organize their own worlds according to their own conceptions and desires. The computer revolution we now experience attests to the value of this individualization and the importance of a motivation that derives from interacting with a technology that is engaging, playful and fun and from the ability to create meanings and construct individual worlds in the process. Standardization of user interfaces, the rational submission to predefined functionalities and the conformity of use, has driven even large scale computer manufacturers out of business. I am suggesting that a discipline, a theory or a discourse whose normative implications are contradicted by so many contemporary experiences becomes non-viable in the long run.

Its inherent dualism. The Cartesian dualism is fundamental to all kinds of objectivisms and naturally at home in mainstream semiotics. This is evident in the foundational distinction between the world of signs, symbols and linguistic expressions and the world of unlabeled objects and observer-independently existing physical events. The former possess the ability to mean, refer to, substitute for, represent or describe the latter, but not the other way around. The two worlds are construed as being governed by different laws, the semiotic rules or codes, and the natural (prototypically physical but also including biological, psychological and

some would even add sociological) laws. The semiotic dualism replicates the stereotypical distinction between culture and nature or between mind and matter and is sometimes rationalized in philosophical realism.

This dualism is not a mere philosophical issue. In the design of industrial products, for example, it assigns product meanings and product functionalities or materialities to distinct phenomenal domains an thereby promotes a particularly suspect design practice. It makes semiotic practitioners, like Friedländer, to talk about the meaning of a door handle as if the door handle were an object that could exist without meaning (for anyone) and to which some meaning could mysteriously be attached (by its designer). Accordingly, it becomes natural for semioticians to look for that additional feature in the inessential aspects of form, the image of a lion's head, for example, implying that without some such feature the door handle would have to be without meaning or meaningless and moreover, that the perceiving and being able to handle what the word "door handle" designates has nothing to do with its meaning.

Helen Karmasin[7], representing a marketing view of product semantics, is guided by the very same dualist conceptions, conceiving meaning as a value adding feature of consumer products. I am far from denying what I see as her main point, that designers' awareness of semantics can improve products' marketability and use. I merely wish to point out that the dualism mainstream semiotics supports encourages the design of products that are thought to acquire values and meanings by (1) *imitating* (*representing or symbolizing*) *something else* that has inherently nothing to do with them, like a telephone in the shape of a duck decoy, (2) *adding symbols* of value from another semantic domain, like non-functional bottoms, dials and frequency indicators to an electronic device to make it appear more sophisticated, valuable or in style than it is, (3) *substituting* cheaper materials *while maintaining traditionally valued appearances*, like pressing Navaho jewelery out of plastic, or (4) *associating* them with *prestigious individuals*, designers, prominent figures that the users are made to believe they could emulate.

Instead of seeking to understand how something comes to be meaningful in users' minds and to enable this process through informed product design, the dualism implied in the semiotic vocabulary, conveniently embraced by the rhetoric of advertisement, creates a make belief world of deceptive symbolisms behind which lack of understanding, alienation and frustration necessarily lingers.

Its absurdities and contradictions. For one example, the dualism just assessed for its practical implications also leads to strange contradictions. If one insists on distinguishing between a realm in which natural laws govern physical events independent of human observation and a realm consisting of semiotic phenomena, signs, symbols and linguistic expressions which seemingly are the products of human consciousness, how can mainstream semioticians justify studying their empirical domain from the very same removed and outsider's perspective that physicists employ to inquire into theirs? How can one simultaneously claim semiosis to be a phenomenon of human consciousness and yet describe it as if humans either did not exist, have nothing to do with it or variously use what is considered same for everyone? Doesn't this kind of semiotics conceptually undermine its own premise.

Consider another example. Ulrich Neisser (1976), after conducting numerous experiments, concluded

that we do not see things but meanings. James Gibson (1979, 1982), before him said much the same by suggesting that we do not perceive objects but affordances. Gestalt psychologists build their approach on the experimentally verifiable experiences that we cannot identify absolute sounds but contrasts between them, melodies for example, that we recognize figures only against a ground, in other words, that an observer-independent physics of sensory impressions has little to say about what and how we see. Imanuel Kant, long ago, concluded: things as such are constitutionally inaccessible to us. Obviously, one cannot simultaneously claim that we only see meanings and that an object (which we would have to be able to distinguish and identify as such without its meaning) has (or conveys) meanings without either running into serious contradictions or claiming that semioticians are in the privileged position of god-like observers superior to everyone else. One is led to ask: what would happen to a semiotics in which the sign-vehicles, stimuli or artifacts on one edge of the semiotic triangle are taken to be as I think they are constitutively inaccessible to human observers?

Unicorns exemplify another class of semiotic oddities. Unicorns, we know, do not exist. When we see one we therefore must deny its status both as real and as a pictorial representation of something real. This lack of reference leads us to describe unicorns with a syntactical language that cannot but bring to bear on its description the kind of experiences we have with the animals unicorns remind as of, thus reintroducing the representational attributes just denied. A film shot in the stage set of a totally imaginary town is equally paradoxical. The camera shoots something that is at once real and imaginary, an original fake. Computer generated images that represent nothing outside that computer's own mode of operation pose similar problems to semiotics and artifacts or

objects of design can be seen in the same semiotically paradoxical state. Saying that something, a unicorn, Gotham City, a spoon or a stone, for that matter, refers to itself is just an effort to save a misguiding objectivism by attributing actor status to objects. Things, like unicorns, are what they mean to us in our experience neither because a theory tells us which experiences are legitimate (even so semiotics may just try to do this in its own domain) nor because the things have the intention to represent themselves in ways they do.

Its inability of self-reflexion. Let me conclude my criticism by pointing to what might underlie all four of the difficulties mentioned: mainstream semioticians see the object of semiotic analysis, the world of semiosis, as existing independent and outside of their describing it. This sharp distinction between the semiosis as observed by a detached semiotician and what semioticians do in their own work prevents semioticians from entering their own empirical domain and makes their own theories and empirical accounts of semiotic phenomena immune to semiotic considerations. It also enables them to deny responsibility for the very semiosis their semiotic accounts may set in motion in those addressed, in the phenomena being described, including in their own cognition. In short, mainstream semiotics is non-reflexive if not authoritarian in consequence (in the sense of both being unquestionably above and not caring for the cognition of those affected by it). In stating this so bluntly, I do not imply unethical intentions or devious conduct, but, as I suggested earlier, that it is the semiotic conceptualizations, vocabulary and discourse that keeps semioticians on the well paved road of a self-limiting objectivism.

A brief example may add to what I already said. A challenging paper by Antje Flade[8] revealed gender differences in what a home means to its inhabit-

ants. It found (please note that "finding" implies that it was there before it was discovered and unaffected by the act of describing it) that women see in their home a place they identify with, a place of human contact, a place where they do their chores, whereas men see in their home a place to withdraw after work, view television and relax, a place to play with kids and be with friends and a place to keep one's material possessions. It also concluded that most home layouts were created by male architects and afforded men's home uses more so than women's. Notwithstanding that the very act of asking these questions may have made interviewees aware of the phenomenon being addressed, notwithstanding also the preference of scientific "findings" to emphasize large frequencies (majorities), commonalties and averages at the expense of exceptions or deviations from main findings, when such scientific reports become instructions to architects to develop layouts appropriate to women's "needs", then past sexual stereotypes are being reinforced, establish themselves as norms and become built into the solid layouts of a home whose "forcing functions" might make it less and less possible for women to escape.

Obviously, even innocent descriptions never are entirely neutral. The semiosis that Flade's insightful "report" encourages has the potential of unintentionally reinforcing the appalling sexual stereotypes whose observation motivated the study. A lesson of this example could be to report not the facts as "found" but what this study could give rise to when embodied in the practice of living in architectural spaces. It serves here as an adequate demonstration that semioticians, through their inquiries into the meanings of others, are themselves involved in a semiosis that constructs and hence changes the very reality they seek to describe so innocently. Objectivists are committed to render nothing other than accurate descriptions and

are thereby prevented from understanding the self-reference of their own practice.

Without claiming to know the right way, I am afraid, the objectivist road might lead to a "semiotized world" full of problems and contradictions that may leave little space for alternatives and to feel at home. Let me therefore retract from the road commonly travelled to where a smaller path branched of and continue in a radically different direction.

The trail worth blazing: towards a constructivist semantics

i have to be brief now. Let me therefore demand, foremost of myself and with implicit justification taken from the preceding, that:

I   Semantics, as a theoretical discourse on meaning, be embedded in human understanding as a recursive cognitive process. Humans should be recognized as constitutive participants in the worlds any semantic theory may construct.

II   My understanding and, hence, also the semantics I am concerned with here, must embrace (leave space for and take account of) others' understanding of the social practices through which we might be concerned with each other. Semantics arises out of social practices, informs them in return and therefore must be valid for observers and for observed others alike.

III   On the premise that understanding always is someone's self-reflective achievement and never finished as such, semantics should be creative and constructive of further understanding and enable the construction of coherent worlds, the design of meaningful artifacts and discourse presumed understandable by others included.

It would follow that such a semantics must spell out the cognitive operations of understanding it is intrinsically concerned with. It should not designate a class of objects of interest, for example signs, but the cognitive processes that brings them into being. Let me mention a few processes a constructivist semantics should embrace.

Understanding

*t*o me, understanding is a recursive process of constructing (deconstructing, reconstructing and inventing) (reality) constructions whose cognitive unfolding (into various practices, interventions and actions) preserves the very process of construction within the experiences of its embodiment. Let me elaborate on some of its properties.

Understanding is a cognitively autonomous process. It arises within individual cognition. It is personal and private. It can be neither transmitted to someone else nor imposed from the outside. (Any "influence" is a matter of one's own causal constructions on how different experiences are connected, how one chooses to explain them). Understanding is not *of* something outside, understanding *is, ongoing,* a process. The eigen value of understanding (where the process converges to with time) may be the feeling that one's reality constructions are coherent, sufficiently complete and viable in practice.

Understanding is a recursive process. As such it builds on its own products, piles explanations on top of explanations, continuously decomposes, reconstructs, elaborates and transforms the constructions already there, weaving concurrent experience into them. "Original" or "raw" experiences, which are hardly accessible as such, recede with time in their importance for directing the process.

Understanding is a creative and constructive undertaking. Reality constructions therefore happen by invention, not by necessity. This is far from saying that understanding is arbitrary. Understanding directs its own history and is constrained by experiences arising from its unfolding constructions into (social) practices and by contingencies (perturbations) from its embodiment. It is within these constraints that its artifacts may arise spontaneously. If understanding were structure-determined and individuals would therefore have no choice in how they construct their realities, a sense of self could not arise and nobody could be held responsible for their actions. If understanding were totally arbitrary, without a viability check, individuals would have to be solipsists and as such unable to respect, live and communicate with others like them. Thus, the notion of understanding here proposed may be nothing more than a creative perpetuation of socially viable constructions.

Understanding defines its own horizon. What is within seems coherent and meaningful, what is beyond escapes comprehension (or may not be seen at all). The horizon may expand, of course, with experiences and in time, but only from within. For example, as it directs its own history, understanding also provides the passing contexts (of reality constructions) for perturbations to enter. However, the causes of these experiences cannot be known outside of understanding or constructing them—which would keep them inside that horizon. For any one individual, there can therefore be no reality, no (social) practice independent of his or her understanding.

Understanding dedicates all of its processes, all of its resulting reality constructions (including the construction of an observing self, others, a physical world and its horizon) to the preservation of understanding (coincidentally including its embodiment,

for example, in the medium of a biological system which may remain unknown as such). One could also say, the purpose of understanding is to sustaining itself in the face of perturbations arising from its embodiment.[9] Alternatively, it could be said that cognitive systems are constituted or constitute themselves to sustain their recursive understanding including themselves. Or, as Spencer-Brown concluded, "we cannot escape the fact that the world we know is constructed in order (and thus in such a way as to be able) to see itself" (1972, p.105).

Understanding and (social) practice belong to different phenomenal domains, to different realities. Anyone's (participation in social) practice is inseparably fused and hence indistinguishable from his or her own self-understanding. Observing and seeking to understand the practices in which others participate involves seeking to understand the understanding by others. One's own understanding and someone else's understanding have different embodiments and therefore belong to different realities. Particularly in the social domain, understanding embraces different realities (or variously embodied reality constructions).

Social practices, coordinations, institutions and other artifacts are correlates of the cognitive unfolding of simultaneously active reality constructions. "Correlates" because they may reach into and involve the participation of others, but what anyone knows or what anyone knowingly acts upon always resides inside his or her own understanding.

With this understanding of understanding in mind, let me develop a few concepts for a constructivist semantics.

Position

*t*he distinction between my understanding and my effort to understand a social practice in terms of someone else's understanding gives rise to different positions one may take within one's own reality constructions. For example, in communication research, one may want to distinguish between the position of the author and the positions of different kinds of readers vis-a-vis that of the communication researcher who links both through a text. The text may be something entirely different for each. To capture this difference (without privileging one's own reading as right and everyone else's as wrong or biased in degrees) requires the ability to take different positions. Taking different positions from which to construct and see something that may appear to us to be the same for everybody enables choices among alternative constructions of reality and accordingly requires taking responsibilities for constructing them.

Objectivist knowledge is positionless. Indeed, the belief in the existence of a single reality outside its observer, a universe, which is the same for everyone, renders alternative positions meaningless. What is seen then is projected onto this outside reality for which no one can be held responsible except for having to accurately describe it. In this belief, alternative forms of understanding become human failures or distortions of reality.

Minimally, positions are evident in our describing what we see (the people in our lives or the artifacts we handle) relative to our body. Someone is a father, an employee or an idol to me or to someone else but not necessarily to both. "Hard" and "soft" are defined relative to our experiences of touch. Whether we talk about people or computers, either has a front, facing us, and a back, facing away from us. And when we describe the functionality of

artifacts we refer to what *we* are able or unable to do with them, whether they help or hinder *us*. Thus, our self is intricately involved in how we see even the most elementary things. Helga and Hans-Jürgen Lannoch (1989) used this natural self-reference in ordinary language descriptions of form to argue for a non-geometric notion of space that includes the position of the observer.

The situation is more complicated when we have reasons to believe that what we are seeing from our position has positions of its own and different from us, when we do not merely observe but observe the observing by others. This is the key to understanding human communication. In human communication, the cognitive autonomy of others, including their ability to choose positions of their own must be mutually respected else interaction ceases to be social and reduces to manipulating others as tools.

However, I do not want to get into issues of communication here. Instead, I want to elaborate on the earlier question of what it takes to understand someone else's meaning (of something), which is the prototypical question semantic analyses should answer. If we say we see only meanings, as Neisser suggests, or affordances, as Gibson claims, or the experiential consequences of the embodiments of our own reality constructions, then such positionless statements as "the lion is a symbol of protection," "red means danger" or "the airodynamic shape of a car indicates its speed" would not make sense without knowing who is talking. (For this reason, I argued that Friedländer's promulgations are Friedländer's account of Friedländer's perceptions, unjustifiably projected onto everybody else). As soon as we speak about others with cognitive capabilities similar to our own then we can no longer insist that *others* respond to how *we* see things. We have to respect their own understanding. Thus, asserting

what something means for others constitutes a relationship between constructions on different logical levels: our understanding and our construction of someone else's understanding. It entails that we acknowledge our own position from which we see (or understand) and to construct from this very position the positions of others from which we have reasons to suspect they see (or understand) differently. In a constructivist semantics taking positions and appreciating (by construction) the positions others take is critical.

I might add here in passing a distinction, proposed elsewhere (Krippendorff, 1990b) among three kinds of positions, that of a becomer, of an observer and of a subject. In the area of semantics, becomers realize their own semiosis and are involved in a continuous process of self-realization. Becomers are aware of making themselves at home in their own understanding. Observers are aware of their ability to construct and reconstruct signs, symbols and artifacts outside themselves but not that this could apply to their own position and to themselves. Designers are prone to taking this position. Subjects see themselves as having to adapt and therefore willingly subject themselves to realities constructed as residing outside their participation and control, for example, to fixed meanings, unquestionable linguistic conventions, unalterable social institutions and super-individual powers. Subjects allow themselves to be oppressed by how they choose to see.

The ability to take positions is fundamental to understanding ones own understanding. The ability to construct the positions of others is fundamental to understanding social practices. A constructivist semantics has to explain the differences created in taking different positions and in this difference might lie the fundamental notion of a sign.

3   6

Metaphor

*O*bjectivists have little analytical use for metaphors, variously describing them syntactically as literary figures of speech, semantically as making vague or allusory references and pragmatically as forms of poetic embellishment and all along blaming them for inconclusive thinking. To me, metaphors, while manifest in certain linguistic figures or visual forms, reflect a very precious cognitive operation. Metaphors seem vague and uncertain only when one is destined to look for referents outside cognition.

Roughly, "metaphors make us see one thing in terms of another" (Lakoff and Johnson, 1980; Lakoff, 1987). They become manifest in changing our perceptions. More specifically, there always are (1) two distinct domains of experiences, (2) a structure, pattern or principle of construction is transferred or carried from one (and usually well understood) domain into another (and usually inadequately understood) domain which it thereby (3) organizes in ways not experienced or seen without this import. The latter involves fitting existing parts from the target domain into new wholes. Once the imported structure makes sense (4) metaphors serve as a bridge for bringing a variety of additional entailments to the target domain. Two examples will suffice.

People use all kinds of nonprescription drugs for all kinds of reasons. In the U.S., the complex web of motivations for drug production, dissemination and use is increasingly understood through war metaphors. Although there are other ways of understanding drug use, for example, as a disease (medical metaphor), as a community or educational issue (social metaphor) or as criminal behavior (legal metaphor), accounts of "the war on drugs" by politicians, the media and ordinary folks make it

into a battleground. Whereas a medical metaphor entails treatment and care for the diseased, the war metaphor entails a distinction between friends and foes, brings forth and mobilizes resources to fight the enemy, justifies even the invasion of another country, Panama as it were, calls for personal sacrifices, winning or losing being the only outcomes. Metaphors are not true or false. They organize perceptions and actions through their terms.

Another example is the shape of personal computers. There is no natural form. The boxes of a mainframe computer are as good as the human figure of a fictional robot. Since the working of a computer is understandable only to very few, it is not surprising that personal computers assumed the shape of two familiar technologies, the TV screen for seeing and the keys of a typewriter for inputting. These two metaphors provided an initial understanding of computation in terms of what was well known in entirely different domains. However, they also drove their evolution. The first PC's had line screens. The user saw his or her outputs not much different from how it came out of a typewriter, line by line and moving up the screen. But TV also shows colors which were added to computers as a matter of course. TV alsohas moving images and sound which are now being realized in various hyper-card applications. So, the entailments of the TV metaphor drives computer development within the horizon of understandability.

From the point of view of a constructivist semantics, metaphors are far from representations that are plagued by referential ambiguity and falsehood. Underlying their linguistic expression are rather definite cognitive operations that create new perceptions and organize actions, render meaningful what heretofore was incomprehensible and constitute new realities we thereafter observe with surpris-

ing certainty. Metaphors reflect a cognitive process that creates new meanings.

Metonymy: sense and function

*M*etonymy reflects the cognitive operation of relating parts to wholes. It explains or overcomes the difference created by drawing a distinction between something and wherein it resides, what it is a part of, the background against which it comes to the fore, for example, between inside and outside, between text and context, between an organism and its environment and between the observer and the observed. Clearly, neither wholes nor parts (which are wholes in their own right) can exist without the two cognitive operations of drawing part-whole distinctions and making sense of what keeps the thus created parts together. Elsewhere (Krippendorff, 1988, 1990a), I suggested a distinction between meaning and sense, describing them as the result of two different operations on experiences. We say that *something makes sense when we understand the role it plays in a particular context,* when we have a metonymic understanding of what we see it does. It makes sense that the movement of a pen over paper leaves a mark. It makes sense that a bolt holds two pieces of hardware together. In contrast, the meaning of something is the sum total of all the contexts for which we are able to imagine a sense for it. My pen does not just write, it can serve me in numerous capacities for example, to operate my computer wristwatch. In short, *something means (or enables someone to anticipate and see) its possible contexts of use.* Thus, by analogy, sense is to meaning as actuality is to potentiality, as performance is to competence (Chomsky) or as speech is to language (Saussure). We acquire sense by perception and action. We acquire meaning by grouping the many senses we could make (of something) in different settings into a recognizable class. I have frequently

argued that *design is making sense (of things)* (Krippendorff, 1989, 1990a). It calls for designing meaningful things, artifacts whose workings are understandable in particular contexts and by prospective users.

Metonymy probably reflects the cognitive prerequisite of objectivist notions of sign. For example, for a cause to become an index of its consequence (or for a consequence to indicate its cause) presupposes (1) drawing a distinction in time and in kind between two events and (2) explaining the difference thus created in causal terms. Only after these cognitive operations were performed on the initially undifferentiated and whole experience, can one event serve as an index of the absent other. Classical examples of metonymies are taking a crown as a sign for a monarchy, using (the image of) a table setting as the sign for a restaurant, making a logo designate a corporation (e.g. by imprinting it on every communication, building or product).

Helene Karmasin[10], gives several good examples of efforts to change the definition of products by presenting them in new contexts for TV viewers to make sense of, for example, deodorants in the context of romantic success or expensive cat food in the context of treating someone special, the cat, for giving invaluable companionship. The aim of this form of advertising is to create metonymies that encourage viewers to make sense that can be generalized to a belief in buying, not a mere chemical that removes odors, but a means to interpersonal success or not mere food to feed a cat but a way of cultivating companionship.

Metonymy also underlies functional analyses, ranging from the social sciences to engineering. Sociology, for example, defines the function of an individual act by how it contributes to the well-being (essential prerequisites) of a society. In social

psychology, social roles are described by the function a person performs by virtue of holding an office, position or title within a social organization. In systems theory, the function of a subsystem is what it does relative to all other parts of the larger system, mathematically expressed by an equation relating inputs to outputs.

Being serious about the possibility of taking different positions within one's own reality constructions, I am suggesting that a *function is* nothing other than *the disembodied sense something makes in a professionally privileged context.* "Disembodied" because it surrenders one's own position to a virtual community or group defined by the presumption of sharing a discourse, seeing alike or making the same sense of things. "Privileged" because the context in which functions arise is not necessarily accessible to the experiences of the uninitiated and the theory that informs what a function is arises from what that professional community considers desirable and real. In design, the functional description of artifacts privileges the metonymic constructions of professional designers. Witness the frequent discussions about what a product's functions should be and complaints about users who do not use it as intended. In semiotics, sign-functions privilege the metonymic constructions of semioticians. All speech communities tend to privilege their own functional discourses. For example, an AI engineer may consider the functional architecture of a computer as the only reality that counts and user conceptions as secondary, subjective and unreal, whereas a user may see that computer primarily as a device for acquiring a competitive advantage over others, rendering the senses made by others less important. Similarly, when designers get excited about an unusual artifact, their professional discourse prevents them from analyzing their emotions and instead places such an artifact in the context of

socially established aesthetic theories which justify arguing in terms of proportions, symmetries, repetitions, etc., not realizing that this way of seeing is rather specialized to their profession.

Sense and functions arise out of the same metonymic processes but differ in the responsibilities taken or refused for what is seen.

Polysemy: meanings and affordances

*b*y accounting for meanings, for example, in terms of contents of containers as in "X *has* the meaning of Y" or in terms of correspondences as in "X substitutes for Y," objectivist semiotics favors one-to-one relationships. Dictionaries, catalogues of symbols and codes describing such relationships are witness to these preferences and when such one-to-one descriptions cannot be achieved, contexts are sought out as disambiguating agents. This is merely an effort to rule out polysemy. Consider a few examples of uses of the word "play:"

to play tennis

to play down an issue

to play something in someone else's hands

to play around with someone of the opposite sex

to play a game of chess

a play by Shakespeare

child's play

playboy magazine

a playboy

"play" plays different roles in different contexts

In these examples, there seem to be few if any commonalties among the senses in which "play" decisively participates. It would therefore be difficult to claim the word to have a core meaning that different contexts merely modify (see synecdoche below). "Play" simply is polysemous which is to say that it can assume a range of roles in different situations. The only constancy in these examples is the word "play."

In view of the chamelion-like senses something can make in different contexts, the semiotic ideal of finding simple correspondences between sign-vehicles and what they refer to or mean, also expressed in the apparent need for disambiguation, may be a hopeless if not oppressive undertaking, save for the most restricted semantic domains, for example, traffic signs, legal terms, technical vocabulary, military ranks and dictionaries used in teaching. In fact, in all of the latter examples there are institutional reasons for forcing unambiguous use. What is needed here is some kind of field theory of meaning.

In the preceding, I defined sense as an explanation of what something is seen as *actually doing* in a particular context of experiences, the role it plays for someone, and meanings as the roles something *could* play or what it could be made to *do* in a range of imaginable contexts. So, a pen is not just an instrument for writing. It can also be a pointer, a stylus, a projectile, a book mark, a reason for holes in one's pocket, a fingernail cleaner, a gift, a status symbol, a sales item, an expense, something to hold a women's hair in a knot, etc. Although some uses of a pen, may be more typical than others, the word "play" does not seem to have a single most outstanding sense. When Neisser suggests we see meanings, not stimuli or things, this would entail that we see in a chair the possibility of our sitting on it, moving it, stapling it, etc., or that we see in a

Porsche the possibility of driving fast, impressing someone else, etc. This is not to suggest that we always have in mind all the culturally conceivable contexts of usefor what meets our senses, but that the *meaning of something equals our present anticipation of what we could do with it, in which contexts it would make sense to us.* Meanings always are relative to someone's circumstances of understanding.

A concept closely related to this notion of meaning is affordance. Gibson (1979, 1982) originally coined the term to account for his observation that pilots, seeking to land their aircraft, look for and see in the surfaces they are exposed to not what it *is* but whether an aircraft is "land*able.*" He extended this idea to perception in general, suggesting that something becomes a chair because it is perceived as affording sitting, that something becomes a cup because it is seen as affording the containment of fluids, etc. Gibson certainly was an objectivist or realist as he described himself who believed that it is the nature of the perceived object that provides information and does the affording. This led him to disembodied accounts analogue to that of functions as discussed above but, unlike the objectivism of his period, his affordances clearly are anticipatory and describe abilities or potentialities. Gibson's affordances seem to be nothing but meanings except that they are disowned by their beholders, projected on a perceived environment outside of them, and presumed shared by members of a (professional) community of psychologists and designers, for example. Thus, *affordances are to meanings as functions are to sense.*

With this terminology in place, differences in constructions and perceptions between professional designers as a community and individual users (or others involved in the cycle of production and consumption) of artifacts become assailable and questions about what a depersonalized object (as

seen by designers) may mean to particular users can be answered. One could say, designers, like good communicators, engage in discursive practices through the articulation of artifacts whose meanings for particular users must also be afforded by them else a user will approach his or her environment with expectations that are bound to fail (Krippendorff, 1989). However, to state such a relationship between affordances and meanings, as in the previous sentence, requires a relativistic understanding of different individuals', understanding including one's own. This relativity withdraws the objectivity from Gibsons claims and makes the very difference between affordances and meanings of prime interest to a semantics for designers. It also shifts the aim of design from creating aesthetic forms of products to providing those affordances that enable ordinary users to understand their artifacts in their own way and to engage with them in socially desirable practices (ultimately with the designers as well).

Thus, a constructivist semantics must recognize polysemy as a normal case, not as the undesirable exception. It should look for meanings in the multitude of contexts someone is capable of constructing for something to make sense. It has to relativise such meanings by taking into account different positions, particularly comparing one's own understanding with understanding of someone else's understanding of what either may understand quite differently. To reduce object-meaning relationships to one-to-one correspondences or codes, like purporting the lion to be a symbol of protection, suppresses the very scope of understanding a constructivist semantics seeks to provide.

Synedoche: types and tokens

*O*ften confused with metonymy, synecdoche reflects the cognitive operation of relating (not parts to wholes

but) species to genera, tokens to types, objects to categories, etc. It is the process by which we identify what something is, to which category it belongs which underlies the linguistic notion of connotation. It enables the naming of something not previously experienced by relating it to a familiar type.

Objectivists define categories in terms of what all the instances of a category or the elements of a set have in common.[11] This most naturally leads to logical taxonomies of downwardly increasing commonalties. The elaborate classification systems of signs in semiotics provide ample examples of the consequence of such a definition.

Constructivist semantics relies instead on the cognitive operations that invoke identifying and categorizing experiences. It defines categories not by boundaries but by their center, often called prototype, ideal type or type for short. The evidence in favor of the latter is strong and has a considerable history. There is Wittgenstein's (1958) concept of family resemblance according to which a category of things need not be represented by what they all have in common but by the connectivity among its members. There is Chomsky's argument that we cannot learn a language by being exposed to all sentences of that language for we construct new ones all the time and understand even ungrammatical sentences with ease. There is Rosh's (1978) work on prototypes suggesting that we can far easier express how close something is to what is most typical of a category, its prototype, than to draw a boundary around all members.

Athavankar (1989, 1990) explored categorization and prototype theory for design in which the identification of something is an important issue when marketing an entirely new product or redesigning a familiar artifact. The boundaries between a cup, a

mug and a bowl may be fuzzy but the ideal- (or proto-) type is clear for any one user. Jochen Gros once described the type of a category of artifacts as its "Wesen[12]" or essence.

Recently Johnson (1987) suggested that meaning forms a category as well, connecting a multitude of contexts that may have nothing in common other than that the same thing links the different senses it participates in into a single category, the category of the artifact. One could argue that anything seen always already is an artifact of cognition by virtue of meaningful prototypes available for it.

Cognitive models: schemas and scripts

When we approach a new experience, we always bring to it a repertoire of patterns for understanding, structures that have guided the coordination of perception and action in the past, maps we have available to walk in similar terrain, scripts we are accustomed to follow, often without much thinking. These phenomena may be captured here by a single concept. To me, *a cognitive model is a recurrent pattern that recursively connects experiences and maps then into understanding so that we may reason with them.* Let me elaborate.

Basic schemas, like cause and effect, map and territory, sign and referent, text and context, actor-action-targets and the semiotic triangle already are cognitive models, albeit simple and general ones. These organize many experiences semioticians have as evident in semiotic discourses. What is important here is that cognitive models are capable of organizing, reconstructing and generating far more complex experiences than these, from driving a car to understanding how to move through a political system.

Cognitive models are neither about nor representative of objects or systems of objects outside of us. One can think of them as guiding particular social practices we wish to engage in. These bring forth experiences that inform the cognitive models in use and thus close a circle that constitutively involves an - without these models unknowable - environment. Within what such an environment affords, cognitive models entail their own limitations. They work or remain viable as long as their unfolding into social practices does not create difficulties for themselves or end up in a breakdown or trap.

However, having said that understanding, our cognitive models included, has no knowable outside referent, we nevertheless can study the cognitive models held by others in our own understanding and compare them with our own constructions of the practice they inform. This seems possible because our ability to reason with them and to express them in verbal discourse. For example, Kempton (1987) carefully analyzed the verbal accounts given by different users of thermostatic home heat control devices and could construct from them what seemed to be the guiding conceptions of the practices he could observe. Kempton found that individuals approached thermostats either with the cognitive model of a valve or with the cognitive model of a feedback loop. Those guided by the valve model caused more extreme temperature differences, had to reset the thermostat more frequently and experienced more frustrations than those guided by the feedback model. The material system afforded both cognitive models, of course, but brought forth rather different experiences for their beholders. The fact that there are engineers who know the system they constructed does not enter the experiences of either kind of users who saw no reason to change their conceptions.

The for practical purposes absence of correspondence criteria for evaluating cognitive models is most striking in the design of user interfaces for computers. The interior of a computer is virtually incomprehensible to most competent users. Within the extremely wide confines afforded by a computer, users have the freedom to develop their own and often rather weird conceptions of how the computer does what is experienced and in turn use those conceptions that worked to generate experiences that would follow from them. These conceptions often come from entirely different domains of experiences (see metaphors) and computer interface designers may take advantage of cognitive models in use to design operations that afford them. For example, by affording opening and storing files, discarding documents in a waste basket which have little to do with what the computer does but much with schemas of human understanding. Turkle (1984) analyzed the cognitive models of computers in children and traced their epigenesis to experiences with videogames, smart toys and human interactions. Johnson (1987) looked for even more basic sources of schemas like inside-outside, up-down, front-back, toward-away from, that are thought to come from early bodily experiences, are expressed in language and underly the construction of many cognitive models for creating the world we come to believe we live in.

The understanding of meaning is to a significant degree informed by an understanding of the cognitive models in use and discourse probably is the best window into their cognitive constructions. Cognitive models cannot be showed aside as "mere" conceptual. They are demonstrably real.

Interactivity: semiosis and involvement

*a*s a final point, I am suggesting that a constructivist semantics would have to embrace change as a consti-tutive principle of understanding. Mainstream semiotics' self-imposed aim to describe the world in terms of binary relationships as enshrined in the semiotic triangle not only limits the complexity of the phenomena it is led to tackle but also betrays what probably motivated its originators, Charles S. Peirce for example, to initiate the project, and this is semiosis, the process by which signs come to be, semiogenesis if you wish. Inquiries into relationships presupposes they exist as such and looking for codes makes one find them in the stabilities of a world that resists variation. In this kind of semiotics, semiosis reduces to learning established signs, adapting to existing conventions and institutions and supporting the status quo. A theme that ran through much of this paper is that cognition is inherently restless. People's understanding not merely adapts but creates social practices. There are many realities, not one, and these are constantly taken apart and constructed anew when we cognitively or discursively attend to them. Asserting something, like producing an artifact, always changes the world we live in, albeit by small measures.

Nowhere is this more evident than in the already mentioned world of modern personal computers. Computers are general purpose machines to start out with on which hardware designers impose a simple architecture that users cannot change. Beyond this, there is a whole industry that competitively provides software for making computers more understandable to users. Software links the computer designers' understanding of how a system works to users' understanding of the same. It is by traditional definitions a mechanism of communication between the two, but of a qualitative new kind. The critical feature of such a mechanisms is not to influence, to control or to enforce a particular behavior, but *to enable* users, senders or receivers, to do something with and in terms of their very own understanding.

By comparison, traditional machines essentially are trivial in structure, embodying particular input-output relations.[13] They are conceived as tools whose specialized use has to be learned and perfected. They force users to adapt to them. The motivation for their employment largely derives from achieving certain goals outside of them to which these machines are means. Personal computers may be used as tools as well but, more importantly, they can be made to perform innumerable tasks, are within an enormous range configurable and can therefore be tailored by and in support of human understanding. This makes them more adapting to users' cognition than the other way around. The motivation for their use comes less from extrinsic achievement but from intrinsic involvement in the process of unfolding ones cognition in interactive practices. The more natural it feels, the more self-directed one can move and the more open to meaningful alternatives a computer is, the more fun it is to interact if not play with it. The evolution from word processors to Macintosh windows to hyper-media applications and to virtual realities is semiosis at its best.

Science always had an affinity to technology, sometimes using it as a testbed for its theories and sometimes taking from it models and metaphors for constructing its theories. It seems that we have to move away from the objectivist vocabulary of icons, codes, causal chains and binary relations, away from represensational and instrumental conceptions of language and away from the search for accurate descriptions, predictions and control, all of which are so clearly tied to trivial machine conceptions. The artifactual world we now experience has grown far beyond our traditional horizon of understanding. We have to catch up to lead its ongoing semiosis.

Modern computers do not provide the only metaphors for what a constructivist semantics

should be concerned with. Interactive practices of deconstruction, reconstruction and designing social realities in which participants understanding thrives in cooperation with each other, creating institutional processes in which new realities are envisioned and put into praxis and the very effort of constructing a constructivist semantics for the design of meaningful artifacts among others, product semantics for short, a semantics that brings forth the phenomena it claims to be about, these provide ample examples of semiotic practices that could provide their own metaphors of understanding.

Let me conclude with the quote from a magician of our trade who, through his own "looking glass," may have anticipated much of what I was proposing here by having his characters engaged in this dialogue:

> "When *I* use a word," Humpty Dumpty
> said, in rather a scornful tone
> "it means just what I choose it to mean—
> neither more nor less."
>
> "The question is," said Alice,
> "whether you *can* make words mean so
> many different things."
>
> "The question is," said Humpty Dumpty,
> "which is to be master that's all."
> (Lewis Carroll, 1982:184)

My answer would have to be found not in the authority of a semiotician but in the constructions we must create by ourselves to live in.

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Notes

1 See a special issue of the Industrial Designers Society of America's magazine, *Innovations*, 3, 2, 1984; a special double issue of *Design Issues*, 5, 2, 1989; the Proceedings from the *Product Semantics '89* Conference, Seppo Väkevä (ed.). Publication of the University of Industrial Arts UIAH, A4, Helsinki, 1990.

2 For example Ernst von Glasersfeld's (1984) radical constructivism, Kenneth Gergen's (1985) social constructionism, Peter Berger and Thomas Luckmann's *Social Construction of Reality* (1967), George Lakoff (1987) and Mark Johnson's (1987) cognitivism and various shades of naive constructivisms ranging from George Kelly (1955) to Jesse Delia (1977).

3 The difficulty of applying correspondence truth criteria also came to light in a recent talk by Thomas Sebeok on "virtual reality," a computer-generated interactive world providing virtually real experiences to users. He grounded the uncertainty regarding what reality is in conclusions rationally derived at by certain philosophers but then proceeded to distinguish between virtual realities, simulations and other forms of representation as if an unqualified reality would knowably exist outside of us, as if the uncertainty as to how reality is constituted could be ignored in its representations. (See Proceedings of the 6th International Congress on "Sign (Theory) in Practice", Passau, Germany, in press).

4 In a recent article, Helga Lannoch and Hans-Jürgen Lannoch (1989) recognize that the orthogonality of geometric space conceptions cannot accommodate human perception and developed instead a semantic notion of space whose attributes are relative to the position of the observer within this space.

5 ——————————— An Essay Concerning Human Understanding, 1690.

6 ——————————— 6th International Congress "Sign(Theory) in Practice" Passau, Germany, October 8-11, 1990. Proceedings forthcoming.

7 ——————————— Helene Karmasin, "Mehrwert durch Zeichenwahl, Semiotik in der Analyse von Marketing und Werbung", Plenary presentation to the above mentioned Congress, Wednesday 10-10-90.

8 ——————————— Antje Flade, "Geschlechtsunterschied und Affordanz von Wohnungen", Paper presented to the above mentioned Congress, Section 5, Ökologie und Semiotik, Monday, 10-8-90.

9 ——————————— This formulation of understanding resembles that of autopoiesis which Humberto Maturana discussed in numerous publications and at the above mentioned Congress. This resemblance is no accident. Autopoiesis is an explanation of living systems as a recursive network of interactions that produces all the components necessary to continuously embody the very process that produces them. As an explanation, autopoiesis is a recent invention by Maturana and Varela (1980) and is not a requirement of anyone's understanding. However, in seeking to understand the (social) practices of *others* in terms of their understanding, since understanding cannot exist outside of its embodyment (in a circular network of perception and action constitutionally involving the biology of that other), the maintenance of a biological organization through self-production, which autopoiesis seeks to explain, is a prerequisite for understanding to take place. In the long run, understanding cannot contradict the autopoiesis of its embodyment.

10 ——————————— Ibid.

11 ——————————— See George Lakoff (1987) for a good discussion of this difference.

12 ——————————— Jochen Gros, *Form*, sometimes before 1984.

13 ——————————— For an elaboration of the trivial machine notion see H. von Foerster (1984).

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