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Semiotic Bodies, Aesthetic Embodiments, and Cyberbodies

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Introduction

With the cognitive turn in semiotics, the corporality of signs has more and more become a topic of sign theoretical reflection. For a long time, semiotic structuralism had overemphasized the dogma of arbitrariness, and signs were only considered as mere structures and abstract relations. Today, the materiality, corporality, or bodily nature of signs is in the center of interest. Their bodily nature is not only apparent in nonverbal and paralinguistic communication, where the human body itself is the sign vehicle and hence the *embodiment* of signs, but also in the process of cognitive, neural, and cerebral processing of acoustic, visual, and other signs, where bodies are the interpreters of signs. The bodily nature and the embodiment of signs is a topic both of Applied Semiotics, where the most diverse corporal and material forms of signs are under investigation, and of Theoretical Semiotics, where the nature of the sign vehicle has to be examined in the elaboration of adequate sign models.

Hardly discovered as a topic of semiotic research, the corporality of signs already appears to be a topic of the past at the turn of the third millennium. We are facing the virtuality of signs and the possibility of simulating bodies in the so-called new media. The futuristic perspectives of new forms of sign corporality in bioinformatic constructs of artificial life and the perspectives of new cybernetic symbioses between human bodies and robots in sign processing make the *disembodiment* of the signs and its consequences for the processes of semiosis a new topic on the semiotic agenda. Last, but not least, the ever increasing claim which the material mass of human sign production and consumption is staking on our natural environment and resources makes the disembodiment of the signs an ecosemiotic prerequisite for our own future.

Body – Embodiment – Disembodiment was the general topic of the Tenth International Congress of the German Association for Semiotic Studies ("Deutsche Gesellschaft für Semiotik") at the University of Kassel (July 19 to 21, 2002). 130 papers presented at the occasion of this congress have been edited in 2004 by Winfried Nöth and Guido Ipsen in the form of a CD-ROM: *Winfried Nöth & Guido Ipsen. Hrg. 2004. Körper – Verkörperung – Entkörperung / Body – Embodiment – Disembodiment.* Beiträge des 10. Internationalen Kongresses der Deutschen Gesellschaft für Semiotik (DGS) vom 19. bis 21. Juli 2002. Kassel: kassel university press [Intervalle Schriften zur Kulturforschung; 7]. A revised version of a selection of these papers is now being presented to the readers in two volumes, one with papers in English, one with papers in German. While the English papers focus on topics of semiotic aesthetics and on cyberculture, the German volume, edited by Winfried Nöth and Anke Hertling under the title *Körper – Verkörperung – Entkörperung* (kassel university press, 2005) deals with other topics of cultural semiotics.

The present volume is divided into three sections. The first, entitled *Bodily semioses*, is introduced by Frederik Stjernfelt's paper on "The semiotic body", which investigates biosemiotic, cognitive, and evolutionary aspects of bodily semiosis. The bodily dimensions of paralinguistic and nonverbal communication in the context of speaking and conversation are the topic of Axel Hübler's paper "Assessing the body's share in conversation". Guido Ipsen, in "Hybridization and extensions of the human body", deals with the fact that semiotic activity in itself is a mode of cultural reimbodiment of natural signs.

Aesthetic embodiments is the heading of the second section with papers on the role of the body in theatrical performance (Erika Fischer-Lichte, "Embodiment — from page to stage") and on the boundaries between natural and artificial bodies in digital art

(Marga van Mechelen, "The representation of the true artificial body" and Priscila Arantes, "Technological poiésis").

The human body in cyberart and cyberculture is the focus of the third section, entitled *Artistic cyberbodies*. With "The arts of the biocybernetic body", Lucia Santaella presents a topic more fully developed in her book on posthuman culture and art (*Culturas e artes do pós-humano*, São Paulo, 2003). Elke Müller, in her paper "Shattered embodiment", discusses some philosophical foundations concerning the locus of humans in cyberspace, while the digital artist Rejane Cantoni shows how the technologies of virtual reality, augmented reality and ubiquitous computing can contribute to the creation of "intelligent environments" and "body architectures". Christina Ljungberg concludes the section with a paper on aesthetic transgressions between bodies and machines ("Mapping the territories of being").

Winfried Nöth

I Bodily semioses

The semiotic body. A semiotic concept of embodiment?

Frederik Stjernfelt

In traditional semiotic thought, the body used to be almost completely ignored. In structuralist semiology, for example, we should expect that the body be treated like any other concept in language. Structuralists would emphasize that the body concepts differ in various languages and cultures, in short, in different semiotic systems, and that a study of such systems would produce just as many cultural representations of the body. In this line of thought, no extra-structural constraints are supposed to determine the spectrum of possibilities of body representation.

Thus, the body concept would be conceived of as subjected to the free arbitrariness of semiotic systems – and no special attention would be paid to the body as a crucial prerequisite of semiotic articulation. This ignorance of the body is about to undergo a complete change – of which the title of the Kassel conference of semiotics 2002 – *Body – Embodiment – Disembodiment* – is a happy indication. What is called for is a concept of the body which, in itself, makes evident the basic semiotic competences of an organism, i.e., a body concept which entails semiotics. It is to be expected, naturally, that this will give rise to a more fine-grained typology of bodies depending on how complicated and sophisticated semiotic behavior the organism in question is able to indulge itself in.

This "embodiment semiotic turn" which has been underway during the last decades has called for new interest in old positions as well as a reorientation in actual tendencies of biology and philosophy. Among the former count re-appropriations and reinterpretations of the foundations of ethnology and theoretical biology, exemplified here by Jakob von Uexküll, as well as a renewed interest in phenomenology, exemplified here in Maurice Merleau-Ponty's work with its focus upon the body and the "flesh" as the necessary concept to avoid sterile mind-matter dualisms. Among the latter count the cognitive semantics movement (George Lakoff, Mark

Johnson, Leonard Talmy, Mark Turner, Gilles Fauconnier, Eleanor Rosch, etc.) and its emphasis on the "embodiment" of cognitive structures; the "complexity theory" around the Santa Fe school (Murray Gell-Mann, Christopher Langton, Brian Goodwin, Stuart Kauffman) and its reinterpretation of classical issues of theoretical biology within the framework of a general theory of complexity; and finally, within semiotics itself, the emergence of "biosemiotics" (Thomas Sebeok, Terrence Deacon), and the Copenhagen School (Jesper Hoffmeyer, Claus Emmeche) to which I myself to some extent belong as a fellow traveler.

This paper will briefly present and discuss the body concepts involved in these developments and their semiotic possibilities.

Cognitive semantics – The body in the mind

The well-known American tradition in linguistics and philosophy known as "cognitive semantics" or "cognitive linguistics" (Lakoff, Johnson, Turner, Fauconnier, Sweetser, Talmy, Langacker, etc.) has provided, during the last 20 years, a new brand of linguistics, loosening the autonomy of linguistics in order to connect it to developments in cognitive science – using insights from psychology, philosophy, comparative literature, anthropology, neurology, etc. "The linguistic turn" is rolled back – language is seen as a specific combination of a series of different, cognitive, pre-linguistic competences. In doing so, cognitive semantics covers a large field of semiotic issues; thus it constitutes one of the main developments of semiotics from 1980 onwards – even if it most often does not explicitly use the term "semiotics".

A very basic tenet in this tradition has been its insistence on the bodily motivation of cognitive, semantic, and linguistic structures. Such structures are claimed to be "embodied". This claim is aimed

against the formalist and logicist trend in American analytical philosophy and linguistics (especially against the Chomskyan tradition) – that is, against the tacit or outspoken assumption that the bodily basis of thinking beings is irrelevant to the study of thought and language (which may then be studied by purely logical, formal means) – a famous version of this claim is Putnam's old "functionalist hypothesis" equating mind and brain with computer software and hardware, respectively. Against the implications of this analogy (a brain is a Turing machine able to "run" any mental program...), the idea is that the specific architecture of body and brain is fundamental to thought and language. This part of the program has been made explicit especially in Lakoff and Johnson's large tractatus *Philosophy in the Flesh* (1999).

A closer look reveals, though, that it is not always completely clear what is intended by the embodiment claim. The following sub-claims constitute the details of the embodiment hypothesis.

a) A philosophy must be true to bodily experiences – instead of indulging in a priori philosophizing. This implies, in turn, two things. It must be open to the results of the various sciences pertaining to bodily experience – psychology, anthropology, linguistics, neurobiology, etc. Furthermore, it must refrain from universal claims, since all facts about the mind depend on the empirical variation studied by these special sciences. It is important to note, however, that these two claims are not necessarily connected. The interdisciplinary view of cognitive processes implied by the latter does not entail the anti-apriorism of the former. Rather, a Husserlian idea of a priori structures[1] would be necessary. Conceptual networks underlying the special sciences would easily fit with interdisciplinarity, and it may be argued that cognitive semantics often involves a priori arguments

1 Like the one represented by Barry Smith (1996), cf. footnote 3.

without admitting it (the embodiment hypothesis could, inter alia, be seen as exactly an a priori hypothesis).

b) Reason and thought use, to a large extent, competences of the sensori-motor system – in conceptualizing phenomena in terms of spatial and motor relations borrowed from or directly relying upon these systems. This implies the possibility of sensori-motor inferences: structures from these parts of the brain facilitate reasoning determined by spatial and motor properties of the phenomena intended.

This idea is exemplified in two core hypotheses of cognitive semantics: the dependence of language and thought upon two fundamental sets of semantic primitives, "basic-level concepts" and "kinesthetic image schemata", respectively. Both are cognitive entities which are inherently meaningful due to the fact that we know them from our bodily interaction with the environment (hence, they are not vulnerable to the "symbol grounding problem" concerning the foundation of the meaning and reference of symbols – they are always already meaningful). The first idea stems from psychological investigations performed by Eleanor Rosch and claims that the fundamental concepts in the human mind refer to types of things or actions with which we have a basic motor experience – and of which we can hence form simple schematic image representations. Chairs, tables, cars, houses; walking, talking, sleeping, etc. The basic idea is that our sensori-motor acquaintance with the world determines our fundamental concepts. More abstract concepts ("furniture", "vehicles", "movement", "action" etc.) lack associated specific motor programs as well as a clear schematic image in terms of the specific whole-and-part structures of the phenomenon in question. More specific concepts, on the other hand ("kitchen table", "Louis XVI chair", "dozing", "marching", etc.) are formed as subclasses of the basic level concepts by further specifying the actions and images involved.

Image-schemata are embodied gestalts (be they explicit or not) used in perception and reasoning: part–whole, center–periphery, link, source–path–goal, cycle, iteration, contact, adjacency, forced motion, support, balance, straight-curved, and near-far, and a few more, but probably not many more. The idea is that we tacitly know these gestalts, their structure, and the inferences which they support, from our bodily activity; they are crucial parts of what it is to be a body. Their description thus adds to the implicit body theory of cognitive semantics: a body is hence characterized by goal–oriented behavior (source–path–goal); connectedness (container); mereological structure (part–whole); hierarchical structure – head/body vs. limbs (center–periphery), orientation in gravity fields (up–down) etc.

A crucial implication of these hypotheses is the dissolution, or, at least, a relativization of the perception-conception boundary: concepts are motivated (but not exhaustingly determined) by structures in perception and action. A further crucial implication is that these basic bodily experiences are the starting point for more sophisticated mental activity; thus abstract thought is taken to arise from metaphorical projections of these structures from the basic bodily field and onto other domains more remote from any sensori-motor activity. The extensive metaphor theory of this tradition is constructed on the basis of this hypothesis, rendering metaphor an important cognitive tool, giving rise to structural metaphors, each of them underlying many linguistic metaphorical expressions. The structural, conceptual metaphor of "knowing is seeing" known in many languages, thus gives rise to a series of different expressions, such as "enlightenment", "can't you see what I explain?", "take a closer look at this problem" etc. This gives the implication, in turn, that imagination becomes an important cognitive tool, not only in these conceptual metaphorical projections, but also in the trial-and-

error construction of more elaborated conceptual models in thought experiments, so-called "idealized cognitive models", built from basic concepts, image schemata and layers of mappings between them.

This gives a rough picture of the body concept at stake in cognitive semantics. There are, however, certain problems in that concept. It is not at all clear what the precise extension of these claims is. The immediate – prototypical – body referred to here is, of course, the human body. The general reference is to "our body and brain", this "our" supposedly referring to the body and brain of the human species, but the extension of this expression is unclear in at least two dimensions. One is "downwards" in the animal kingdom: how many of the competences used in the description of this body concept holds for higher animals? We should probably expect higher animals to make use of basic level concepts and kinesthetic image schema as well, but maybe to a lesser extent the metaphorical extensions of these basic tools[2]. Another is "sideward" in a Kantian manner, so to speak: are these claims valid not only for the empirical human race but for any possible reasoning subject as such? Cognitive semantics itself gives an explicit answer to this question: no. Cognitive semantics claims to empirically investigate human languages by studying the human body and brain and thus reject all a priori reasoning. Still, a problem remains here. Even if it is easy to agree with cognitive semantics that theories of meaning which disregard the body must themselves be disregarded, it is less easy to agree that their theory itself is, in fact, purely "experiential" and without any a priori assumptions. The assumptions established rest on various special sciences, true, but this does not entail they have no a priori

2 A problem here, though, is that there is no strict boundary separating metaphorical projection from concept extension (both refer to the application of a concept on hitherto uncovered domains).

validity.[3] So the question remains whether it is, in fact, the case that any real intelligence must possess some sort of a body, conceptualize in basic level concepts and use kinaesthetic image schemata, etc.? This question is not answered within cognitive semantics, but as far as I can see, it becomes a crucial question for generalized semiotics on the one hand and theoretical biology on the other.

Another problem of the theory is that the relation between embodiment and general semiotic competences is fairly underdeveloped. If a body is defined by instantiating (some of the) gestalt schemas mentioned, this does not imply that that body is necessarily able to *represent* such schemata. A bacterium behaves according to the source–path–goal schema (when swimming upstream in a sugar gradient thanks to "biased random walk"), it instantiates the container and part–whole–schema by its closed cell membrane, and so on, but this does not in any way imply that it has any mental representation of those schemata. Ability to reason with such schemata requires the tacit or explicit mental *representation* of them, separated from actual sensori-motor behavior, due to the kinaesthetic sense and to the existence of sensori-motor integrative body images in the nervous system. Here, cognitive semantics is in need of further underpinning of neurological and phenomenological work on these issues.

3 The grasp of this problem depends on the understanding of "a priori reasoning". If it is to be taken in the Kantian tradition where a priori refers to validity prior to any empirical knowledge as well as to evident givenness for any knowing subject whatsoever, it is clear that cognitive semantics is right in refusing to indulge in a priori reasoning. A weaker definition of "a priori" cancels the latter part of the definition, but not the former. This leads to what Barry Smith calls "fallibilistic apriorism" – the idea that a priori knowledge is indeed valid prior to any empirical knowledge, but that it is not, for that reason, intuitively evident. Rather, it is subject to the same fallibilistic constraints as empirical knowledge. A priori knowledge is hidden in the conceptual structures of the special sciences, and we may seriously err in our grasp of such structures – errors which may be corrected by further investigation.

Jakob von Uexküll and the body as a functional circle

A theory at the root of ethology which has reflected some of these problems in a proto-semiotic manner has gained widely renewed interest in semiotic circles during the last decades: the German-Estonian biologist Jakob von Uexküll's "Umweltlehre". The basic idea is to found a theoretical biology by extending the Kantian revolution to animals so that any animal constitutes its own surroundings, defined by its perception and action possibilities respectively, both of them defined as specific phases in the "functional circle" of that animal's behavior (Figure 1).[4]

The circle is, so to speak, the cycle of metabolism extended to cover an external circle segment taking place outside of the body, necessary to close the circle of metabolism: that of locating and getting hold of nourishment. This very basic body conception is described in semiotic terms. Perceptions and actions are classed as sign types, "Merkzeichen" and "Wirkzeichen", respectively, all in all making up the "Umwelt" of the species in question. The body and its surroundings are thus conceived of as correlatively defined entities. A body is a body only with respect to a specific umwelt, and vice versa. This definition of the body is thus exactly correlated with that of the environment it constitutes. Both perfectly fit into each other. The environment is that which the body may perceive and act upon, and the body is that which establishes itself by performing these perceptions and actions. In this conception of the organism, the body *per se* is conceived as a semiotic device. It is an intrinsic property to a body that it is able to perceive the surroundings through signs and act correlatively through signs.

4 On Uexküll's account, only animals have a proper "Umwelt". Plants (and fungi, supposedly) do not possess specific perception and action signs and they only possess a "Wohnhülle". Borderline discussions must be expected, though, cf. the examples of insect-eating orchids on the plant side and corals on the animal side.

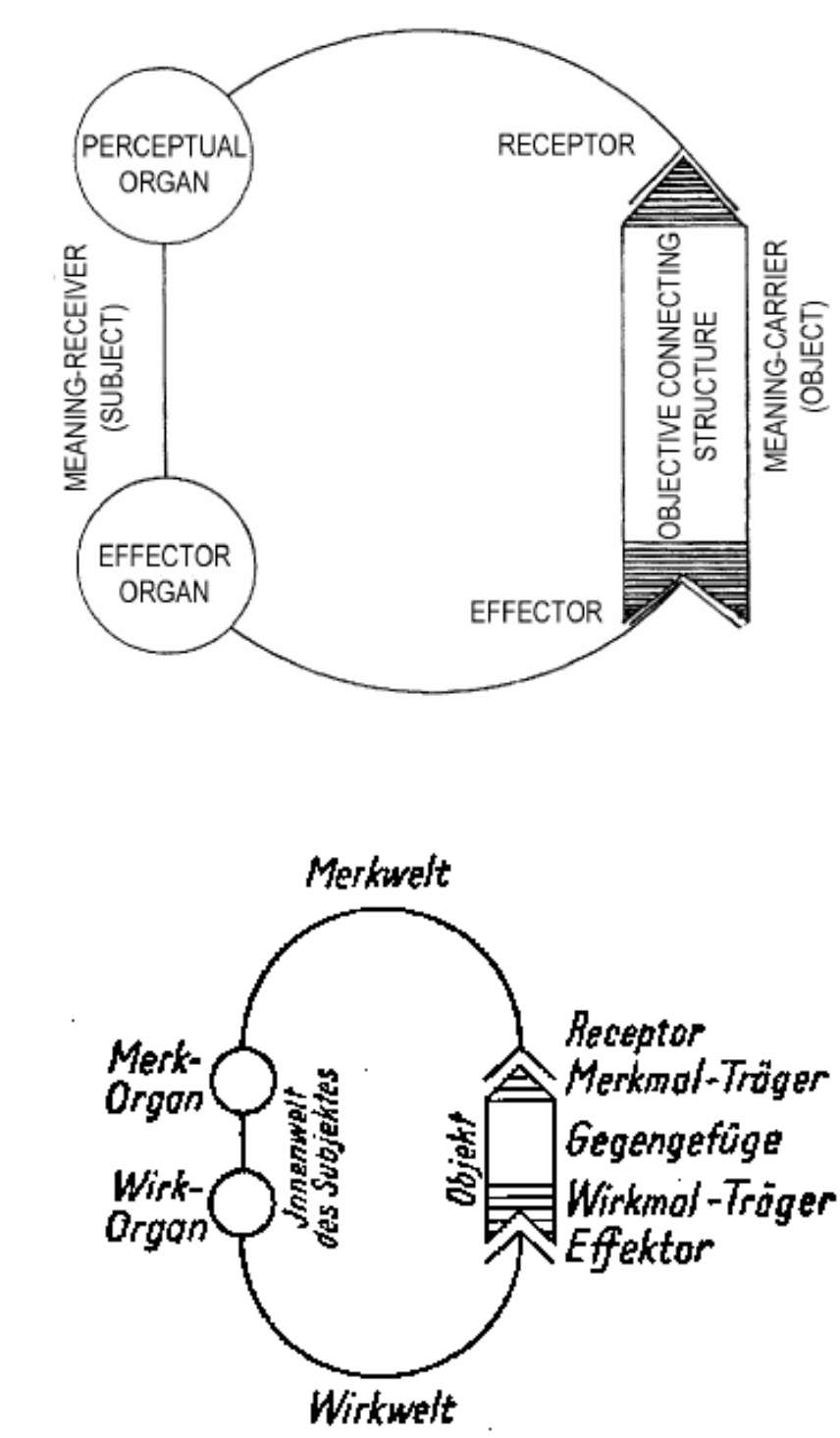

Figure 1. Uexküll's functional cycle.

The extension of this definition of the body to what is later called "endosemiosis" is natural. When one part (the external parts) of the functional circle requires sign use, why should other parts (the internal parts) of it not do the same?

In von Uexküll's description of the detailed fit between organism and surroundings, a musical metaphor is pervasive, namely "nature as symphony". This perfect fit, though, constitutes a major problem for an evolutionary conception of *umwelten*: if no lack or fault in the umwelt relation is possible, it is difficult to see why any species should be able to compete, or should not lose in competition. Correlatively, if no openness is existent in the umwelt, it is difficult to see how individuals may learn to grasp new phenomena in their umwelt by ontogenetic learning and perception during their own lifetime, and not only during the slower process of natural selection (such as is in fact the case in all higher animals). Von Uexküll never concludes decisively on this point and leaves the question open if higher animals possess a relative "freedom" in relation to their own needs which enable them to have access to "neutral objects" in the surroundings, or if they address only objects of direct teleological interest for their needs defined in the functional circle. For example, von Uexküll claims that dogs only perceive action-related objects; hence, chairs are seen by the dog as endowed with a certain "sitting tone". Following this, it might seem that it becomes a human privilege to perceive neutral objects without any immediate functional relevance. However, the perception of neutral objects is, of course, a prerequisite to learning because learning in some sense consists of nothing but the de-neutralization of neutral objects, drawing them into segments of functional circles. In order to be thus invested with meaning, neutral objects, of course, must be phenomenologically presented *before* learning. The perfect fit between organism and

environment must thus be relativized: life time adaptability presupposes to some degree the perception of neutral objects which are not immediately functionally relevant.

The musical metaphor in von Uexküll has, on the other hand, a crucial implication which is never made explicit in the Umweltlehre. Music is, of course, possible only by the *discretization* of the acoustic continuum into discrete tones (involving large parts of the acoustic continuum deemed irrelevant for the scale chosen and thus only appearing as noise). In the same manner, the body-surrounding fit is possible only through discretization, both in the perception and the action relation. Perception possesses a highly constrained selection of possible environment stimuli, ranging from simple cases like the possibility of sensing only groups of specific chemicals and to more complicated cases like the necessary limit of discrimination ability in any continuous perception spectrum (visual, auditory, tactile, etc.). In short, perception and action both possess a certain *granularity* which allows it to be pragmatically efficient at the prize of a certain imprecision. This imprecision, it is evident, implies certain limitations – larger or lesser – on the perfection of the organism-environment fit. Both enhanced perceptual precision (which uses more resources), and enhanced perceptual economy (which is less precise) may be favoured by selection, according to the specific conditions in the single case. In semiotic terms, this implies that in the functional circle, a tension exists between semiotic simplicity and semiotic economy. The "perfection" discussed by von Uexküll can be nothing but a local optimum (always potentially subject to change due to environmental pressure) in the tension between these two poles.

All in all, the umwelt concept furnishes semiotics with a basic idea of a body as semiotically defined by the set of its perception and action sign possibilities.[5]

Merleau-Ponty: The body's functional circle opening up

It is well-known how Merleau-Ponty's special branch of phenomenology took its point of departure in Husserl, enriched by ethology and psychology of perception. This lead Merleau-Ponty to taking on a characteristic third position in mind-matter problems where he rejects this well-known dualism and various, more or less one-sided, attempts at resolving it with reference to the primary position of bodily being and perception. Thus, both rationalism and idealism are rejected as hypostatizations of pure mind, while, correlatively, materialism and traditional naturalism are rejected as hypostatizations of pure matter. The very condition of possibility of mental or idealized structures on the one hand and pure, material objects on the other, is bodily being whose behavior and perception form a prerequisite basis which cannot be further dissolved – cf. Merleau-Ponty's concept of "flesh" antedating both mind and matter. Unlike many other phenomenologists of Heideggerian influence, Merleau-Ponty never saw such a philosophical stance as alien to science, and it is well-known how he supported this hypothesis by references to biology and psychology of perception. It is probably less well-known how he – to the end of his short life – undertook a major work to support this position by reference to central figures in different branches of biology. These reflections appeared in university courses in the latter half of the fifties and Merleau-Ponty's lecture notes from those courses have only recently (1995) been published – and they

5 A more detailed discussion of the benefits and drawbacks of von Uexküll's umwelt and functional circle concepts can be found in Stjernfelt (2001).

add further details precisely to his conception of embodiment. Here, Merleau-Ponty confronts a long series of biological thought ranging from German Idealism (Kant, the Romantics, Husserl), vitalism (Driesch), behaviorism (Watson), Darwinism, ethology (Uexküll, Tinbergen, Lorenz), and many others – reading these currents in order to interpret their results philosophically and extract the points relevant to Merleau-Ponty's own phenomenology of embodiment.[6]

Here, I can run through only some of the main points he addresses. Referring to von Uexküll in particular, Merleau-Ponty takes care to note that the notions of an organism equipped with an umwelt in which to unfold its behavior, called "comportement", are more basic than consciousness; quite on the contrary, consciousness is but one of the forms this behavior takes. The functional interrelation between organism and surroundings is prerequisite to consciousness, not the other way around – an idea in which von Uexküll would probably agree.[7] Correspondingly, the umwelt is not only to be found at the level of the whole organism; even a single organ could be said to have its own umwelt (cf. Merleau-Ponty 1995: 220) – an idea which, of course, opens the "endosemiotic" issue. The distinction is drawn between lower animals – mere functional bundles – where the umwelt forms a closed set of reaction types, and higher animals that possess, thanks to the central nervous system, an internal representational mapping of the surrounding world facilitating an open umwelt (cf. Merleau-Ponty 1995: 225). Thus, higher animals

6 Doing so, Merleau-Ponty follows the example set by Ernst Cassirer – philosophizing by sifting the results of the special sciences – rather than that of Heidegger and his claim that the "Wissenschaft denkt nicht". There are more references to Cassirer than to Heidegger in *Phénoménologie de la perception*.

7 Despite the idea that the umwelt is a subjective construction on part of the organism, von Uexküll's position is not necessarily subjectivist in the sense that it is a construction taking place in the organism's consciousness. Von Uexküll's methodology for Umweltforschung was, in fact, a sort of behaviorism: an animal's umwelt should be investigated by observation of its interaction with its surroundings, rather than through any sort of empathy.

have sensory organs able to move (e.g., movable eyes and ears, intertwining sensation and motion in quick searching sequences) which enable them to explore and inform the world actively (cf. Merleau-Ponty 1995: 225). This movability of the sensory organs so to speak short-circuits the functional circle and enables the organism to increase precision and decrease the time granularity of the umwelt relation. This implies, correlatively, the "possibilities of objects"[8]; the animal may distinguish its own spatial position, e.g., against gravity; this ability becomes complete only with a proper system of proprioception (cf. Merleau-Ponty 1995: 226) facilitating feed back control of behavior as measured against the interiorized umwelt and its "Merk"- and "Wirk"- components, a proper perceptual world and a behavior world. Only now when the body is, in itself, perceived, the perceptual world becomes possible as a world inhabited not only by stimuli but by body-like objects.[9]

Merleau-Ponty's philosophical interpretation of Uexküll's umwelt concept takes its departure from his melody metaphor: the umwelt as a melody singing itself. This image loosens the umwelt from pure, actual, physical time, just like the melody it is aims towards the future, as it cancels the priority of effect over cause, of ends over means, of essence over existence. The umwelt thus, in Merleau-Ponty's interpretation, acquires an *ideal* character, not in any subjectivist sense, but as opposed to the actuality of the present existence. The umwelt is an ideal structure which, like the melody, persists over and above the vicissitudes of the single moment. Behavior cannot be understood by analysis of moment for moment, but only as a meaningful whole extending through time. Without being defined in

8 Merleau-Ponty thus does not hesitate to solve von Uexküll's problem with the possibility "neutral objects": higher animals with central nervous systems do possess such objects, cf. below.

9 This idea anticipates René Thom's idea that environment objects are prototypically conceived of as a sort of generalized "animals" so that nouns in general refer to such animal-objects.

actual time and space, it is thus trans-temporal, trans-spatial – almost a Platonic idea, in some sense, but at the same time the result of a process of self-organization involving organism and environment. In higher animals, the functional cycle of the umwelt becomes detached ever more from its immediate pursuit of teleological ends and indulges in interpretations of symbols. Merleau-Ponty thus chooses sides in Uexküll's fight against himself as to the possibility of the existence of neutral objects and the corresponding freedom in the umwelt. To Merleau-Ponty, this possibility is crucial and points to the possibility of the existence of "pre-culture" in higher animals (Merleau-Ponty 1995: 231). Symbols point out of the immediate present to future perception, event, and action possibilities, and the action through symbols permits organisms to perform not-innate complicated action wholes.[10]

Merleau-Ponty's fertile interpretation of von Uexküll is enriched by the reflective introduction of a long series of other biological thinkers. I shall here restrict myself to those who add to the body concept here outlined. E. S. Russell's idea of "directiveness" of organic activities is referred to for its generalization of the notion of behavior encompass not only the "external circuit" of a body's relation to its umwelt – but also the internal regulation of an organism. There is no definite limit between these two (cf. Merleau-

10 In this idea, Merleau-Ponty's concept of symbol approaches the Peircean symbol, being defined by its esse in futuro and its ability to anticipate future action by incarnating habits. Furthermore, Merleau-Ponty anticipates Terrence Deacon's fertile idea of symbolicity as a crucial threshold in evolution (Deacon 1997). Deacon tries to make the presymbolic-symbolic borderline fit with the animal-human distinction – without succeeding, according to us. According to Peirce's symbol definition, most higher animals able to learn will possess symbols (Pavlov conditionings will constitute symbols), and even according to Deacon's own more demanding reinterpretation of Peirce's symbol concept (including systems of symbols), intelligent higher animals will be able to use symbols. Instead, Peirce's notion of "hypostatic abstraction" seems a better candidate for defining the semiotic animal-human distinction (Stjernfelt 2002). However, this is a detail. Deacon's overall idea of interpreting evolution and especially the ape-man transition in terms of Peirce's sign theory is a major breakthrough and we shall return to it at the end of the paper.

Ponty 1995: 235), and hence it makes sense to talk about bodily behavior already during morphogenesis. This idea thus, moreover, dissolves the strict borderline between the organism and its behavior which should be seen, rather, as dual concepts: "Le corps appartient à une dynamique de comportement. Le comportement est enlisé dans la corporéité" (Merleau-Ponty 1995: 239). Thus, the relative plasticity of behaviors is seen as an integrated property in the being of a bodily organism as such, both at the external and internal levels – pointing again towards the semiotic notion of "endosemiosis" of intra-organism semiotic processes.

Adolf Portmann's study of the outer appearance of animals becomes an important source to a beloved theme of the elder Merleau-Ponty, namely the duplicity of perceiving and being perceived, of visibility and invisibility. Parts of an animal's outward appearance may be the chance result of a local process (e.g., the shell of a snail) and is thus without interest in this respect. Other aspects of appearance, however (e.g., the skin of the zebra) is the result of non-local processes characterizing the whole animal and its umwelt. Thus, these aspects have two characteristics.

First, they satisfy a mimetic teleology as if there was a perceptive relation between the animal morphology and environment (cf. Merleau-Ponty 1995: 246). However, this teleology, according to Merleau-Ponty, cannot be primary but requires, in the first place, a certain freedom of expression which may direct the appearance towards utility in some cases, in others not so. Second, hence, animal appearance has an aspect of "presentation", of existential manifestation by which the animal makes itself visible to fellow creatures (and invisible to predators, it should be added). In a parallel to the older Husserl's notion of "intersubjectivity", Merleau-Ponty thus talks about an "inter-animalité" as granting an ontological status to the notion of species (this idea probably may freely be extrapolated to the notion

of ecosystem): an animal looks in a way which it is itself able to see (in order to be able to be recognized by specimens of its own species): "l'animal voit selon qu'il est visible" (Merleau-Ponty 1995: 247).[11]

Konrad Lorenz, von Uexküll's notorious pupil, is also made the object of an interesting reinterpretation, notably concerning his controversial notion of "instinct". According to Lorenz, an instinct is an innate action series which requires a certain environmental releaser in order to be actualized. This idea has often been interpreted as a purely mechanistic idea, but Merleau-Ponty rejects this reading and points to the fact that Lorenz's notions of objectlessness and "Prägung", imprinting, entail quite the opposite. Instinct, in Lorenz, is objectless and it possesses a ceremonial, ritual excess in addition to its possible function. Moreover, the phenomenon of Prägung shows that instinct is in many cases incomplete and requires a fill-in from the environment which implies that it entails an open orientation towards the surroundings, especially in complex cases where the actualization of an instinct is only possible with an adjoining umwelt construction, with systematic world elaboration (cf. Merleau-Ponty 1995: 255). This emptiness and openness of instincts is what enables it to become, in turn, a kernel in symbol construction. Instinctive action series may be cut off from their – possible – telos and be taken to symbolize quite different phenomena in animal communication (cf. Merleau-Ponty 1995: 254). It is exactly the objectlessness of the instinct that makes possible its imaginative reinterpretation as a basis for symbol formation.

Merleau-Ponty's treatment of his great master Husserl is interesting in this context. Husserl's problem is, Merleau-Ponty argues, analogous to that of Schelling: to find a place for nature in a philosophy of

11 This importance of animal appearance is not only valid for its relation to species mates and to predators, but presumably also for relations to other species with which it competes, enters into symbioses, etc.

reflection. Hence, two competing tendencies are to be found in Husserl. One, connected to his transcendental philosophy, sees natural objects as connected to the "natural attitude", the attitude of innocence, characteristic of the unphilosophical observer who must unlearn this naive way of seeing in order to grasp the phenolmenological stance. The other tendency attempts to understand natural objects as pertaining to different regional ontologies, and the break with the natural attitude is an attempt also to clarify this prereflexive stance, in which the natural world is given to us in a passive synthesis: "La phénoménologie dénonce l'attitude naturelle et, en même temps, fait plus qu'aucune autre philosophie pour la réhabiliter" (Merleau-Ponty 1995: 104). Nature, consisting of pure things, is the correlate of pure consciousness, but antedating this, there is the more original, perceived world, the "Lebenswelt". This world is the world of the body – the body as the organ of the Husserlian "I can", the so to speak Husserl version of the sensorimotor umwelt that is alien to the merely perceptual world supposed by large parts of the philosophical tradition since Kant. The body perceives the objects not in a detached way, but by considering the motor possibilities implied: "La chose m'apparaît comme fonction des mouvements de mon corps" (Merleau-Ponty 1995: 106). The body is the place both for my inhabiting the world of things, and, at the very same time, for my perceptions (op. cit.: 107). The body is, as always in Merleau-Ponty, subject and object at one and the same time: the world of things is part of my body. (op. cit.: 108) The body is the zero-point of orientation, not only in space-time, but in all normative scales: it is thus the body which founds the very idea of normativity.

As to the existence of other bodies, I grasp them by an "Einfühlung" which is corporeal (cf. Merleau-Ponty 1995: 109): I perceive them as perceiving bodies before I perceive them as thinking, and

the latter idea presupposes the former. This bodily relation with other bodies is indispensable for the possibility of the thought of pure things: it is only now that the pure object can be defined as a thing to which every subject has virtual access: this "intercorporéité" (op. cit.: 109) defines the very access to objects. (cf. Dan Zahavi's discussion of intersubjectivity). It is in this relation that I pass from pre-human to human, Merleau-Ponty claims (even if it remains unclear exactly in which respect "intercorporéité" differs from the "inter-animalité" of animals which also possess the ability for empathy).

However, does this reference of the universe to the body and to humanity not ignore that life may disappear? And what would, in that case, be left (cf. Merleau-Ponty 1995: 111)? This possible disappearance, Husserl claims, would not entail that the evidence of references would appear, so we must assume a mute world would remain even in that case (in contradistinction to the Kantian case, to be sure). Thus, in *Ideen II*, Husserl may define nature as that to which I have an original and primordial relation "le seul unique monde pour tout le monde" (op. cit.: 112) as Merleau-Ponty jestingly puts it.

Merleau-Ponty remarks the constant tension between this idea and the idea of the break with the natural attitude which it presupposes, and he concludes by saying that Husserl never really resolved this tension which he implicitly admitted, e.g. in his double concept of constitution (constitution "par actes", on the one, anti-naturalistic side, and "latente", on the other, naturalistic side, op. cit.: 112). Obviously, Merleau-Ponty prefers to underline the latter, pertaining to the "passive synthesis" while, at the same time, maintaining the methodological necessity of the transcendental "epoché" of the former.

All in all, the body concept in Merleau-Ponty's reflections on nature has the following characteristics:

- It refers to future possible states and thus transgresses the pure actuality of physics – and at the same time points to "real possibilities" as having ontological existence (cf. Peirce's insistence on exactly that notion).
- It is prerequisite to both the subject and object category.
- It has a primary sensori-motor relation to the world.
- It has the possibility of transgressing its own finality in behavior with an "open" side facilitating mere expression and symbol use, already in the case of higher animals.

Merleau-Ponty, furthermore, envisions the need for the transgression of the body concept in both up- and downwards directions, so to speak: he admits the possible umwelts even of single organs (and cells?) on the one hand, at the same time as he locates the animal in an "inter-animality" anticipating intersubjectivity.

In comparison to the body concept of cognitive semantics, Merleau-Ponty lays the same stress on the primacy of the sensori-motor entanglement of the body, on its gestalt competences, and its imaginative abilities. In addition to cognitive semantics, Merleau-Ponty, with his von Uexküll and related references, extends his body concept to cover higher animals as well, while the specificity of the human body comes into play along with language, intersubjectivity and the appearance of pure objects (even if he is not unambiguous on this point – the access of higher animals to neutral objects must provide a large step towards pure objectivity, just like his notion of "inter-animalité").

Complexity theory – "Autonomous agent" as a formal body definition

A recent tradition of thought with huge implications for theoretical biology is the so-called "complexity theory" of the Santa Fe School

(Murray Gell-Mann, Brian Arthur, David Pines, et al.), which strives to find formal regularities of complexity in all domains where a manifold of interacting entities are at play, from solid state physics over biology to economy and sociology. Especially the work of Stuart Kauffman is of interest in our context; even if his work does not contain explicit reflections on the body concept, such reflections can be easily inferred from his general discussion.

Hoffmeyer takes his beginning point in Darwin's idea of the origin of life in a biological "primordial soup" of organic chemicals and looks at the possibility of one chemical substance to catalyze the reaction of two others, forming new reagents in the soup. Such catalyses might, of course, form chains, so that one reagent catalyzes another catalyzing another, etc., and self-sustaining "loops" of reactions are an evident possibility. A statistical analysis shows that such catalytic reactions may form interdependent networks when the rate of catalyzed reactions per molecule approaches one, creating a self-organizing chemical cycle which he calls an "autocatalytic set". When the rate of catalyses per reagent is low, only small local reaction chains form, but as the rate approaches one, the reaction chains in the soup suddenly "freeze" so then what was a group of chains or islands in the soup now connects into one large network. Such an interdependent reaction network constitutes the core of the body definition unfolding in Kauffman, and here, as in von Uexküll, its cyclic character as the basic precondition for self-sustainment must be noted. He defines the "autonomous agent" – a sort of general, formal organism concept – as follows. An autonomous agent is an "Autocatalytic set able to reproduce and to undertake at least one thermodynamic work cycle", defined, in turn, as the recurrent release of thermal energy for performing mechanical work (Kauffman 2000: 49).

This definition implies two things: 1) reproduction possibility, and 2) the appearance of completely new, interdependent goals in work cycles. The latter idea requires the ability of the autocatalytic set to save energy in order to spend it in its own self-organization, in its search for reagents necessary to uphold the network. These goals evidently introduce a (surely restricted) teleology defined simply by the survival of the autocatalytic set itself: actions supporting this have a local teleological character. Thus, the autocatalytic set may, as it evolves, include in its cyclic network new sub-cycles supporting it. This has its exact analogy in economy, Kauffman argues: in 18th century England, coal-fired pumps were employed to empty the coalmines for water – and thus made more efficient coalmining and industrialization as a whole.

Thus, Kauffman proposes that the concept of "autonomous agent" implies a whole new cluster of interdependent concepts (forming so to speak, in itself, an autonomous agent network on the conceptual level). Thus, the autonomy of the agent is defined by "catalytic closure" (any reaction in the network demanding catalysis will get it) which is a genuine gestalt property in the molecular system as a whole – and thus not derivable from the chemistry of single chemical reactions alone. Tasks and molecules constitute, on this level, a duality (Figure 2).

The work definition here concerns the *governed* release of energy with respect to a task. Thus "organization" becomes the set of constraints pertaining to an energy release process in the system. To the conceptual cluster of "autonomous agent" thus also belongs the emergence of organization consisting of entities measuring relevant properties of non-equilibrium systems in the environment, identifying sources of energy that can perform work. This requirement is evidently, co-extensive with what we normally call perception and

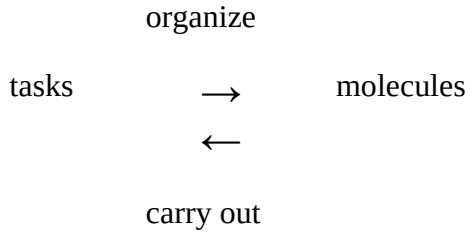

Figure 2. Duality of tasks and molecules according to Kauffman.

action – the search for, identification of, and putting to use of energy sources in the environment (Kauffman 2000: 83). Thus, all of the following concepts pertain to one and the same conceptual network defining an "autonomous agent": work, constraints, construction, measuring, energy, information, event, organization (as *closure* of the set of possible molecules, of catalytic tasks). Thus, semantics is first of all defined by teleology – in an autonomous agent, chemical agents (or to be more precise, specific molecular configurations on the surface of macromolecules) can become signs.

It is interesting to note that Kauffman's definitions thus entail not only the cyclic structure, but also the primitive perception and action phases, of von Uexküll's functional circle. Thus, Kauffman's definition of the organism in terms of an "autonomous agent" basically builds on an Uexküllian intuition (even if there is no reference to von Uexküll), namely the idea that the most basic property in a body is metabolism: the constrained, organizing processing of high-energy chemical material and the correlated perception and action performed to localize it – all of this constituting a metabolic cycle defining teleological action. Perception and action are so to speak the extension of the cyclical structure of the closed catalytic set to encompass parts of its surroundings, so that the circle of metabolism

may only be completed by means of successful perception and action parts.[12]

Of special semiotic interest are certain corollaries to the concept of "autonomous agent". Environment perception must, for economical reasons, be semiotic. One aspect of this is the fact that perception must coarse grain the environment and seek information on a certain level of stimulus dissolution. Biological evolution makes perception tend towards an optimal coarse graining of environmental information. Another aspect is that "usefulness" in relation to a given agent only pertains to a few properties – just like a few properties then may play the role of signs for their useful objects. The useful properties and the sign properties may, in many cases, coincide (giving a high degree of interpretational security), but in other cases, the sign properties may merely overlap or even differ highly from the object properties which are sought after, introducing an arbitrary aspect of such signs. A third semiotic constraint in the concept cluster surrounding the autonomous agent concept is the fact that neither we, nor any autonomous agent, can map the configuration space of the biosphere and search for regularities therein. The space of all possible species is so enormous that it is impossible to access directly in any rational way (and much worse, then, the space of all possible interspecies relations which is larger than 2 elevated to the power of the number of species). This necessitates *story telling* as the only way to access knowledge about typical event series – storytelling here ranging from innate action sequences which have proved useful for survival, over acquired knowledge about typical event sequence structures in environment interaction, to human explicit narrating.

12 It is an interesting and strange implication of Kauffman's work (which it shares with the organism definitions of much romantic "Naturphilosophie") that this cluster of concepts defining an autonomous agent may not be a privilege for biology as we know it (geomorphology in geology, galaxy clusters in astronomy, companies in economy, states in international politics, etc. may be other candidates for autonomous agents in Kauffman's definition).

Narratology thus becomes an a priori consequence of the vastness of biological configuration space and the impossibility of a priori access to that space. The autonomous agent furthermore introduces the distinction ought/is, correlative to the distinction between functions and effective causes in an organism, while on the other hand the physical distinction between laws and initial/boundary conditions is relativized by the circularity and growth potential of the agent. Stephen Jay Gould's well-known notion of exaptation[13] also stems from the inability to access biological configuration spaces: no finite list of biological functions can be predetermined. Thus, invention refers to new combinations of select properties among the indefinite number of properties of a system.

The evolution of autonomous agents is taken as the empirical basis for the hypothesis of a general thermodynamic regularity based on non-ergodicity: the universe (and, consequently, the biosphere) is not at equilibrium and will not reach equilibrium during the life-time of the universe. This gives rise to his idea of the "adjacent possible". At a given point in evolution, one can define the set of chemical substances which do not yet exist in the universe, but which are at a distance of one reaction only from substances already existing in the universe. Biological evolution has, evidently, led to an enormous growth of types of organic macromolecules, and new such substances come into being every day. Maybe there is a chemical potential from the actually realized substances and into the adjacent possible which is in some sense driving the evolution?[14] In any case, Kauffman claims the hypothesis that the biosphere as such is supercritical in the sense that there is more than one action catalyzed by each reagent.

13 Referring to the putting to use of a biological property for another purpose than that for which it originally evolved.

14 This idea forms Kauffman's suggestion for a fourth thermodynamical law – the universe invades the "adjacent possible" with the highest possible speed. It remains unclear, though, what this "highest speed" should be measured against.

Cells, in order not to be destroyed by this chemical storm, must be subcritical (even if close to the critical boundary). However, if the biosphere as such is, in fact, supercritical, then this distinction seemingly necessitates the existence of a boundary of the agent, protecting it against the environment. Kauffman does not go deeply into this, but it is, as a matter of fact, an a priori argument for the existence of cell membranes, skin, fur, etc.

With about 80,000 structural genes (some of the latest guesses are lower, but this does not add to the core of Kauffman's argument), the state space of the cell consists of 2 to the 80,000 possible states. However, the cell necessarily lies in a small "ordered" part of that phase space (or else it would dissolve), close to the border of chaos, hence its number of states is the square root of the gene number (because the cell's cycle time is proportional to the square root of the gene number, 168), that is, approximately 300 states. Kauffman sees an important point in the fact that this is close to the number of cell types in higher animals; the enigmatic cell differentiation in higher animals could thus be seen as corresponding to the set of generic cell behaviors.

To sum up, the body, understood as an "autonomous agent", has the following properties:

The body defines a conceptual cluster involving reaction chains forming a loop in autocatalytical closure, emergence of organization, perception, action, work, constraints, construction, measuring, energy, information, event, organization, semantics, and teleology.[15]

The birth of meaning, signs, and intention thus supposedly takes place alongside the self-organization of autonomous agents.

15 What Kauffman calls "clusters of concepts", Husserl would call a regional ontology of a priori concepts for any possible biology.

Narration and story-telling are necessary in the absence of access to the configuration space of autonomous agents and their interrelations.

The body boundary is implied by the necessity of the sub/supercritical distinction.

In relation to biosemiotics, it is crucial to note that the definition of autonomous agents takes the body concept all the way down to cell level (and maybe below as a limit case, cf. "autocatalytic closure").

Biosemiotics – A semiotic embodiment definition

Biosemiotics has emerged as a semiotic project during the last decades, involving the initiative of the late Tom Sebeok, and, among others, the Copenhagen School (see p. 15).

Biosemiotics takes its point of departure in the set of metaphors inaccessibly found in modern biology and biochemistry: "information", "code", "messenger", etc. Officially being just metaphors or "façons de parler", biosemiotics takes such expressions seriously to be indispensable for biology, even in biochemistry.[16] The appearance of such terms is no coincidence, and they must be elaborated in order to constitute a basic branch of semiotics covering sign use in living beings. Thus, biosemiotics claims that biology and semiotics are co-extensive and semiotics takes its beginning – like Kauffman's claim – at the cell level. Biosemiotics is thus compelled to include, on the one hand, the empirical findings of biochemistry and on the other hand, various theories, such as the ones presented here, dealing with theoretical biology in one way or the other. It probably goes without

16 It is interesting to note that the semiotic and informational vocabulary found in biology always appears where teleological (or even worse, vitalist) expressions would earlier be used. Thus, the semiotic slang in biology partly serves to hide teleological assumptions implied, and partly to suggest that such expressions could always be translated into explanations referring only to effective causes.

saying that the task of biosemiotics is difficult. By investigating the biological use of semiotic expressions critically, we should expect them to achieve specific meanings when used in biology – and thus throw a new light back onto semiotics proper. Thus, the biosemiotic notion of "sign" does not necessarily imply consciousness (as some semiotic doctrines might imply as a basic prerequisite to sign use).

I cannot run through the whole set of ideas of biosemiotics here, but let me give some of its basic assumptions. Independently of Kauffman, biosemiotics sees the cell as equipped with a point-of-view – defined as a "stable integration of self-reference and other-reference" (Hoffmeyer 2005) – and like in Merleau-Ponty or Kauffman, this does not necessarily imply the presence of consciousness. This definition refers to the self-description by genetic means on the one hand, necessary to pass on the information about the stable structure of the body to the next generation, and on the other, to the stable representation of the outside within the cell due to its system of "perceptions" facilitated by specific chemical receptors. This self-description, in turn, is double, due to life's "code duality": the digital DNA representation is not the only information inherited, and it is certainly not, as it is often maintained, the "cause" of the phenotypical organism. The whole cell structure with different organelles constitutes an additional "analogue code" which is inherited directly (some of the organelles may even have their own DNA) in the egg cell.

Membranes are seen as crucial in biosemiotics because defining the inside/outside distinction characterizing all life forms, facilitating the highly constrained traffic across this boundary in the form of signs (perception can, then, be rephrased as "inner outsides", just as action changing the surroundings into a specific ecological niche can be rendered as "outer insides"). Moreover, internalized membranes of many different sorts facilitate semiotic processes inside the cell,

regulating metabolism. Likewise, in higher animals, internalized skin sensors might have given rise to the part of the important part of the nervous system performing proprioception.

The simplest semiotic process is categorical perception, or environmental granularity (already at biochemistry level) – thus biosemiotics finds the semiotic vocabulary necessary to describe even biochemical reactions – that is, when they take place in the context of the cell's metabolism. The "recognition" of chemical agents in biochemical processes generally takes place due to certain "active sites" which the large, overall ball-shaped macromolecules display on their outsides. These "active sites" function as signs for the reagents in question, and they may be deceptive, as very different macromolecules may present identical "active sites".[17] "Scaffolding" is a concept invented by Hoffmeyer for the general process of stabilizing, channeling, automatizing and sophisticating (by adding new stable possibilities) a segment of metabolism: ranging all the way from cell architecture, organ structure, and to nest building, herd behavior, language, and writing. In Hoffmeyer, this implies the notion of "increasing semiotic freedom" – higher animals may not only be able to recognize tokens as instantiations of types but nevertheless use these, apart from their possible reference to the immediate surroundings, to symbolize, to play, to reason, to argue, to use diagrams. This bodily basis even permits sufficiently complex organisms to make abstractions by treating relations as a thing (metaphorically) – probably only humans are able to do this explicitly and at will.

Biosemiotics in general thus points to the necessity of defining the body concept in constant interaction between biology and semiotics: the body as the minimal biological entity simply *is* a sign processing

17 Thus, Umberto Eco's old definition of semiotics by the means with which to lie is already pertinent at this low level. Of course, such lies are without conscious intention – "being fooled" is probably more primitive than the more complex process of being lied to.

device. The evolutionary stance of biosemiotics, moreover, urges it to try to define a series of differently apt bodies so that the ability to specific sign use is correlated to a type of body.[18]

Umberto Eco originally proposed the idea of a lower threshold of semiotics, presumably distinguishing human language and sign use from simpler signal systems in biology. This idea has, of course, been challenged by biosemiotics that establishes instead a crucial threshold between inorganic and organic nature – cf. Sebeok's idea of biology and semiotics as co-extensive. Thus the idea emerges that the crucial task is not to find one lower threshold of semiotics but rather to establish a ladder of thresholds of increasing complexity. In addition to thresholds separating the inorganic from the organic world and animals from human beings, we may expect semiotically defined thresholds separating unicellular from multicellular organisms, plants and fungi from animals, animals with/without central nervous systems and correlated environment representations – and probably many more. The semiotic "missing link", Terrence Deacon (1997) has

18 When I have presented this idea in lectures, it has been challenged by excellent semioticians, like Susan Petrilli and Lucia Santaella, on Peircean grounds. They claim that Peirce's metaphysical continuity prohibits such thresholds from having any ontological value. I would argue this is a fallacious argument. It is perfectly possible to maintain a basic continuist ontology and at the same time searching for discontinuities in this continuum. This lies already in one of Peirce's basic arguments for the primacy of the continuum: the continuum, without problems, includes discontinuities, vice versa not so (and all attempts at "building" the continuum from discrete entities fail). Moreover, even when no apparent discontinuity is at stake, clear differences are possible (take, e.g., the continuum of color which does not imply that there is no difference between, say, yellow and green. A sharp demarcation between any two colors will possess a certain arbitrariness, but still it will be *cum fundamentum in re*. It is important not to let continuity assume a role of thought prohibition, a new darkness in which all cows become grey. This would violate Peirce's basic motto: Do not block the way of inquiry.

The biosemiotic Scala Naturae may be conceived of on the basis of Gould's idea of "punctuated equilibrium". Even if evolution is basically continuous, it may be segregated into long periods with little change, separated by short periods with huge changes. Thus, the development of man's unique semiotic possibilities took place during a very short time span on an evolutionary scale, and it may be possible that the same thing holds for the passing of some of the other semiotic thresholds.

argued, is the transition from iconic and indexical to symbolical signs; a problem here is that if we use Peirce's symbol definition, many higher animals use symbols. Maybe the semiotic missing link is constituted by several sub-thresholds lying close? The ability of diagrammatical reasoning is probably also shared by some higher animals, the use of metaphor likewise, the existence of inter-subjectivity and, correlated, objectivity arguably has its primitive form in Merleau-Pontyan "inter-animalité". The use of the special symbol type of argument can also, presumably, be found in many higher animals. This author finds the best candidate for the semiotic missing link in a special subtype of the Peircean symbol: the so-called "hypostatic abstraction", making of some aspect or relation of a phenomenon a new, explicit object. This would be the ability to make signs, arguments, and symbols *explicit* and thus subject them to deliberate control and change.

In any case, one of the tasks of biosemiotics must be the construction of a semiotic ladder of evolution. Below follows, as a conclusion, a first outline of such a scale with some of the single steps nicknamed after central authors.

A biosemiotic Scala Naturae defining organisms with respect to semiotic ability

- "Searle threshold" – conscious, deliberate, intentional communication actions – linguistics
- "Eco threshold" – linguistics and other human sign systems – human sciences
- the "biosemiotic missing link" – probably consisting of several sub-thresholds?
- "Deacon threshold" – symbols?

- "Lakoff threshold" – metaphors? (However, is there any clear limit between metaphor and concept extension?)
- "Husserl threshold " – intersubjectivity?
- hypostatic abstraction?
- diagrammatical reasoning?
- "Merleau-Ponty threshold" – multicellular bodies with central nervous system (and probably consciousness), symbol processing, "interanimalité" and environment mapping – higher zoology
- "Uexküll threshold" – active information gathering, functional circle – zoology
- threshold between unicellular and multicellular organisms (plants, fungi, animals) – pertaining to the introduction of stable intercellular semiosis and cell differentiation ?
- threshold between prokaryotes and eukaryotes where the DNA in the former is not separated from the protoplasm so that it may much more freely be communicated to other prokaryotes?
- "Sebeok threshold" – semiotic processes proper – biology
- "Peirce threshold" – protosemiotic processes – all of the universe

References

Deacon, Terrence W. 1997. The Symbolic Species. The Co-Evolution of Language and the Brain. New York, London: Norton.

Emmeche, Claus et al. (eds.) 2002. Reading Hoffmeyer. Rethinking Biology. Tartu: University Press.

Fauconnier, Gilles & Mark Turner. 2002. The Way We Think: Conceptual Blending and The Mind's Hidden Complexities. New York: Basic Books.

Gould, Jay S. 1972. Punctuated equilibria: An alternative to phyletic gradualism. In Thomas J. M. Schopf (ed.). Models in Paleobiology. San Francisco: Freeman, Cooper, 82-115.

Hoffmeyer, Jesper. 2005. Biosemiotik. En afhandling om livets tegn og tegnenes liv. København: Ries.

Hoffmeyer, Jesper. 1996. Signs of Meaning in the Universe. Bloomington: Indiana University Press.

Hoffmeyer, Jesper. 1992. Some semiotic aspects of the psycho-physical relation: The endo-exosemiotic boundary. In Thomas A. Sebeok & Jean Umiker-Sebeok (eds.). Biosemiotics. The Semiotic Web 1991. Berlin: Mouton de Gruyter, 101-123.

Hoffmeyer, Jesper & Claus Emmeche. 1991. Code-duality and the semiotics of nature. In Myrdene Anderson & Floyd Merrell (eds.). On Semiotic Modeling. Berlin: Mouton de Gruyter, 117-166.

Husserl, Edmund. 1980. Logische Untersuchungen. Tübingen: Niemeyer.

Husserl, Edmund. 1993. Das Gesetz der Fortpflanzung. In Die Krisis. Ergänzungsband. Husserliana vol. XXIX. Dordrecht: Kluwer, 317-320.

Kauffman, Stuart. 2000. Investigations. New York: Oxford University Press.

Kull, Kalevi. 1999. Biosemiotics in the twentieth century: A view from biology. Semiotica 127: 385-414.

Lakoff, George & Mark Johnson. 1999. Philosophy in the Flesh. The Embodied Mind and Its Challenge to Western Thought. Chicago: University Press.

Merleau-Ponty, Maurice. 1995. La nature. Notes. Cours de Collège de France, ed. Dominique Séglard. Paris: Seuil.

Peirce, Charles S. 1934-58. Collected Papers, vols. 1-6, eds. Charles Hartshorne & Paul Weiss, vols. 7-8, ed. Arthur W. Burks. Cambridge, Mass: Harvard University Press.

Peirce, Charles S. 1976. The New Elements of Mathematics. 4 vols., ed. Carolyn Eisele. The Hague: Mouton.

Petitot, Jean. 1992. Physique du sens. Paris: Éditions du CNRS.

Prodi, Giorgio. 1988. Signs and codes in immunology. In Eli E. Sercarz et al. (eds.). The Semiotics of Cellular Communication in the Immune System. Berlin: Springer.

Sebeok, Thomas A. 1991. A Sign is Just a Sign. Bloomington: Indiana University Press

Sebeok, Thomas A. 1992. 'Tell me, where is fancy bred': The biosemiotic self. In Thomas A. Sebeok & Jean Umiker-Sebeok (eds.). Biosemiotics: The Semiotic Web 1991. Berlin: Mouton de Gruyter, 333-343.

Sebeok, Thomas A. 2001. Global Semiotics. Bloomington: Indiana University Press.

Sebeok, Thomas A. & Jean Umiker-Sebeok (eds.). 1992. Biosemiotics. The Semiotic Web 1991. Berlin: Mouton de Gruyter.

Smith, Barry. 1996. In defense of extreme (fallibilistic) apriorism. Journal of Libertarian Studies 12: 179-192.

Stjernfelt, Frederik. 2003. Sebeotics at the threshold. Review of Ponzio and Petrilli, Tom Sebeok. Semiotica 147: 485–494.

Stjernfelt, Frederik. 2002. Categories, diagrams, schemata. In Frederik Stjernfelt & Dan Zahavi (eds.). 100 Years of Phenomenology. Logical Investigations Revisited. Dordrecht: Kluwer, 147-170.

Stjernfelt, Frederik. 2001. A natural symphony. The actuality of Uexküll's bedeutungslehre for our days' semiotics. Semiotica 134 (1/4): 79-102.

Stjernfelt, Frederik. 2001a. Biology, Abstraction, Schemata. Man as the abstract animal rather than the symbolic species? In Berit Brogaard & Barry Smith (eds.). Rationality and Irrationality. Vienna: Hölder-Pichler, 341-61.

Stjernfelt, Frederik. 2001b. Umberception and econicity. Review of Umberto Eco's Kant and the Platypus. RS/SI 21.1-3: 309-22.

Stjernfelt, Frederik. 2000. How to learn more. An apology for a strong concept of iconicity. In Troels D. Johansson et al. (eds.). Iconicity. A Fundamental Problem in Semiotics. Copenhagen: NSU Press, 21-58.

Stjernfelt, Frederik. 2000a. Diagrams as centerpiece of a Peircean epistemology. Transactions of the Charles S. Peirce Society 37.3, 357-92.

Stjernfelt, Frederik. 2000b. Mereology and semiotics. Sign Systems Studies (Tartu) 28, 72-98.

Stjernfelt, Frederik. 2000c. Die Vermittlung von Anschauung und Denken. Semiotik und Schematismus bei Kant, Cassirer und Peirce. Zeitschrift für Semiotik 22: 341-68.

Stjernfelt, Frederik. 1999. Biosemiotics and formal ontology. Semiotica 127: 537-66.

Stjernfelt, Frederik. 1992. Categorical perception as a general prerequisite to the formation of signs. In Thomas A. Sebeok & Jean Umiker-Sebeok (eds.). Biosemiotics. The Semiotic Web 1991. Berlin: Mouton de Gruyter, 427-454.

Thom, René. 1989. Causality and finality in theoretical biology: A possible picture. In John Casti & Anders Karlqvist (eds.). Newton to Aristotle. Towards a Theory of Models for Living Systems. Boston: Birkhäuser, 39-45.

Thom, René. 1972. Stabilité structurale et morphogénèse. Paris: Ediscience.

Uexküll, Jakob von. 1982. The theory of meaning. Semiotica 42: 25-82.

Uexküll, Jakob von. 1928. Theoretische Biologie. Berlin: Springer.

Zahavi, Dan. 1996. Husserl und die transzendentale Intersubjektivität. Dordrecht: Kluwer.

Assessing the body's share in conversation

Axel Hübler

The nonverbal share in communication

Due probably to the rhetorical tradition, we tend to think that the nonverbal part of our communicative behavior is a matter of choice. But this is only half of the truth, it seems. It pertains to that part which is left when we have subtracted what the production process itself requires. On the basis of about 100 hours of videotaped (narrative) material, McNeill (1992) arrives at the following stance, as far as gesture is concerned:

> Gestures and speech are closely linked in meaning, function, and time; they share meanings, roles, and a common fate. [...] Gestures and speech, considered jointly, reveal a process in which holistic and imagistic representations interact with analytic and linguistic representations. Gestures (global and synthetic) and speech (linear and segmented) co-occur and are coexpressive in the act of speaking. [...] Speech and gesture arise from an interaction of mental operations of opposite character – imagistic and linguistic. (McNeill 1992: 218) Gestures occur [...] because they are part of the speaker's ongoing thought process. (McNeill 1992: 218, 245)

And he draws the conclusion:

> Thought is image *and* word. [...] Conceiving of thought as a dialectic lets us glimpse into the creativity within ordinary human acts of speaking, thinking (including visual thinking), and storytelling. Gestures are part of this creativity. (ibid.: 271-272)

Usually, we differentiate between two (main) nonverbal modes of communication in normal everyday face-to-face interaction. Besides the kinesic mode there is also the prosodic mode, and I would like to include it into my considerations because it can be approached in physical terms as well.

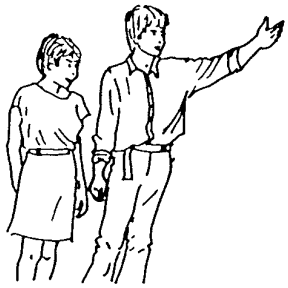

Figure 1. Deictics.

Figure 2. Beats.

The kinesic mode

Within the context of communication, kinesic behavior is more or less equivalent with gestures. In accordance with Kendon (1984: 81), I use the term gesture

> to refer to any instance in which visible action is mobilized in the service of producing an explicit communicative act, typically addressed to another, regarded by the other (and by the actor) as being guided by an openly acknowledged intention, and treated as conveying some meaning beyond or apart from the action itself.

Five gesture types have gained particular prominence, i.e., emblems, iconics, metaphorics, beats, and deictics (cf. McNeill 1992).[1] They all relate to what is verbally said. The terms *deictics* and *beats* are quite transparent in that they actually refer to pointing and accentuating gestures respectively (Figure 1, 2).

The other terms call for some brief explanation. *Emblems* are culture-specific and in many respects similar to language. They have to be learned as symbols – though they are usually not arbitrary but motivated – and can be used like words or even whole sentences/utterances (Figure 3). *Iconics* are gestures that show in their

1 Other, just slightly different typologies have been suggested by Ekman & Friesen (1969), inter alia.

Figure 3. Emblems: "That's [good]!"

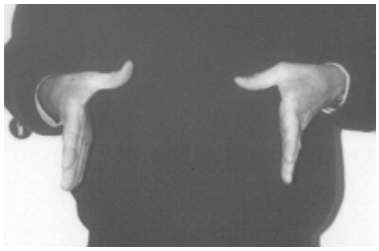

Figure 4. Iconics: "It was [a box]."

Figure 5. Metaphorics: "He [confessed] his love."

form a close relationship to some concrete content item of a given utterance, of which they highlight some selected aspect (Figure 4). *Metaphorics* are formally very similar to iconics. They are also pictorial in their make-up, but they relate to abstract meanings, which they metaphorize by presenting them as if they were concrete phenomena (Figure 5).

Mention should also be given to affect displays and to adaptors. *Affect displays* signal emotional states; when they occur in concomitance with language behavior they either express emotional attitudes toward propositional states of affairs (Figure 6) or signal modality (Figure 7).

Figure 6. Affect displays: States of affairs ["My wife has won the first prize in the lottery"] (Morris 1982: 44).

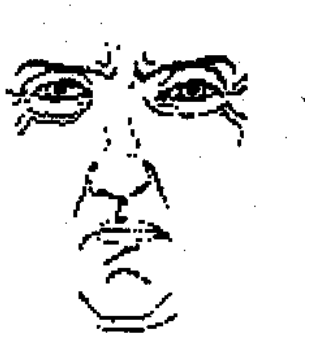

Figure 7. Affect displays: Modality ["There must be some mistake"] (Morris 1982: 44).

Figure 8. Adaptors: Selfmanipulation (Molcho 1984: 169).

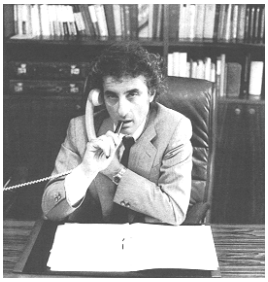

Figure 9. Adaptors: Object manipulation (Molcho 1984: 176).

Figure 10. Adaptors: Touching others (Molcho 1984: 152).

Adaptors consist in kinesic behavior meant to meet certain physical and emotional needs, for instance to reduce inner tensions; they consist in manipulations with some body part of one's own (Figure 8), with objects (Figure 9), or with some body part of the conversation partner (Figure 10). They can occur independently of speech, but when they co-occur with it they are likely to exert an evaluative/emotional function.

Figure 11. Regulator: Gesture.

Figure 12. Regulator: Gesture.

A last type, often tackled in literature as well, namely *regulators*, will be discarded here – mainly for technical reasons. Regulators comprise that part of the kinesic behavior that contributes to the organization of verbal exchanges. Apart from rare gestures such as in Figure 11 and Figure 12, they typically consist in eye contact and gaze avoidance. Eye contact is difficult to videotape and to observe in (prefabricated) video material.

The prosodic mode

The main prosodic phenomena to be taken into consideration are pitch, loudness, and tempo. Syllabic duration (drawls) and rhythm enter into the picture as well, just as some other sorts of vocal behavior that Poyatos (1993) classifies as qualifiers, alternants, and differentiators. *Qualifiers* result from controlling the articulatory organs, breathing, and articulation. The corresponding effects normally run under labels such as falsetto, whisper, overarticulation etc. *Alternants* consist of language-free sighs, throat clearings, clicks, sniffs, snorts and all those "hhmmmm" and "eerrr" sounds of hesitation or planning with which (spontaneous) utterances are interspersed. *Differentiators*, finally, represent a class of vocal signs that can act as qualifiers of language, but don't have to; they can also occur by themselves. Most common are laughter, crying, and shouting. Sighing, panting, yawning may appear already marginal to conversation, belching is certainly exceptional.

Back to pitch, loudness and tempo. The various functions they can exert have been documented to a considerable extent by Poyatos (1993). What he does not topicalize, though, but what seems to be a prerequisite for such interpretations is that we have to segment the continuum of prosodic flow in ways that allow us such interpretations. The task, in other words, consists in identifying prosodic/vocalic configurations out of the prosodic continuum. This is a task analogous, – though more difficult – to identifying gestures out of the continuous flow of kinesic behavior.

Proposals in terms of characteristic prosodic contours can well be adopted for the notion of configuration. Kohler (2005), for example, identifies certain pitch configurations to which – in coordination with articulatory timing – he attaches relatively fixed meaning values (Figure 13).

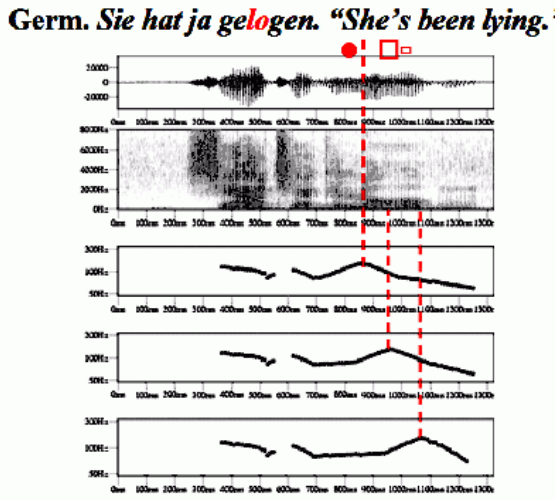

Figure 13. Peak-configuration (pitch) across time (Kohler 2005: transparency 51).

The pragmatic functions the peak-configuration assumes can be summarized thus:

> early occurrence – finality (knowing, synthesizing, end of a line of argument, resignation)
> middle occurrence – openness (observing, experiencing, start of a new line of argument)
> late occurrence – unexpectedness (observing against expectation, surprise, hard to believe)

Hübler (2002) has pursued another approach. It rests on marked deviances from what is expected. The examples that will serve as illustration are taken from a narrative within an interview, which we will have a closer look at later. For each parameter separately[2], the mean and standard deviation, calculated for the narrative passage at issue, serves as point of reference. Values above or below will be considered as marked, and if they extend over more than one syllable they

2 According to articulatory phonetic principles, a positive correlation at least between pitch and intensity is to be expected. The data certainly show some correlation, but allow for the conclusion that beyond standard deviation both parameters can be considered to function independently.

will be taken to be a configuration. (This is certainly an intuitive, if not arbitrary way of defining the necessary criteria and in the long run they will have to be established in an empirical manner).

As to pitch, the mean in the narrative from which the following three examples are taken is 117.1 Hz, the standard deviation 15.6 Hz. Consequently, pitch values above 133 Hz are considered to be markedly high (MH), values below 101 Hz markedly low (ML) (Figure 14a).

per	108 Hz	
haps	131 Hz	
not	123 Hz	
know	121 Hz	
ing	112 Hz	
this	88 Hz	ML
since	88 Hz	ML
four	97 Hz	ML
or	96 Hz	ML
five	100 Hz	ML

Figure 14a. "perhaps not knowing [this since four or five]". Pitch, markedly low (see Case study Prince Andrew below).

In the case of intensity, the medium as well as the standard deviation are calculated on the basis of syllable peaks only, because it would make no sense to take into account the lows, which naturally occur where the voice comes to a rest or where there is, for example, a voiceless fricative. Accordingly, the mean intensity is 75 dB, the standard deviation 4.6 dB. Values above 79.6 will thus be considered to be markedly high (MH) (Figure 14b).

For obtaining the speech tempo, the total duration (21.938 seconds) had to be mediated with the total number of syllables (136). The medium speech tempo is then defined as the average number of syllables per second, which – in the passage under consideration – is

6.4 syll./sec.; that is slightly above the average of a generally accepted value of 5-6 syll./sec. for British English speakers. The standard deviation of the average speech rate for the passage is 1.3 syll./sec. Thus passages faster than 7.7 syll./sec. and slower than 5.1 syll./sec. stand out as configuration (Figure 14c).

per	69,8 dB	
haps	80,3 dB	MH
not	80,4 dB	MH
know	82,2 dB	MH
ing	78,4 dB	
this	70,9 dB	

Figure 14b. "per[haps not know]ing this". Marked intensity, high (see Case study Prince Andrew below).

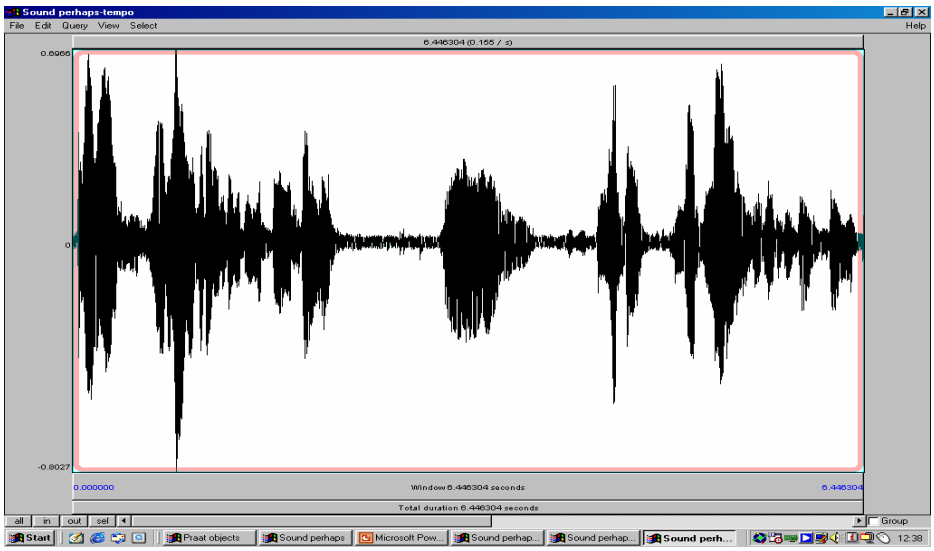

Figure 14c. ["since four or five] (6.19 syll./sec.) em perhaps not knowing this [since four or five] (5.07 syll./sec.)". Marked tempo (see Case study Prince Andrew below).

Once we have identified such prosodic/vocalic configurations, we can take them as quasi-gestures. We may even be bolder and interpret prosodic configurations as gestures proper. This step is not simply a capricious idea; it is, rather, theoretically prefigured.

The physicality of prosody

Apart from Bolinger's occasional remarks on the "inherent iconism of intonation" with certain forms of nonverbal behavior (cf. Bolinger 1985 and 1985a), we find the theoretical stance clearly outlined by cognitive approaches to phonology. According to Neisser (1976: 156ff.), speaking amounts to performing subtly coordinated movements in parts of our body, and it does not make much of a difference that we hear these events rather than see them. Movements of the vocal apparatus equal in dynamical respects those of the limbs; both represent different ways of arriving at the same point. Kelso & Tuller (1982) speak in these cases of motoric equivalence or equifinality. They draw the conclusion that "speech and limb movements are dynamically alike in sharing a common solution to the equifinality problem."

The distinction between the kinesic and the prosodic mode thus turns out to be partly misleading. If we want to pay tribute to this fact we could call them all gestures and qualify them as prosodic and kinesic or, maybe even better, as visual and audible. They share the property of being physical. It is merely the degree of physicality that differs[3] – in correspondence with the different degree of physicality of the articulators employed. Such a perspective points toward measuring (the impression of) the physicality of gestures.

3 Kinesics and vocalics are to a certain degree interdependent, though. A lower pitch, for example, can be realized more easily while the head is bent downward since the vocal cords are more relaxed. The opposite can very well be observed with singers who stretch their head upward to give the vocal cord a higher tension in order to reach higher notes. The data, however, show that they can principally act independently.

Assessing physicality

The measure is certainly not identical with delineating a cline in physicality of the bodily articulators involved in the various gestures. It is more complex; that is, more factors should enter into it. As a minimum, I propose four parameters to be taken into account; besides quality (the parameter introduced above), these are quantity, role, and purpose. Each will subsequently be tackled individually.

Quality

This criterion is purely formal and embraces the "articulators" used for the production of the gesture at issue. Grossly speaking, I propose the following cline of physicality: contact movements – hand movements – face/head movements – eye movements – movements of the vocal tract. Some further differentiations, however, seem desirable (Figure 15).

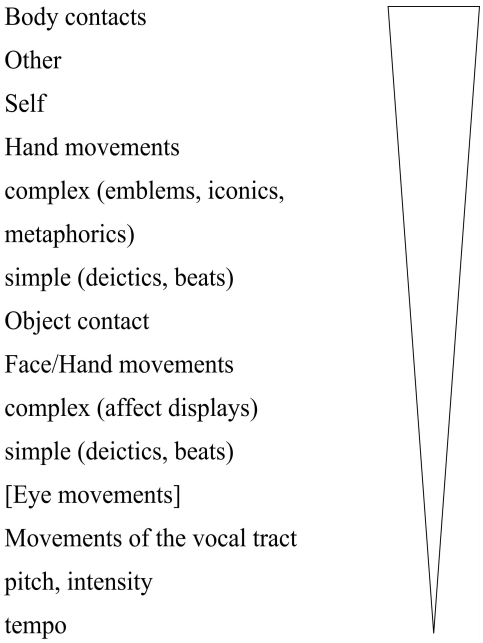

Figure 15. Quality.

Figure 16. and [rolls down the] street (McNeill 1992: 305).

Figure 17. and [rolls down the] street (McNeill 1992: 305).

As far as contact behavior is concerned, it seems that touching other people's body is physically "weightier" because more marked than touching one's own body; object contacts are considered to be even less physical, in fact, I would grade them as physically weaker than hand movements. The hand movements, in turn, can be graded according to the (typical) elaborateness or complexity. It thus appears that gestures belonging to the class of emblems, icons or metaphorics rank higher than those that are deictics or beats. A similar internal ranking applies to face and head movements, which – in our hierarchy – follow the object contacts; face movements that function as affect displays (or signal modal attitudes) are usually more complex and thus show more physicality than movements (of the head or the eyebrows) to be classified as deictics or beats. Eye-movements follow next (but – in the case study to follow later – will not be taken into consideration because they are difficult to get hold of, at least in prefabricated video material). Movements of the vocal tract show the lowest degree of physicality; with respect to pitch, intensity, and tempo, I would assign a higher degree of physicality to pitch and intensity than to tempo.

Quantity

This is also a formal criterion and pertains to the size of a given gesture. Size can be understood in terms of space and time, and may be worth tackling separately. For the time being, I will pay attention to the spatial aspect only. Kinesic gestures will be characterized relative to their "natural" size, which amounts to what Bolinger (1977) calls (with respect to adjectival gradation) the "expected average"; any deviation from it will be considered marked, either as small or as large.

An analogous criterion applies for prosodic configurations/gestures as well. Accordingly, prosodic gestures could be identified as large (or small, where feasible) if a second level (beyond the one of standard deviation) were established, by calculating the average of the marked values obtained for the individual speaker as regards pitch, loudness, and tempo respectively. (The case study to follow later, however, will not pursue this line.)

A gesture which shows a size larger than expected will be considered more physical than a gesture showing a smaller size than expected. That is pretty obvious but needs mentioning nonetheless.

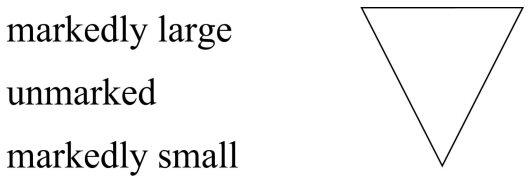

Figure 18. Quantity.

Role

The role a gesture can take over is to be defined against the background of a systematics of interaction between the verbal and the nonverbal. Generally speaking, they are normally compatible with

one another. Only occasionally may they be incompatible. Spontaneous cases may be limited to those rare occasions when a speaker is undecided himself; otherwise it would have to be considered a rhetorical phenomenon.

Simplifying the systematics by viewing the interaction exclusively from the nonverbal, I will distinguish between two roles of the nonverbal, i.e., supportive and complementary. A gesture is supportive if its meaning overlaps with that of the verbal element.

As regards the influence that the role exerts on physicality, there may be some good reason for assigning a high degree to supportive gestures. I would, however, advocate the reverse rating. In Western society at least, gestures unaccompanied by corresponding words tend to be considered impolite; the reason is, I suppose, that the exclusive role of the nonverbal assigns too much importance to the body. Anyway, this attitude seems to justify a higher rating in physicality for complementary gestures.

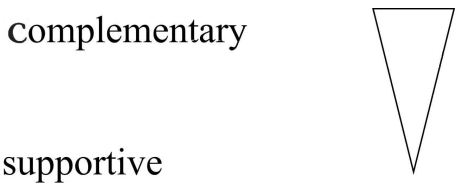

Figure 19. Role.

Purpose

In the context of narrating at least, it seems feasible to discern between nonverbal behavior that merely accompanies speech and nonverbal behavior that interacts with it. The first class is referred to by the term "circumstantial" and covers (speech-independent) affect displays and adaptors (Figure 20).

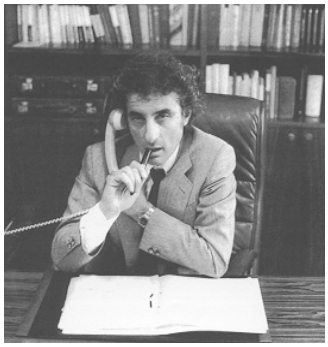

Figure 20. Circumstantial: ["It's him – I see"] (Molcho 1984: 176).

The second class is to be further subdivided. A distinction is made between gestures that serve organizational, structuring purposes and those that serve to signal the speaker's evaluative attitudes. Figures 21 and 22 illustrate the text-structuring type:

and [the old] woman who keeps Tweety
Beat

Figure 21. The beat marks the introduction of a character (Granny), important for its relationship to the story as a whole (Tweety Bird) (McNeill 1992: 169).

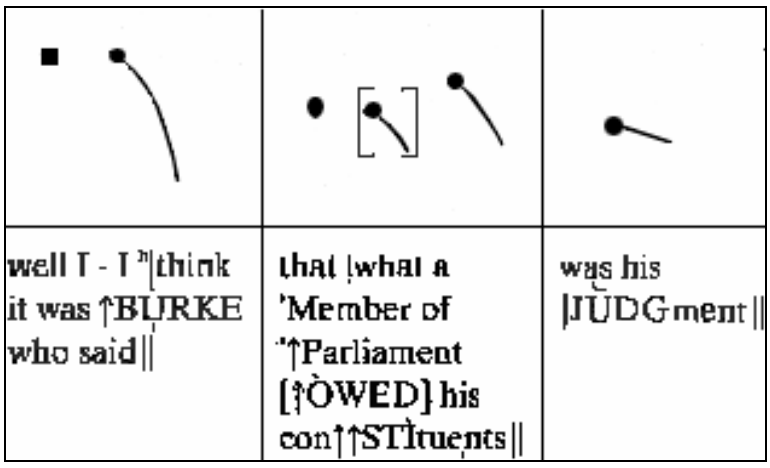

Figure 22. The initially occurring great pitch range on Burke marks it – supportively – as the focus (of this minor paratone) (Couper-Kuhlen 1986: 199).

The two examples to come cover the main variants of the evaluation type, i.e., modality and appraisal.

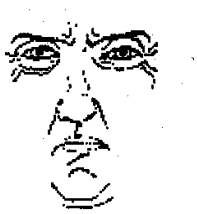

Figure 23 (= 7). Modality: ["There must be some mistake"] (Morris 1982: 44).

Figure 24 (= 6). ["My wife has won the first prize in the lottery"] (ibid.).

And this differentiation applies to vocal gestures as well:

per	69,8 dB	
haps	80,3 dB	MH
not	80,4 dB	MH
know	82,2 dB	MH
ing	78,4 dB	
this	70,9 dB	

Figure 25. "per[haps not know]ing this" marked intensity (high). The markedly high intensity elaborates the modal-concessive attitude of the speaker as important (see Case study Prince Andrew below).

there	146 Hz MH
are	133 Hz
al	143 Hz MH
ways	124 Hz
hum	131 Hz
ble	113 Hz

Figure 26. ["there are al]ways humble beginnings"] pitch markedly (high). The high pitch gesture is at the opening of a narrative about something quite personal (falling in love with one another); it thus can count as embarrassment or the like (see Case study Prince Andrew below).

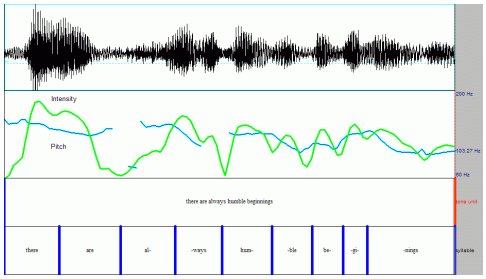

Figure 27. Sound spectograph, intensity and pitch of text in Figure 26.

The first, structural kind of purpose will be referred to as "metanarrative"/ "metapropositional", the second, evaluative kind as "paranarrative"/ "parapropositional".

In addition, we have a great many gestures (mainly of the visual sort) that contribute to the content of an utterance:

> and uh the first [scene you see] is uh
> *Iconic: hand depicts flat surface of window ledge*
> this th[is win]dow with [Birdwatcher's] Society underneath it
> (1) (2)

(1) Iconic: depicts window ledge
(2) Iconic: depicts rectangular sign

We could characterize their function as narrative/propositional (as McNeill 1992 does), but I prefer to call them "expressive". They highlight and emphasize certain aspects of the (lexical) concept they co-occur with.

The parameter of purpose pertains to physicality indirectly (Figure 28). Its inclusion is based on the assumption that physicality in the context of communication finds some sort of counterbalance in the degree to which the purpose of a gesture can be assessed in less personal and more objective, i.e., narrative-related terms. The purposes identified actually show such a cline. Structuring a narrative is less personal than expressing attitudes toward propositional states of

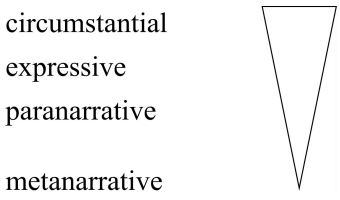

Figure 28. Purpose.

affairs, and this, in turn, is less personal than showing involvement in narrating as such (expressive purpose). Most personal are those gestures that do not contribute to the narrative at all, but are merely circumstantial. Accordingly, the physical impact of gestures is alleviated increasingly as we can define their purpose moving from circumstantial to expressive, from expressive to paranarrative and from there to metanarrative purposes.

Synthesizing the four parameters of physicality considered, the measure of physicality acquires the format shown in Figure 29.

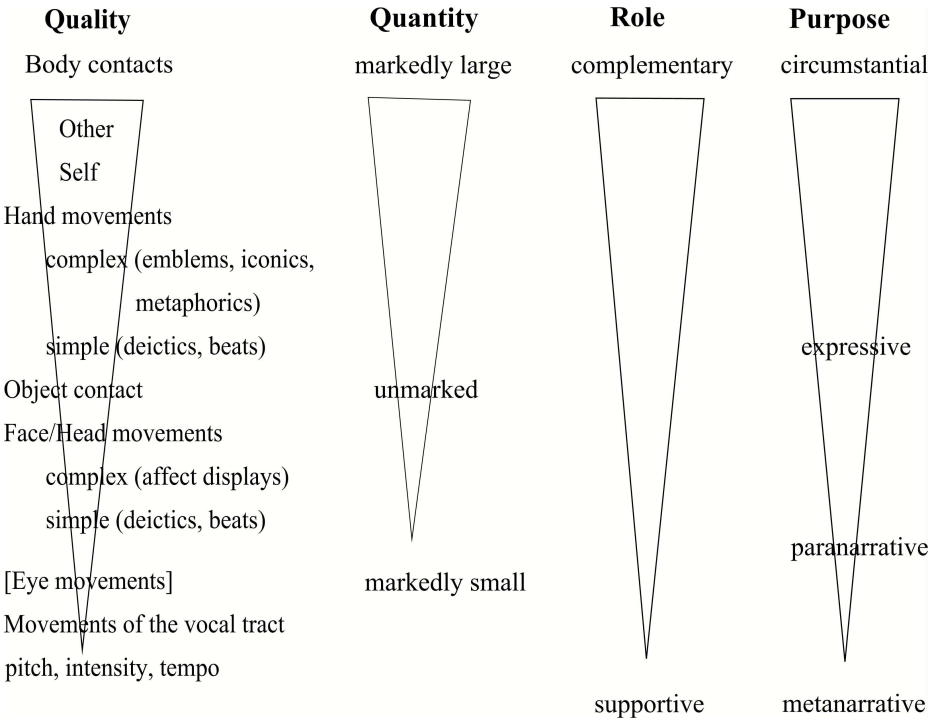

Figure 29. The four parameters of physicality.

Besides relative frequencies, we could weigh the load that the single factors within a single parameter should actually have. In analogy, the single parameter in comparison to other parameters is not easy to establish. The assignment of concrete values implies answers to questions of the following kind: Is a complementary kinesic metaphoric gesture of a big size (used for expressive purposes) more physical than a (circumstantial) auto-adaptor of a small size? Or: Is a paranarrative vocal configuration of markedly high intensity (metaphoric) less physical than, say, a quick raising of one's eyebrows (metanarrative beat)? As Figure 30 shows, I decided – tentatively – on the following: (a) to assign fixed values from 10 (high physicality) to 1 (low physicality) to the (ordered) articulators of the quality parameter; and (b) to assign to the different degrees in physicality pertaining to the other three parameters a multiplication factor ranging from 2.5 for high to 0.5 for low physicality.

What has not been taken into consideration but eventually should, concerns two further aspects: (a) Variety of gestures within narratives as regards all four parameters. It relates to the following question: Does physicality (or rather the impression of it) increase if the nonverbal manifestations freely vary or if they occur in certain recurrent combinations? And would it ask for its inclusion, if the (empirically obtained) answer would be positive? (b) Articulateness of (kinesic/visible) gestures. Every gesture as such shows a center, which sometimes is called stroke (e.g., McNeill); its articulateness, however, can vary. Even a seemingly simple gesture such as a deictic gesture shows such variation. A description of a highly articulated variant is provided by the following passage (taken from a historical treatment).

> The arm, the hand, and the fingers united in one flexible line of several joints, which combinate together their mutual action, form the grand instrument of gesture, or as Cicero calls it, "the weapon of the

> orator". The centre of motion of this compound line is the shoulder, which does not move all together in the manner of an inflexible line; but each separate joint becomes often a new centre of motion for the portion between it and the extremity. Accordingly, in directing the gesture towards any particular point, the upper arm first arrives at its proper position, then the fore arm, turning on the joint of the elbow, and lastly the hand moving on the joint of the wrist [...]. (Austin 1966: 375).

Quality		Quantity	Role	Purpose
Body contacts		markedly large	complementary	circumstantial
Other	10	(Factor 1,5)	(Factor 1,5)	(Factor 2,5)
Self	9			
Hand movements				
complex (emblems, iconics, metaphorics	8			
simple (deictics, beats)	7			expressive (Factor 2)
Object contact	6	unmarked (Factor 1)		
Face/Head movements				
complex (affect displays)	5			
simple (deictics, beats)	4			
				paranarrative
[Eye movements]	3	markedly small (Factor 0,5		(Factor 1,5)
Movements of the vocal tract				
pitch, intensity	2			
tempo	1			
			supportive	metanarrative

Figure 30. Values of physicality.

Case study: Prince Andrew

Some of the examples previously given were taken from a narrative that will now be taken to briefly show how the assessment of physicality with the help of the measure outlined above works. It is an excerpt from a TV-interview with Prince Andrew and Sarah Ferguson, on the occasion of the official announcement of their engagement (BBC 1, 03/19/1986). The verbal version reads the following:

> it could
> there are always humble beginning
> it's got to start somewhere but
> I mean we we have known each other
> since we were four or five
> perhaps not knowing this since four or five until
> again about nineteen eighty-three
> when we were staying at
> various house parties together
> around the country during during
> the part of eighty-three and eighty-four
> and it was at Ascot that that
> as it w(h)ere the whole thing
> as you say took off
> but it wasn't at Ascot we
> it wasn't at Ascot as such
> that we realized that there was anything in it
> it was later on

For the analysis, three software programs, all Microsoft compatible, have been applied: (a) *Praat*, a program for standard phonetic analyses by Paul Boersma (University of Amsterdam), (b) *Anvil*, a program for building up an integrative score for picture and sound by Michael Klipp (Deutsches Forschungsinstitut für Künstliche Intelligenz, Saarbrücken), and (c) *Excel* for statistical analyses. The

resulting score (in Anvil) acquires a format that the following screen shot may well illustrate (Figures 31, 32).

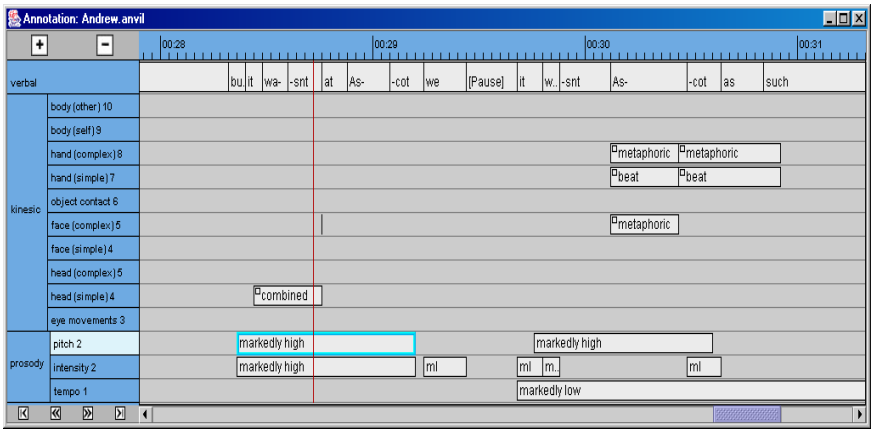

Figure 31. Screen Shot: Annotation Andrew Anvil.

Figure 32. Screen Shot Track: Prosody pitch; descriptive attributes.

I have analyzed all (visible and audible) gestures by the Prince except for eye movements and those audible gestures whose configurations do not rest on deviancy. What has been neglected are the two additional stylistic features that may have an impact on physicality as well, i.e., the variability of the gestures and the articulateness in the execution of kinesic gestures. The 31 gestures identified are listed in

the following table, characterized along the parameters introduced and evaluated accordingly.

00:00:00	metaphoric	hand simple 7	small 0,5	supportive 1	para-narrative 1,5	it could
00:00:00	metaphoric	voice-pitch 2	(MH)	supportive 1	para-narrative 1,5	it could
00:01:63	affect display	voice-pitch 2	(MH)	comple-mentary 1,5	para-narrative 1,5	there are al(ways)
00:01:63	affect display	voice-intensity 2	(MH)	comple-mentary 1,5	para-narrative 1,5	there are always
00:03:83	metaphoric	face complex 5	unmarked 1	supportive 1	para-narrative 1,5	(some) where but I mean we
00:04:96	metaphoric	voice-pitch 2	(MH)	supportive 1	para-narrative 1,5	mean we've we've known each o(ther)
00:04:96	metaphoric	voice-intensity 2	(MH)	supportive 1	para-narrative 1,5	mean we've we've known
00:05:55	metaphoric	head simple 4	unmarked 1	comple-mentary 1,5	expres-sive 2	we've known each o(ther)
00:09:11	metaphoric	voice-tempo 1	(ML)	supportive 1	para-narrative 1,5	perhaps not knowing this since four or five until

00:09:15	metaphoric	head complex 5	small 0,5	supportive 1	meta-narrative 1	perhaps not knowing this since four or five until
00:09:19	combined	voice-intensity 2	(MH)	supportive 1	para-narrative 1,5	(per)haps not know(ing)
00:10:35	metaphoric	hand complex 8	large 1,5	comple-mentary 1,5	meta-narrative 1	this since four or five until
00:10:39	metaphoric	voice-pitch 2	(ML)	comple-mentary 1,5	meta-narrative 1	this since four or five
00:17:44	icon	hand complex 8	large 1,5	comple-mentary 1,5	expres-sive 2	around the country
00:24:60	metaphoric	voice-intensity 2	(MH)	comple-mentary 1,5	meta-narrative 1	where the whole
00:24:76	metaphoric	hand complex 8	large 1,5	comple-mentary 1,5	expres-sive 2	the whole thing
00:26:23	deictic	hand simple 7	large 1,5	supportive 1	para-narrative 1,5	as you say
00:26:23	beat	voice-tempo 1	(ML)	supportive 1	para-narrative 1,5	as you say took off
00:28:39	metaphoric	voice-pitch 2	(MH)	supportive 1	meta-narrative 1	it wasn't at Ascot
00:28:39	metaphoric	voice-intensity 2	(MH)	supportive 1	meta-narrative 1	it wasn't at Ascot
00:28:44	combined	head simple 4	small 0,5	supportive 1	para-narrative 1,5	it wasn't

00:29:79	metaphoric	voice-pitch 2	(MH)	supportive 1	meta-narrative 1	but it wasn't at Ascot
00:30:08	metaphoric	voice-tempo 1	(ML)	supportive 1	meta-narrative 1	it wasn't at Ascot as such
00:30:12	metaphoric	hand complex 8	unmarked 1	supportive 1	meta-narrative 1	Ascot
00:30:12	beat	hand simple 7	large 1,5	comple-mentary 1,5	meta-narrative 1	Ascot
00:30:12	metaphoric	face complex 5	small 0,5	comple-mentary 1,5	meta-narrative 1	Ascot
00:30:47	metaphoric	hand complex 8	unmarked 1	supportive 1	meta-narrative 1	Ascot – such
00:30:47	beat	hand simple 7	large 1,5	supportive 1	meta-narrative 1	such
00:31:87	metaphoric	voice-tempo 1	(MH)	supportive 1	meta-narrative 1	that we realized that there was anything in it
00:32:72	beat	face simple 4	small 0,5	comple-mentary 1,5	meta-narrative 1	anything in it
00:33:00	beat	head simple 4	small 0,5	comple-mentary 1,5	meta-narrative 1	in it

Figure 33. Gesture occurring in Prince Andrew's narrative
(Key: MH – markedly high, ML – markedly low).

Adding up the single values, we then arrive at a global value. In the case of Prince Andrew, this value is 229. Relating the sum to the narrative output (number of words), we finally obtain a mean value; for the Prince, it is 2.201.

Significance

The findings of McNeill and others teach us that it is hardly possible to conceive and express ideas in a disembodied way. There are, however, choices between modes of different degrees of physicality. And it is for this very fact that a measuring device for physicality seems to make sense.

But what is it good for – measuring physicality in such or similar ways? The measure allows us to draw comparisons between people and subject the differences found to social analyses. Two lines of analysis seem promising and could thus provide some more concrete evidence of the utility of such a device.

The first line is of a socio-psychological nature. It is geared towards identifying links between physicality and the attribution of certain personality traits. For example: Is dominance or assertiveness linked to communicative physicality and if so in which way? Or: How does physicality contribute to the persuasiveness of a message or argument?

The second line is geared towards identifying links between communicative physicality and social class/culture. In other words: Are there differences in communicative physicality between working class people and those of the upper middle class – in Germany, England and Italy, for example – to mention just a rather simplistic interest. Or more complex: What happens in societies in which the body is subjected to heightened control, will the control extend to

speech-accompanying nonverbal behavior and become a criterion for drawing social differences? To this question in particular, I hope I'll be able to make some valid contribution – in the future.

References

Austin, Gilbert. 1966. Chironomia or A Treatise on Rhetorical Delivery, ed. Mary M. Robb & Lester Thonsson. Carbondale: Southern Illinois University Press.

Bolinger, Dwight. 1985. The inherent iconism of intonation. In John Haiman (ed.). Iconicity in Grammar. Amsterdam: Benjamins, 97-108.

Bolinger, Dwight. 1985a. Intonation and its Parts. London: Arnold.

Bolinger, Dwight. 1977. Neutrality, Norm, and Bias. Bloomington: Indiana University Linguistics Club.

Couper-Kuhlen, Elizabeth. 1986. An Introduction to English Prosody. Tübingen: Niemeyer.

Ekman, Paul & Wallace F. Friesen. 1969. The repertoire of nonverbal behavior: Categories, origins, usage, and coding. Semiotica 1: 49-98.

Hübler, Axel. 2001. Das Konzept ›Körper‹ in den Sprach- und Kommunikationswissenschaften. Tübingen, Basel: A. Francke.

Hübler, Axel. 2002. Discourse structures made visible and audible. Paper given at the International Symposium on Multimodality. Salzburg 1 – 25/26.

Kelso, Scott J. A. & Betty Tuller. 1982. Exploring the information support for speech status. Report in Speech Research 69: 43-54.

Kohler, Klaus J. 2005. Prosodie in der sprachlichen Kommunikation. Die Kieler Intonationsforschung. Vortrag am Institut für Germanistik Potsdam. <http://www.ipds.unikiel.de/kjk/pub_exx/kk2005_1/potsdam.zip>

McNeill, David. 1992. Hand and Mind. What Gestures Reveal about Thought. Chicago, London: University of Chicago Press.

Molcho, Samy. 1984. Körpersprache. München: Mosaik Verlag.

Morris, Desmond. 1982. The Pocket Guide to Manwatching. London: Triad/Granada.

Neisser, Ulric. 1976. Cognition and Reality. New York: Freeman & Co.

Poyatos, Fernando. 1993. Paralanguage. Amsterdam: Benjamins.

Hybridization and extensions of the human body, or: The conquest of nature by culture

Guido Ipsen

Let me sketch for you a scene from a semiotic conference; venue and date are of no importance. Suffice it to say, it was not too long ago, the audience consisting of not too unknown colleagues. A certain scholar had just finished his presentation, the title and topic of which are of no concern to this paper. However, as on so many occasions when semioticians meet, an old discussion emerged: what is a sign? All other matters were set aside and the group was busy arguing for or against the point that a "door" was a sign. More precisely, the question was in which instances the door will function as a sign and in which situations it will not. Said colleague argued that the poor door would only gain the quality of a sign if it was *significant*, i.e., in the case the beholder would make use of it, or perceive it as a "usable" door, hence arguing in favor of the pragmatic dimension of the sign. Now while this is a point that could well be argued (a sign being, after all, a social entity not necessarily bound to the use of any individual and in this bearing great similarity with doors), one of his arguments was most peculiar. "Will the door be a sign if I do not perceive it?" he asked, pointing at his rather strong glasses. "I may not perceive it, though the door is still there. But it will never be a sign to me!"

Please allow me to stray from the subject of sign-ness here. We shall leave this to more appropriate places of discussion. Rather, allow me to ask you to concentrate on the problem of the glasses, eyesight, body, and its obvious connection to the mind. Our colleague obviously was not only referring to his impaired eyesight for the sake of his illustrating example of the door, though he might not have been aware of this. Unwillingly, he gave insight to his very personal semiosis, which had produced a theory of signs that was heavily influenced by his impaired vision. And even more importantly, he allowed us to behold in his very own presence a fundamental principle of cognition: body and mind are not separated, but

the same. Without the precondition of his body – the short-sightedness of his eyes – neither the example nor his theory would have held. If I may extrapolate so easily on this fact, I should take this point even further: mental signs and biological signs inter-penetrate each other, influence each other and share the same semiosic principles of production and processing, in human thought sometimes being aided by extensions such as glasses or other prostheses. This is the outset of this paper, and I invite you to join me from here on a journey from within the body to without, across boundaries to the environment, and leaving behind such confines as have been set by terms such as *semiotic* and *nonsemiotic*, *body* and *environment*, *nature* and *culture*, respectively. We shall find that this idea is not new, even in thinkers who postulated otherwise. As our vehicle for this journey, I suggest the theory of hybridity. I shall try to illustrate that all three divides are connected to one another, hence creating a binary world view that inhibits a full-fledged semiotic understanding of the cosmos.

The semiotic paradox of divides

The habit of taking on material from natural resources to the human body in order to produce clothing for shelter, accessories for decorative purposes, tools, or weapons, is as old as human *culture*. But does this practice indeed make up a divide between this so-called exclusive human domain and *nature*? Is there really a dividing line between semioticized material in culture and unused matter beyond? An argument in favor of this divide was that the said materials only gain the value of signs as soon as they are being used by the standards of cultural signification. The whole argument ultimately boils down to the question of whether a nonsemiotic world exists, by its very existence defining the more sophisticated, however somewhat smaller cultural domain. This question can be

pursued in two ways. First, we could try to prove that there is a non-semiotic world by finding something that has yet not gathered the value of a sign. The second way of defining the nonsemiotic is to state that there are beings in a biological world whose perceptions, communication, and lives are not meeting the standards of semiosis as we find it in humans. Let us explore these two lines of reasoning first.

The nonsemiotic world of items

Instead of "item", we may also use the terms "thing", "object", or "material". Nearly all terms, however, have been introduced to one cosmological model or another. Appropriate terminology therefore is difficult to approach. What is here called items is that which is defined as "not (yet) being a sign". What are "non-signs"? I admit that this paper challenges the existence of non-signs altogether. I suspect that they are a theoretical construction to introduce yet another negative definition of what signs are. According to Saussure, e.g., the nonsemiotic world is an "uncharted nebula" (de Saussure 1986: 111-112). This is a negative definition par excellence, and also a genial delimitation of theorizing: it defines everything known as signs, and at the same time spares Saussure to actually name something which is not a sign. As we will see later, Saussure's approach bears some similarity to this paper's arguments, as there are clearly areas and things in the world which are not known to us. We know of the unknown and if only for the reason that our measuring apparatus has been able to penetrate some of the vast unknown of the universe, leaving yet uncharted areas behind the final frontier. Yet, the postulate that whatever matter is unknown remains in a "nebula" of non-signs is a hypothesis only serving for insuring us of the significant value of our knowledge. Moreover, it reduces semiotic theory to mere anthropocentrism.

For another example, St. Augustine (397: 624-625; cf. Nöth 1990: 82) gives a clearer account of what non-signs are. He distinguishes between "signs" and "things". Keeping close to the definition of a sign as *something which stands for something else*, i.e., *aliquid pro aliquo*, he lists items such as "wood, stone, cattle or other things of that kind" as non-signs. Nöth calls this approach "naïve realism". Indeed, here the question must be raised again if a sign will only be a sign if it will be sorted with other, similar signs, in a system appropriate to human understanding. Furthermore, does the sign cease to be a sign when it appears outside of this systemic context? Clearly, wood, stone and cattle can take on most diverse sign values. We will discuss the case of living creatures later on. Concentrating here on the examples of wood and stone suffice it to say that they already gained sign value as soon as St. Augustine listed them as specimen of non-signs: wood or stone standing for non-signs, they paradoxically become *signs of non-signs*.

Another well-known approach which has also been employed for dividing the cosmos into the spheres dominated by humans and by other creatures is the one devising the so-called *semiotic thresholds*. Umberto Eco (1976: 16-28) employed the term of the threshold to delimit the semiotic field. The interesting aspect here is that it is the methodological and disciplinary perspective of a semiotic science which governs the view of the cosmos. Below the lower semiotic threshold, there are those phenomena not guided by social convention, which means that the semiotic field is limited to the socio-cultural sphere. Beyond the upper semiotic threshold, according to Eco, there are those phenomena studied by other sciences than semiotics. Most interestingly, Eco sees any possible object as endowed with semiotic as well as nonsemiotic value. As soon as something is studied as a sign, it becomes included in the

semiotic field. If the same item is then studied as, say, a tool, it shifts from the semiotic field to the sphere of utilitarian objects, which is studied beyond the upper semiotic threshold.

While it is only obvious to acknowledge that the fields of study, such as physics, sports, mathematics, etc. are separate from the semiotic field if seen from the monodisciplinary perspectives of the physicist, sportsman, or mathematician (these not calling themselves semioticians[1]), I would argue that there is no such schizophrenic nature of items, as Eco sees it. As soon as semiotics puts itself to the task of examining *anything* according to its sign value, an item cannot ever again disappear from the semiotic field. Neither can semioticians see an item oscillating between the semiotic and the non-semiotic, unless they disregard their own discipline. In other words: while other (possibly merely ignorant) persons may not see things as semiotic, semioticians must always see them from their semiotic perspective. Otherwise, semiotics would be reduced to an alternative science without a field of its own, since any sign may "resemble" any material, tool, or other item subject to analysis in a different framework.

While I do not only embrace but admit the possible accusation of pansemiotism here, my main objection against the upper semiotic threshold is especially nurtured by Eco's drawing of disciplinary borders. His division between the semiotic and the nonsemiotic remains artificial and is already guided by cultural propositions, for

1 Note, however, that the point has been made that there are not only explicit studies of semiotics, which would cover the theories of the sign proper, but that there is also an implicit semiotics which "covers the many semioticians avant la lettre who have contributed to the theory of signs since Plato and Aristotle but also includes semiotically relevant current studies in the many neighboring fields of semiotics", as Nöth (1990: 4) remarks. In accordance with Peirce (CP 1.1), I hold the limits of these neighboring fields as virtually nonexistent. In this judgment I follow his intention to "outline a theory so comprehensive that […] the entire work of human reason […] shall appear as filling up of its details." In this regard, physics, sports, and mathematics are fields of semiotics.

clearly the concept of disciplinary fields is not inspired by nature as such. Semiotics, however, should be seen as a transdiscipline par excellence, as such busying itself with signs from any field of human knowledge.

The nonsemiotic world of beings

In the realm beneath the lower semiotic threshold, we find the processes of communication in animals and plants. While Eco's upper threshold is rather a disciplinary border, as mentioned above, the lower one definitely separates biological life from the human sphere of signification. This second divide hence does not yet separate the body from its environment, but the cultural from the natural sphere. Everything above that threshold, according to Eco, in the realm of culture, is coded in a specificically cultural way. Naturally, the question is what "culturally coded" means. The point has been made that by discovering more and more sophisticated sign systems in the realm of animals, or even plants, the semiotic threshold has been lowered and is being lowered still. I do not wish to go into the question of whether animals are capable of producing signs and to observe signifying actions in a way comparable to humans. This would be a completely different endeavor beyond the scope of this paper (but see Martinelli 2002 for a detailed analysis of this subject matter).

More detailed work on the semiotic delimitations of the cultural sphere has been done by Lotman, who admittedly was less interested in *excluding* animal and plant life from human culture than in *defining* the possible limitations of the latter. We must, in contemplating these differences, keep in mind the binary, or dyadic, foundation of Russian semiotics. A thorough study of Lotman's work will therefore reveal that the limitations of culture also comprise the limits between various strands of culture, and most notably those

between one's own and the foreign culture, thus creating structural dichotomies as models. The space of culture, in Lotman's theory, is called the *semiosphere*, contrasting with the *biosphere* of biological life (Lotman 1990: 125). The important features of culture are communication, language, and the intricate means of using these to pass culture on to following generations (Lotman 1990: 124; 1981: 125; Nöth 2000: 133).

However, the borderline between the semiotic and the non-semiotic sphere may also be understood as the borderline between signs already culturally coded and those not yet culturally coded. Such a division would render the *entire* universe semiotic, faithful to Peircean theory, and would hence differentiate only between certain types of coding: cultural and non-cultural.[2] The possibility of dividing the world into these domains must remain questionable, though (cf. Nöth & Kull 2001).

Another point made by Lotman (1981: 26-27) concerns the rules and methods of how information is stored and communicated by culture. Certainly there are differences between "culture" and "mere biological life". I do not wish to argue against it. However, sign processes will transcend such borders, and culture, too, depends on biological processes which support cognition and mental activity. There is not possibly any culture without biological life, and in order to function properly and interact with its environment, a culture will have to incorporate biological life from the so-called non-semiotic world substantially. The process of semiosis therefore transcends the nature-culture divide and requires a redefinition of the various semiotic spheres which constitute the universe.

2 I prefer to avoid the term "natural" here, as this would imply that there be a coding system of nature similar to a coding system of culture. Truly, there are many other coding systems; either they should be summarized under the label "nature", including culture, or the term nature should be avoided. As this paper argues, there can be no nature-culture dyad. Both are intertwined and form the unity of the cosmos.

The semiosphere is externally constituted by that which is not in agreement with the coded structures within (cf. Lotman 1990: 131-142). Nöth (2000: 133) explains that there can be semiotic space within and without the semiosphere. However, it seems that Lotman's focus on culture denies that there are semiospheres to be assumed in nature, hence the contrasting term biosphere. In the biosphere, we may assume by negating Lotman's characterization of the semiosphere, there is no information that was not inherited, there are no specialized means to organize information, and there are no rules to determine the overall system of information communication (cf. Lotman 1981: 26-27). It is exactly this terminological emphasis on communication which renders the biosphere so obscure, since "language" is the basis of cultural action, and "social conflicts" as well as the "semiotic systems" of the semiosphere are the cultural "messages" formulated in "texts" (cf. Lotman 1981: 27-29), which leaves the seemingly non-linguistic biosphere behind. This logocentristic view of culture has the unfortunate effect that it draws a definite border difficult to overcome. Following these lines of argumentation, a linguistic basis of coding would have to be found in the biosphere so to qualify it for semiotic consideration.[3]

Dissolutions of the semiotic-nonsemiotic divide?

There are several semiotic approaches that may serve to either weaken or even overcome the divides between the semiotic and the non-semiotic. One of the more traditional approaches to this aim is

3 It should be pointed out here that the metaphor of the "text" that has been favored throughout the twentieth century by semioticians indeed lacks some qualities which are necessary to illustrate transcending sign systems. Texts are human artifacts, they are two-dimensional, they consist of one material only, namely whatever substance the threads of code consist of. I suggest the application of another metaphor, namely the forest of signs. The /silva signorum/, as I may term it, shows many qualities of the view on sign systems used in this paper: forests are natural, or they can be planted and hence be human made.

Greimas's text semiotics. Greimas undertakes to give a possible definition of what "natural signs" could be (Greimas 1987: 20). However, from the outset, Greimas does not move beyond the cultural sphere in his argumentation. His examples are strictly culture-governed: first, he mentions examples illustrating "cause and effect", such as a cloud signifying rain, rain in the cause signifying autumn and so forth, or the knee-jerk reflex signifying good health. Admittedly, Greimas agrees that these interpretations are bound to peculiar cultural spheres (cf. Greimas 1987: 21). Still, he does not go so far as to admit that any phenomena may also attain sign value beyond culture whatsoever, hence a cloud resembling a physicosemiotic body in itself, or the knee-jerk reflex being a biosemiotic sign signifying a chain of sign events in the body without so much as a cultural interpretation being necessary in the first place. Greimas's approach may be acknowledged as a "bridge spacing the gap" between pansemiotism and anthroposemiotism, but it must be admitted that the semiotization of the natural environment takes place in a "semiotics of nature based on cultural codes of interpretation of this environment" (Nöth 2000). This means the "natural world is only significant in a human-made way. Natural semiotics is rendered an exclusive result of the human codification of nature" (Nöth 2000, all quotes my translation). Nöth calls this perspective "intersemiotic", it should be pointed out, however, that the perspective remains anthropocentric, as Greimas himself declares: "A *human world* is detached from the totality of the "natural" world specific to each cultural community. Only those events of the world which have people as *subjects* are part of such a semiotics; natural events (e.g., earthquakes) are excluded" (Greimas 1987: 30). Greimas "natural semiotics" is therefore less a bridge between the

semiotic spheres than a proof of the thesis of this paper, namely that any contemplation of the natural world, regardless of its independent semiotic value, must result in a culturalization of the natural.

A theory truly dissoluting the semiotic-nonsemiotic divide is Peirce's approach. Peirce claims that "all this universe is perfused with signs, if it is not composed exclusively of signs" (CP 5.448 Fn.). This remark has been widely disputed, especially in regard of the question whether everything really *can be* a sign. Again, I shall not venture into this discussion here. It is, however, fundamental that by the process of semiosis, where from firstness via secondness to thirdness all sign-forms may appear, the variety of signs reaches far beyond those bound to convention. The latter, in Peircean terminology, the symbolic legisigns, are just one of the many classes of signs he devised in his semiotic system.[4]

Hybridization and the pansemiotic bridge

Even if we pursue a course that clearly divides *culture* from *nature*, as, Umberto Eco did, we have to accept that an elementary act, such as the one of using tools, also exists in the world of animals. Otters use stones for breaking shells, chimpanzees "fish" ants by use of sticks, and many animals build shelters.

In these examples, we may see how the nature-culture divide is being weakened from below. At the same time, humans have continuously been extending the variety of resources nature offers.

4 From the many varying approaches Peirce takes to this subject matter, I may be so bold as to propose here that the Peircean classification of signs in itself is merely an artificial system devised by the great scholar in order to metaphorize his theory, which in itself is rather process-related than class- or system-oriented.

This inclusion of as yet protosemiotic[5] matter into the process of cultural development produces *hybrid artefacts*. They are hybrid because they consist of so-called "natural" material – i.e., material that does not originally have cultural value or purpose – and a cultural concept of how to use the item. We must understand that this process started at the most archaic levels of evolution. Culture – in whatever terms we may define it – always carries a basic function. It helps the human being understand the cosmos by "humanizing" it. By this I mean that the items and material found in the cosmos are evaluated according to their uses and functions to the human being.[6] They hence have a double sign value. First, natural signs – which, I argue, do exist beyond the confines of the human mind – interact on the foundations of natural laws or relations beyond the obvious to the human mind. Second, items and materials gain a second sign value by their being taken on to human culture. Since this distinction exists only in theory but both sign spheres occupy the same physical world, it is obvious that these signs must become hybridized.

5 Protosemiotic here refers to possible-signs that are as yet non-signs only in regard to purely human signification. Indeed, for the human being – as I may add here for emphasis – signification is not only a possibility, it is a must, perhaps even a "curse". Humans will never be able to fully understand nonhuman signification, as they can not leave the cognitive apparatus of their species behind. Also, meaning for us is always given; even in producing new meaning, we must refer to existing ones (cf. Greimas 1966). The transformation of the protosemiotic to the semiotic adheres to the same principles, governed, however, by the rules of human signification alone. I should also like to agree with Nöth (2001: 14-15), who emphasizes that the acknowledgement of semiosic processes beyond the confines of culture goes along with the rediscovery of Peirce's concept of semiosis, a concept large enough to cover for much more than cultural signification.

6 Taking this argument literally, it follows that God was wrong when he asked Adam to give everything its proper name. He should rather have said that Adam was to give every item on earth its most appropriate name according to Adam's subjective view of the universe, so to conceptualize the world by human terms.

From these preliminary thoughts it becomes clear that in discussing hybridity, the material form of items must not be the focus of investigation. Indeed, matter and concept together form a hybrid artefact. Hence, a stone in the field neglected by any passers-by is not a culturally hybrid item. Nevertheless, it has its proper place in the sign systems of minerals. It evinces form, radiation, and constituents which terminate its place in the cosmic evolution. However, as soon as somebody picks up the stone for *any* purpose, the stone is immersed in human culture. Its pure "naturalness", if you allow for such a term, is ultimately lost. Its color may now be regarded as beautiful, its mineral contents as valuable. Its form may appear useful as a wedge or a doorstop or its heaviness as a weight. In this way, any item, material, or appearance in the universe may become "culturalized".

The most prominent hybrid artefact in this sense is the human body itself. Hybridization of the body is usually conceived of as being directed towards the appearance or composition of the body. Hybridization in these terms means taking on material to the body in order to intensify its beauty, to give it shelter, or to replace lost organs or limbs, i.e., replace them by prostheses, in order to maintain the functionality of the human body. All of these meanings of hybrid bodies are true, of course. Nevertheless, hybridization of the body also involves the amalgamation of material and concept. The application of paint to the face does not produce beauty or significance automatically. The colors, powders, and fragrances used for this purpose are culturally coded, as is the way the make-up is applied to eyelids, cheeks, or lips. In this example, we find hybridity in the *appearance* of the body.

As soon as it comes to more complicated examples such as *sheltering* the body, we find that concept and material are actually gradually moving away from the body into the semiotic sphere

surrounding it. To the body, shelter may well mean clothing – something that indeed changes the appearance and the composition of the body itself – but it can also refer to a cave, or a house. In both cases, something is coded with a bodily function – namely, maintenance of temperature, protection from rain, etc. – but not directly connected with the body. The bricks, beams, and tiles of the house are not a part of the body, neither is the rocky surface of the cave walls. Still, both are *immersed* into the bodily coded culture. The materials have been *reimbodied* in cultural contexts. In other words: beyond their possible semiotic qualities in a hypothetically nonsemiotic nature, rock, wood, and stone are now part of the culturally coded interpretant.[7]

From this semiotic process of immersing nature into culture, two statements follow: First, hybridization of the body only begins with using stones as tools, or animal fur as clothing. Any habit, technology, or other cultural practice results in hybridization of the body and its "umwelt". In modernity, it has reached the level of melting metal from ore and refining plastic material from oil, using sophisticated machines for calculation, firing rockets to the end of destruction, etc. Humans are thus able to produce prostheses for a large variety of uses in the human body. In this variety, both special cases, such as medical applications and everyday usage of materials in fashion or other fields are included. The consequence is the extension of the culture into nature, a result which makes it easier to understand the umwelt, and at the same time reduces it, since the umwelt becomes itself a part of the semiosic process *within* the interpreter.

7 This argument challenges the notion that a difference exists between usage and meaning, the point, however, already has been made by semiotic studies of commodities. Cf. Douglas & Isherwood (1979: 62), Csikszentmihalyi & Rochberg-Halton (1981), or Appadurai (1986).

The second statement follows from the first. If anything used by humans, if everything conceptualized, graded, considered, or calculated becomes part of human culture, there is virtually nothing "purely natural" left in the universe, save for objects or concepts as yet unknown to humankind (and I do not refer here to as yet unseen doors). For any theory depending on a nature-culture divide, this is an ultimate problem. Nature in itself, as long as it is by definition demanded to exist completely unattained by culture, would remain unobservable. This phenomenon may be described as the *ecological paradox*. Peircean semiotics, however, offers a valid solution to this problem, which I will try to sketch. The second statement draws on the fundamental notion of how the universe must be designed. Obviously, the universe is divided into those objects which are culturally coded and those which are not (and rendered unknown). In the process of human semiosis, extensions of the human body have reduced those areas on the planet Earth devoid of cultural coding to a little number, now comprising only the deepest depths of the oceans, several happy species of insects and plants, and the tiniest spaces of the microcosm. Man strives to extend his area of knowledge to include these, too. Nature has thus almost entirely been conquered by culture. This makes it hard to define the confines of "real" nature in the ecological or semiotic discourse. Whatever we speak of when referring to *nature* has long since become part of culture. Animals and plants, ores and minerals have acquired cultural value, indeed any attempt at excluding animals or plants from what is frequently called cultural behavior can only result in paradoxically including, reembodying, immersing these same animals and plants into culture, as necessarily they must be culturally coded – and graded – before being able to serve as counterexamples.

The result of such thoughts is that we need to establish a pansemiotic view in order to understand the effects of cultural signification in the larger semiotic sphere which comprises the cosmos. Pansemiotism has been condemned by more conservative semioticians (cf. Nöth 2001: 15). Pansemiotism has thus almost become an accusation close to an insult.[8] Nöth prefers to use it cautiously with a question mark. He argues that

> to describe Peirce's universal semiotics as a pansemiotic theory is a gross simplification. Semiosis, in the framework of Peirce's theory, presupposes thirdness, but the world does not only consist of phenomena of thirdness, but also of phenomena of firstness and secondness, which are not yet semiotic phenomena, although they may have "quasi-semiotic" characteristics, since Peirce's theory of continuity does not establish a mere dichotomy between semiosis and nonsemiosis, but distinguishes many transitions between genuine and degenerate quasi-semiosis. (Nöth 2001: 15)

I should like to focus on the aspect of continuity here. Indeed Peirce's system of categories signs, and semiosic processes allows for two interpretations, the first of which would suit semioticians who prefer to draw borders between nature and culture, the semiotic and the nonsemiotic, and so forth. This interpretation would locate definitely quasi-semiosic processes below said semiotic thresholds, so to be neglected by semiotics. The second interpretation, which is preferable, should emphasize the aspect of continuity in Peirce's

8 Some semioticians also reject the pansemiotic view for the same reasons Eco introduced his threshold: They require the concept of difference in order to specify semiotics. On the same congress I mentioned above, a colleague argued that "if everything is semiotic, semiotics does not exist", hence falling for the old trap of negative dyads. However, such thinking leads to unwelcome and inappropriate constructivism. For example, we do accept the existence of the universe although we know of nothing that is not the universe. Also, definition along the lines of Peircean thought should result in an additive reasoning, not a negative. Difference in Peirce is only at the root of semiosis, not in its interpretative result.

theory and allow us to neglect the existence of thresholds in the first place. We may thus create a pansemiotic bridge covering the gap between nature and culture, which is the path to an understanding of the transcendence of sign processes in the cosmos.

The semiotically hybrid body

In the process of semiosis, Peirce well defines a process where the semiotic world cannibalizes the non-semiotic world. Semiosis started from utter chaos and will (ultimately but still hypothetically) result in a universe governed by the rule of thirdness. Peirce, however, does not speak of the universe as only consisting of signs if chartered by human thought. According to Peirce, as mentioned above, the entire universe is composed of signs.[9]

A plurality of sign systems, not a monadic system governs the universe and hence human cognition. This is no new insight, but has long been observed in the pragmatist tradition. Note, however, that "pluralism" does not exclusively focus on concepts such as difference.[10] Rather, plurality is conceived of as a logical concept at the root of any cognition. The minimal form of plurality, namely binarity, is contained in any thought, as Peirce emphasizes. Each meaning is already a form of reaction:

9 Hence, a distinct and fundamental division has to be made between Peircean and Saussurean views of the universe. In the latter's conception, anything not coded by cultural signs remains vague and unchartered – virtually nonexistent. From Peirce's point of view, also forces of nature are in itself semiotic. He devised a complex variety of sign types for any possible phenomenon. Hence, if there was something nonsemiotic, according to Peirce such a thing or concept should not only be beyond our knowing of it, but also beyond any possibility of hypothetical existence.

10 Difference in plurality and hybridity does play a role in structuralist and/or poststructuralist theory, where the essence of sign relations will always depend on the exclusive position of a sign in a system which constitutes itself in difference to other signs in the system.

> We can make no effort where we experience no resistance, no reaction. The sense of effort is a two-sided sense, revealing at once a something within and another something without. There is binarity in the idea of brute force; it is its principal ingredient. For the idea of brute force is little more than that of reaction; and this is pure binarity. Imagine two objects which are not merely thought as two, but of which something is true such that neither could be removed without destroying the fact supposed true of the other. Take, for example, a husband and wife. Here there is nothing but a real twoness; but it constitutes a reaction, in the sense that the husband makes the wife a wife in fact (not merely in some comparing thought); while the wife makes the husband a husband. (CP 2.84)

The result of binarity, namely the relation between elements, naturally belongs to the category of secondness. It connects the phenomena of firstness (mere feelings yet bearing no true meaning), as without secondness nothing can be experienced: "The world would be reduced to a quality of unanalyzed feeling. There would be an utter absence of binarity. I cannot call it unity; for even unity supposes plurality. I may call its form firstness, orience, or originality" (CP 2.85).

Such plurality, inherent to signs, results from the process of semiosis, the principally endless chain of experiences leading to ever new signs which will again be incorporated into the process. Experience requires continuity, and continuity is a projection on the past; experience is "esse in praeterito" (CP 2.84). As experience – as a result of semiosis – is found in the interpretant, or the effect of the sign, plurality is an important criterion of thirdness: "The general idea of plurality is involved in the fundamental concept of thirdness, a concept without which there can be no suggestion of such a thing as logic, or such a character as truth" (CP 4.332). Hence, plurality means multitude in signs and thus in the cognizable world ("variety of nature", cf. CP 1.160; 8.307). The universe in itself *is* plural, its

singular appearances are our own constructs. They do not lie in the nature of the universe itself:

> In the little bit that you or I can make out of this huge demonstration [of the universe], our perceptual judgments are the premisses for us and these perceptual judgments have icons as their predicates, in which icons qualities are immediately presented. But what is first for us is not first in nature. The premisses of nature's own process are all the independent uncaused elements of facts that go to make up the variety of nature. (CP 5.119)

In the words of this paper: experience is essentially hybrid. The "internal" and the "external" flow together in the signs; representamens of manifold kind, be they acoustic, pictorial, tactile, olfactory, etc., together form new interpretants.

If this plurality, and hence hybridity, is active in all the universe, the human body is an object of hybridity, and the human mind is an agent of hybridization. There cannot be a body without a mind, or a body without an environment. The borders between those are drawn for reasons of argument, and proper research, but in our understanding of the universe they should be neglected.

Résumé: The ecological paradox

I have seemingly arrived at a dead end: if everything is nature, and everything at the same time is culture, then where is the point of making a difference between the two in the first place? I should like to point out here that it is not the purpose of this paper to avoid terminological differences. The study of writing, of sports, and of architecture is different from the study of whales, of flowers, or of the planets. The former object of study may clearly be attributed to culture, the latter to nature.

Still, we have come to think of whales as something "valuable", "precious". We have come to think of planets as something "worth to study", and flowers may represent "love", as the rose does, or mourning, or a thousand other sentiments. Anything can become a sign; any "natural" thing may become "culturalized". The natural resources may dwindle in substance, but they have long ceased to exist as a sign resource in themselves: they have become included in human culture.

The only true paradox is hence human beings engaging in a discourse on nature. As soon as nature becomes a topic of discourse, it is not nature any more, but a part of culture. This fact has been ignored by Lotman and others because they do not acknowledge the sign value of things *beyond* human signification. But the tree is worth while as a tree, as the growing thing which does not even bear a name. In Peircean terms: there is a natural thirdness of nature which enters our perception only by way of cultural firstness. Cultural thirdness then is the alienation of these sign values. The tree as the oak, birch, etc. in our biological sign systems has nothing to do whatsoever with that "tree" which is natural in itself.

This is what I would like to call the ecological paradox. Even while discussing measures of protecting nature, we are diminishing nature. We cannot escape this paradox. The nature of human signification dictates that semiosis results in symbols or thirdness. However, by acknowledging this process, and possibly deconstructing it, we may be able to go beyond the nature of our culture and see that there is a different, alien, but quite real culture of nature. Both form the unity of the universe and nurture each other. Let us appreciate this holistic perspective, to which semiotics opens a door.

References

Appadurai, Arjun (ed.). 1986. The Social Life of Things. Cambridge: University Press.

Augustine, Aurelius. (397) 1952. On Christian doctrine. In St. Augustine, Confessions [...]. Chicago: Encyclopedia Britannica, 619-698.

Csikszentmihalyi, Mihaly & Eugene Rochberg–Halton. 1981. The Meaning of Things: Domestic Symbols and the Self. Cambridge: University Press.

Douglas, Mary & Baron Isherwood. 1982. The World of Goods. New York: Norton.

Eco, Umberto. 1976. A Theory of Semiotics. Bloomington: Indiana University Press.

Greimas, Julien A. 1966. Sémantique structurale. Paris: Larousse.

Greimas, Julien A. 1987. On Meaning. Selected Writings in Semiotic Theory. London: Frances Pinter.

Lotman, Juri M. 1981. Kunst als Sprache: Untersuchungen zum Zeichencharakter von Literatur und Kunst. Leipzig: Reclam.

Lotman, Juri M. 1990. Universe of Mind: A Semiotic Theory of Culture. Bloomington: Indiana University Press.

Martinelli, Dario. 2002. How Musical is a Whale? Towards a Theory of Zooemusicology. [Approaches to Musical Semiotics 3]. Helsinki: International Semiotics Institute at Imatra.

Nöth, Winfried. 1990. Handbook of Semiotics. Bloomington: Indiana University Press.

Nöth, Winfried. 2000. Handbuch der Semiotik. Stuttgart: Metzler.

Nöth, Winfried. 2001. Protosemiotics and physicosemiotics. In Winfried Nöth & Kalevi Kull (eds.). The Semiotics of Nature [Special Issue: Sign System Studies 29.1]. Tartu: University Press & Kassel: University Press, 13-26.

Nöth, Winfried & Kalevi Kull (eds.). 2001. The Semiotics of Nature. [Special Issue: Sign System Studies 29.1]. Tartu: University Press & Kassel: University Press.

Peirce, Charles S. 1931-58. Collected Papers, vols. 1-6, ed. Charles Hartshorne & Paul Weiss, vols, 7-8, ed. Arthur W. Burks. Cambridge, Mass.: Harvard University Press.

Saussure, Ferdinand de. 1986. Cours de linguistique général, eds. Charles Bally & Albert Sechehaye. Paris: Payot.

II Aesthetic Embodiments

Embodiment – From page to stage. The dramatic figure

Erika Fischer-Lichte

Prior to the 18th century, neither the relationship between the literary text of a drama and its performance on stage nor the process "from page to stage" provoked any serious theoretical debate. It was probably Diderot and Lessing who first dedicated some thought to the issue. Both proceeded from the insight that written drama and the enactment of it use different kinds of sign systems: verbal poetic signs as well as gestural sings of acting. Thus, the question arose as to which conditions are needed to translate the verbal signs of the written text into the gestural signs of the actor's acting. In order to deal with this question properly, the first undertaking was to clarify which kind of objects are best depicted or represented by which sign system and where the specificity of each sign system lies.

Diderot on words and gestures

In his *Letter on the Deaf and Mute* (1751) Diderot compares verbal and gestural signs empirically, i.e., in concrete communicative situations. He comes to the conclusion that actions can be represented equally well through words and gestures. Diderot demonstrates this by referring to the example of a man born deaf and mute who acts as his host: "He wanted to tell his servant to pour me some wine. First he gestured to the servant. Then he looked at me, and, with his right arm and right hand imitated the movements of someone pouring wine" (Diderot 1968: 39). Such gestures are no less capable of conveying an order to the servant or of signifying the concrete action to be performed than the corresponding sentence in verbal language. That is to say that both the speech act and its proposition can be equally well expressed by gestural and linguistic signs.

Diderot came to a similar conclusion as to all utterances referring to concrete objects and ideas which can be represented by a metaphorical name. Thus, the mute adequately expresses his opinion

that Diderot has lost the game of chess by closing his eyes, lowering his head and his arms. On the basis of such "experiments" with the deaf and the mute, Diderot concluded that large sections of speech – namely all those which refer to the objects listed above – can be translated into gestural signs without any great difficulty. Moreover, gestural language has the advantage of being more easily understood than word language because it is without "arbitrary signs" and its syntax is "suggested by nature herself" (Diderot 1968: 33). These findings can be applied to the process "from page to stage"; what is expressed in the speech of the characters may, to a large extent, be equally well expressed by gestural signs.

In order to test whether the gestural signs on stage correspond "correctly", Diderot (1968: 38) held his hands over his ears during the performance

> whenever the plot and the performer's acting seemed to tally with the words I could remember. I only listened when the gestures confused me or seemed to confuse me [...]. I would like to tell you [...] of the utter amazement of those around me when they saw me weep tears through the tragic parts, although I still held my hands over my ears.

Hence it follows that the characters' speech can, in principle, be translated into a language of gestures. To use Peirce's modern terminology: the gestural representamen is able to produce an interpretant as its linguistic equivalent. Therefore, the actor must be in a position to find/invent exactly those "movements and gestures" which will be able to represent and express the objects depicted by the linguistic signs. That is, the gestural language on stage repeats the utterances expressed by the words. Moreover, it does so in a more direct way which is more easily understood, particularly by those who do not have complete command of the verbal language.

While gestures are as capable as words of representing actions, concrete objects, and certain ideas related to actions and objects, they are thoroughly inefficient when it comes to the depiction of abstract terms. These can only be represented by verbal signs. On the other hand, gestural signs surpass verbal signs in the case of "sublime gestures". What they express can only be adequately represented by these gestures; despite "the greatest eloquence", they can only partially and in an incomplete way be translated into verbal signs:

> Such are the gestures of Lady Macbeth in Shakespeare's tragedy. Lady Macbeth sleepwalks across the stage to the front with her eyes closed (Act 5, Scene 1) and imitates the action of someone washing her hands, as if her hands were still stained from the blood of her king whom she had murdered over twenty years before. I know of no language as gripping as the silence of this woman and the movements of her hands. What an image of remorse! (Diderot 1968: 34)

That is to say, extraordinary emotions and extreme mental states can be expressed more perfectly by gestural than by verbal signs.

Diderot's insights would seem to suggest that a drama should preferably select actions and extraordinary emotions as objects for depiction so that the verbal signs it uses can be translated into the gestural signs of acting.

The actor as phenomenal and as semiotic body

His theoretical deliberations in *Laokoon* (1766/67) lead Lessing to a similar conclusion. Since the signs of the art of acting not only extend in space, but also follow each other in a temporal sequence, Lessing assumes that they are capable of evoking the "true sensory impressions" of two kinds of objects: those which exist in simultaneity – as in painting – and those which follow each other

sequentially – as in poetry; both can imitate body and action alike. Since they are related to both kinds of objects at the same time, the signs of acting can depict bodies which move and change position as well as the actions carried out by certain bodies. The signs of acting always portray humans in action.

By drawing on the speech of the "dramatis personae", Diderot and Lessing attempted to establish a repertoire of verbal signs in drama for which the signs of the art of acting could offer equivalents to the end of establishing equivalent interpretants. Since verbal and gestural signs can only create identical interpretants when referring to certain types of objects, Diderot and Lessing concluded that the speech of the "dramatis personae" must focus on precisely such objects. Thus, Diderot and Lessing inevitably arrived at a normative poetics of drama.

It is not only the recourse to a normative poetics which makes Diderot's and Lessing's apparently quite plausible solution to the problem unacceptable to us, but also the fact that their solution entails and presupposes two concepts which are no longer valid today; one concerns meaning, the other, the actor's body.

Meaning, according to Diderot and Lessing, was conceived of as a fixed and stable entity which can be conveyed by different sign systems such as verbal and gestural signs without undergoing any change. Meaning is neither affected by the particular materiality of the sign system used nor by the different sign combinations. Meaning remains always the same. Since we believe today that meaning emerges with the materiality of the sign system employed, the way in which signs are combined, their context, the situation, etc., Diderot's argument is no longer convincing.

On the other hand, Diderot and Lessing conceived of the actor's body as a completely semiotic body. The actor has to take care to purge his body of everything which could remind the spectator of

his organic body, of his bodily being-in-the-world. In *Mimik* (1785/6), Johann Jakob Engel criticizes the actor for using the body in a way which does not allow the spectator to perceive it as a sign of the character being played and, accordingly, each gesture as a sign of the emotional or mental state of the character. Instead, he directs his attention to the phenomenal body of the actor, his particular corporeality.

> I do not know what evil devil possesses our actors, particularly those of the female sex, that they seek the greatest art in falling, or should I say collapsing? One sees Ariadne, when she discovers her tragic fate from the God of the Cliffs, fall flat the full length of her body, faster than if she had been hit by lightning and with such force that it seems she might shatter her skull to pieces. If, after such unnatural, perverse acting, a loud applause should follow, then it is only from the hands of ignorant people who do not know how to interpret the real interest of the play, who buy their tickets for the sake of gawping and who would rather have gone to a traveling booth or bull-fight. As for a regular theatre-goer, if he applauds, he probably does so out of pitiful cheer that the poor creature who might be a decent girl, even if she may be a poor actress, has survived without great injury. The art of breaking one's neck ... belongs to the circus tent where the interest is focused on the real person and his physical agility, and it grows the more one sees the daredevil in danger. (Engel 1804: 59-60)

In the theatre, however, the spectator is inclined to perceive only the character, to feel sympathy with the character alone. If his attention is attracted to the actor's body as a phenomenal body, a specific bodily being-in-the-world and not as a sign of the emotional or mental state of the character, he begins to feel sympathy for the actor or actress. This "inevitably tears him out of the illusion" (Engel 1804: 58). He feels forced to abandon the fictitious world of the play and enter the world of real corporeality.

Thus, according to Diderot, Riccoboni, Lessing, Engel and many other theoreticians of the theatre of the 18th century, the actor must completely transform his organic, sensuous body into a semiotic body. For it is only under this condition that his body can serve as one of many material signs for the meanings created in the verbal signs of the dramatic text. It was assumed that the meanings which a playwright expressed in the text would find another perceptible sign-body in the actor's body in which everything that did not serve the mediation of the meanings, everything that could affect, falsify, sully, contaminate them, was deleted and annulled. The actor's body was to be purged of everything that might hint at his sensuous organic body, so that a purely semiotic body was created. This is because only a purely semiotic body will be capable of presenting the meanings manifested in the text to the spectators' eyes. In other words, the actor has to de-corporealize his body in order to transform it into a text composed of gestural signs.

The actor's performance according to Georg Simmel

Today, nobody adheres to such concepts anymore; nobody would seriously voice the opinion that the "correct" meanings of a dramatic text can be found as long as it is read thoroughly and with sufficient knowledge or that these can be translated into the gestural signs of acting without undergoing any change. Nonetheless, the relationship between the literary text of the drama and its performance on stage is still being discussed in terms of adequacy, equivalence, even correctness. This is all the more surprising since current theories of meaning, of sign systems, and of the human body do not seem to permit such discussion. It has been challenged constantly since the last turn of the century.

In his pioneering study, *On the Philosophy of the Actor* (1908), Georg Simmel undertook to explain why the actor's performance on stage cannot be understood and described as a mediation of the meanings conveyed by the verbal signs of the text via another medium, namely the actor's de-corporealized semiotic body. First, Simmel (1968: 75f.) refers to the fundamental differences between meanings conveyed by language and by the body:

> The stage character based on the script as a figure in the drama is not a complete person, as it were, not a human being in the tangible sense – but rather that particular composite of elements of a person which literature can grasp. Neither the voices nor the tone, not the *ritardando* nor the *accelerando* of speech, not the gestures nor the special ambience of the warm living figure can be sketched out by the writer in advance, indeed, he cannot even give really clear premises for them. Rather, he has shifted the fate, appearance and soul of this figure into the one-dimensional unfolding of the merely intellectual. Viewed as literature, drama is a self-sufficient whole; with regard to the totality of the action, it remains a symbol, from which the totality cannot be logically derived.

In *Letter on the Deaf and the Mute*, Diderot tried to prove that all utterances referring to actions, concrete objects, and to those ideas that can be named metaphorically, can be equally well expressed by verbal and gestural signs so that it is, in principle, possible to translate verbal signs into gestural ones. Simmel, however, points to fundamental differences between language and the body. It is this difference which makes it, if not impossible, at least arguable and highly problematic to translate linguistic signs into gestural ones. For this reason, Simmel (1908: 78) criticizes the notion that

> the ideal way of playing a character is unequivocally and necessarily given with the description of that character. As if the pages of *Hamlet* could yield the complete sensuous theatrical form for one who is able to see sharply enough and construct things logically

> enough. The same notion suggests that there is only one "correct" depiction of each role by the actor, a depiction which the actor empirically approximates for better or worse. This is disproved by the simple fact that three great actors will play the part in three completely different ways, each having the same value as the other two, and none of which is more "correct" than the others. It is, in other words, not possible to play Hamlet simply by relying on the lines of the part, for such an approach would legitimate the conception by Moissi just as it would that by Kainz or Salvini[1].

Simmel discusses the different "conceptions" of the parts by Moissi, Kainz, and Salvini, i. e., different results of a hermeneutic process which all three have performed while reading the text. However, taking into consideration his ideas concerning the difference between language and the body, the different Hamlets of the three actors seem to result not only from different "conceptions of the part" but also from different corporealities: "voice", "tone", "gestures", "the special ambience of the warm, living figure". In other words, none of the Hamlets performed by Moissi, Kainz, or Salvini are bodily translations of the part as it is sketched by the verbal signs of the text. Rather, they are different Hamlets. Hamlet, as played by Moissi, cannot be found anywhere but in his performance, just as Salvini's Hamlet only exists in and through his own performance. It is their performative acts which create the character. Moissi's Hamlet cannot be identical to that by Salvini or Kainz nor to the Hamlet of the literary text. For his Hamlet cannot exist beyond or independently of his body. Moissi's body is the existential ground in which his Hamlet is rooted, just as Salvini's Hamlet is inconceivable outside of Salvini's body. The actor's body serves as the existential ground for the creation of a dramatic character on stage. The actor's particular corporeality and his bodily

1 Simmel writes "Salviati", but there is no great actor of that name at his time. So, I suppose, he had in mind Salvini.

presence are the conditions which underlie the possibility that a dramatic character comes into existence on stage. Moissi's Hamlet does not exist as a conception of the role independent of Moissi's particular individual corporeality but only as *embodied* by Moissi.

The concept of embodiment

I am using the term "embodiment" here in the sense recently introduced by cultural anthropology and cognitive studies. Up to the early nineties, cultural anthropology mainly dealt with a body which generates meaning or to which meanings can be attributed, i.e., with the semiotic body. The body was addressed as a text which has to be deciphered, which has to be read whether as "analytic body", "topical body" or "multiple body", as Csordas (1994: 1-24) terms the three leading research paradigms. The phenomenal body, however, the bodily being-in-the-world of human beings, which provides the condition of the possibility of understanding and investigating the body as object, theme, source of symbolizing processes and product of cultural inscriptions etc. is largely ignored. It is taken for granted, as a matter of fact. Csordas introduced the term embodiment in order to bring it back into view and into the scholarly discussion. He defines it as the "existential ground of culture and self" (Csordas 1994: 6). While the metaphor of "culture as text" previously prevailed in cultural anthropology, Csordas confronted it with the concept of embodiment and opposed the concept of representation to that of "lived experience". Taking recourse to Merleau-Ponty's philosophy, mainly to his philosophy of the "flesh" [*chair*] in his later works, Csordas criticizes the definitions of the term "culture" developed by different disciplines of cultural studies because "none have taken seriously the idea that culture is grounded in the human body" (Csordas 1994: 6). This insight appears to him as the funda-

mental basis on which alone it makes sense to deal with culture and with the body.

What is at stake here is granting the body a similarly paradigmatic position as the text instead of subsuming it under the paradigm of the text. This is the function and purpose of the concept of embodiment. It opens up a new methodological field in which the phenomenal body, the bodily being in the world, is to be regarded as the condition underlying the possibility of each and every cultural activity. Accordingly, the concept of embodiment – which is still to be elaborated – is meant to serve as a kind of methodological corrective authority challenging the claims and explanatory values of concepts such as "text" and "representation". This also holds true with reference to the cognitive sciences, which no longer only consider neurophysiological data but also the body as a whole. Important research directions such as enactivism (cf. Varela et al. 1996) and experientialism (cf. Johnson & Lakoff 1980 and 1999; Johnson 1992; Lakoff 1987) proceed from the insight that cognition is to be understood and examined as embodied activity, that the mind is always embodied. The term "embodiment" is not used here in the sense of something that clothes a mind with a body, gives concrete form to ideas, or is an expression of ideas etc. Such usages seem to presuppose two different kinds of worlds: the mental world of ideas vs. the physical world of bodies. By contrast, embodiment means the very process of bringing these two worlds together. The term as it is used here is based on the assumption that there are no two such worlds and that whatever cultural activity or product we have – whether it is a mind or an idea – cannot be conceived of as being independent of the body. It is always embodied.

Conclusions regarding the dramatic figure

The concept of embodiment, as outlined here, sheds new light on the problem concerning the relationship between the literary text of the drama and its performance on stage, in particular in terms of the relationship between the dramatic figure as expressed by the written linguistic signs of the text and the dramatic figure played by the actor on stage. Let us return to Simmel's deliberations on the three different Hamlets by the three actors Alexander Moissi, Josef Kainz, and Tommaso Salvini. They are not to be regarded as three different embodiments of one and the same Hamlet as laid down by the text, as the theory of the two worlds would suggest. Rather, we are dealing with different Hamlets. For none of the three has any existence outside the body of the actor playing the part. Moissi's Hamlet does not exist in Shakespeare's text but only as embodied by Moissi.

Undoubtedly, this insight is already implied in Simmel's explanations. Nevertheless, it did not become confirmed, propagated, or popularized before the emergence of performance art and the introduction of completely new ways of using the body on stage in the 1960's. Action and performance artists such as Rudolf Schwarzkogler, Chris Burden, Marina Abramović, or Gina Pane deliberately drew the spectators' attention to their individual vulnerable corporeality by wounding and mutilating themselves on stage. Theatre companies such as La La La Human Steps, La Fura dels Baus, Societas Raffaello Sanzio, or directors such as Jan Fabre, Einar Schleef, or Reza Abdoh asked the actors-performers to carry out precisely those dangerous actions which their gestures were meant to signify and thus to expose their bodies to risk and injury; alternatively, skinny, wrinkled bodies, fat, sweating bodies, munching, spitting bodies, or copulating bodies were exhibited on stage. In all such cases the bodies of the actors-performers were not

meant to signify something like a dramatic figure or a body concept, a value, or an attitude, etc. Rather, the spectators were confronted with their particular corporeality, which often triggered in them observable affective responses, such as fright, horror, disgust, feelings of shame, of desire, utterances of aggression, etc.

Such experiences have given evidence that in the case of an actor who plays a part, i.e., someone who uses his body as the material and medium for semiotic processes and thus as a semiotic body, the individual, phenomenal body never disappears into or shadows this semiotic body. Instead, it forms the basis and the condition of the appearance of the semiotic body. The dramatic figure which the actor's body signifies – as semiotic body – does not come into being on stage dissolved from, or independent of, his phenomenal body. It only exists on stage in and through this particular corporeality, as one unique embodiment. When we say an actor embodies Hamlet then we mean that the actor's bodily being-in-the-world, his individual corporeality with all its peculiarities, his phenomenal body, can be regarded as the condition underlying the possibility that the dramatic figure Hamlet comes into existence by Hamlet's appearance on stage. Independently of this body, Hamlet does not exist.

It is our way of speaking that misleads. We use the same name – for instance "Hamlet" – when referring to a dramatic figure constituted by the written linguistic signs of the text, to the figure which the reader forms in his imagination while reading the text, to the figures created by different actors, playing the part, and to the figure which the spectators create while perceiving and interpreting their play. This suggests, in a way, that the theory of the two worlds is valid: First, the figure is in the text, where the reader can find it as a fictitious figure, and this fictitious figure can be given a body by different actors and thus always appear on stage as the same thing,

albeit in different bodies. They may, it is true, show a certain family resemblance, in Wittgenstein's words. Nevertheless, contrary to the suggestive power of our way of saying, we have to insist that the actor's actual body does not only serve as medium and sign of the figure constituted by the written text. The dramatic figure which appears on stage as unique cannot be conceived of, nor perceived, without the actor's very particular bodily being-in-the-world. Beyond his or her individual phenomenal body which this being-in-the-world does not extinguish nor make disappear, the dramatic figure does not have any existence.

Thus, the question arises as to whether it still makes any sense to examine and discuss the process "from page to stage" as a process of intersemiotic translation in terms of adequacy and equivalence. This is questionable even if we consider very carefully all the hermeneutic problems involved and everything which semioticians from Peirce to Lotman and Eco have found out about the differences between the various sign systems, their particular materiality, the possible combinations, the contexts, the situations, etc. It would only make sense if we were capable of dividing up the actor's body and separating his semiotic body from his phenomenal body, so that we could accord the dramatic figure to the semiotic body alone. But this is, as we all know, not possible. There is no semiotic body without the phenomenal body, the latter being the existential ground and basis for the former. The dramatic figure always appears on stage as *embodied*, and this means, tied to, and grounded in, the actor's phenomenal body, his bodily being-in-the-world.

We should give up such an approach and look for another, more promising one. If we proceed from the performance – instead of from the written text – we can easily agree on one of the conditions for its coming into being: there must be a space, there must be

actors and – in our case – there must be a text. These three components form the basic materials of any performance in dramatic theatre. In other words, there is no such process as "from page to stage"; rather we have a process in which something completely new is created out of three different kinds of basic material – space, the actors' bodies, and the dramatic text – that is, a performance which cannot be reduced to one of the basic materials but comes into being as the result of a working process in which just one of the three basic materials vanishes: the written text of the drama. What the spectators perceive are bodies moving in and through the space, speaking, sighing, sobbing, crying, laughing, roaring, singing, humming, etc., exposing their particular corporeality to their gaze. In perceiving such a particular corporeality, the spectators watch a dramatic figure on stage, and this figure only exists in the embodiment of a particular actor.

Thus, it is the concept of embodiment which seriously challenges our ideas on the relationship between the written text of the drama and its performance on stage. We have yet to discover whether it will also help and enable us to elaborate a new theory on this relationship which might prove more promising.

References

Csordas, Thomas J. 1994. Introduction: The body as representation and being in the world. In Thomas J. Csordas (ed.). Embodiment and Experience. The Existential Ground of Culture and Self. Cambridge: University Press, 1-24.

Diderot, Denis. 1968. Brief über die Taubstummen. In D. Diderot. Ästhetische Schriften. vol. 1, ed. Friedrich Bassenge. Frankfurt a. Main: Europäische Verlagsanstalt, 27-97.

Engel, Johann J. 1804. Ideen zu einer Mimik. In J. J. Engel. Schriften. vol. 7. Berlin: Mylius.

Johnson, Mark. 1992. The Body in the Mind. The Bodily Basis of Meaning, Imagination, and Reason. Chicago: University Press.

Johnson, Mark & George Lakoff. 1980. Metaphors We Live By. Chicago: University Press.

Johnson, Mark & George Lakoff. 1999. Philosophy in the Flesh. The Embodied Mind and its Challenges to Western Thought. New York: Basic Books.

Lakoff, George. 1987. Women, Fire and Dangerous Things – What Categories Reveal about the Mind. Chicago: University Press.

Simmel, Georg. 1968. Zur Philosophie des Schauspielers. In Georg Simmel. Das individuelle Gesetz. Philosophische Exkurse, ed. Michael Landmann. Frankfurt a. Main: Suhrkamp, 75-95.

Varela, Francisco et al. (eds). 1996. The Embodied Mind. Cognitive Science and Human Experience. Cambridge, Mass.: MIT Press.

The representation of the true artificial body

Marga van Mechelen

Why did the artists and filmmakers show all those more or less documentary films and videos on an art exhibition like the *Documenta* in Kassel, Germany? Why here and not on television, in movie theaters etc.? According to the makers of these films – they consider themselves not always artists – it is because the art context offers them still the best free area, a refuge with less rules and restraints compared to other fields of culture. An old idea that seemingly still holds. The art space is still that protected area where transgressions mostly harmlessly are taking place, where autonomy reigns, where artists are able to show their fantasies and extremities, where transgressions of every kind are taking place. Presenting documentary films on this most important art event worldwide has to be considered as a sign, a sign of the interest amongst curator and artists in daily life. Art has been returning to real as Hal Foster put it (Foster 1996). Differently though compared to what was shown in Kassel in 2002.

A good and at the same time exceptional example of an exhibition that both was concerned with the real and with fantasies and speculations, was the exhibition *Post Human* that traveled through Europe and the Near East in 1992 and 1993 (Figure 1). The curator was the American Jeffrey Deitch, also an art collector gallery owner. His idea was to show works that represent implicitly or explicitly the biological era we are entering. That is to say: the fantasies and speculations of artists about our near future. They gave us either an optimistic picture of a world without diseases, post-sexual, immortal, a society that lives in peace and harmony, or just the opposite: a black, anti-utopian image of mankind. Some works prefigured to a certain extent the already quite famous and controversial ideas of Michel Houellebecq. His *Elementary parts* of 1998 ends as science fiction and is radically optimistic in the sense that a new, nonindividualistic human species is born thanks to genetic manipulation. In

Figure 1. Cover of the exhibition catalogue Post Human in 1992.

the future men will become lord and master about nature, hereby announcing in a visionary manner the end of the liberal western society.

It is not the first time that we hear words like these, and of course, just as in the past, not everyone will agree with the opinion Houellebecq is displaying in his book. Religious groupings in general oppose strongly to this belief for well known reasons: whoever thinks he is able to challenge nature that is created by God, will fall. Others object to his idea because they are afraid of uncontrolled, unpredictable, and risky developments and because of that ask for state control. They are convinced that human beings never can be lord and master over their own means and achievements. People like Fukuyama and me, who refer to Houellebecq's latest book *Our Posthuman Future*, state that we live in a posthuman phase of history that is a threat to liberal values, democracy, and politics as a whole. We gape at a moral abyss. Fukuyama thinks that the developments in biotechnology are to blame for that. However, Fukuyama knows the attraction it exerts over people. We only have to mention the immense success of drugs such as Prozac and

Ritalin, which have a remarkable influence on human behavior. Neither does Fukuyama avoid the contaminated subject of eugenics. Contrary to Houellebecq, Fukuyama fears the loss of our humanity, our human values, whatever that may be. And this is also Habermas's concern in his book of the year 2001 *Die Zukunft der menschlichen Natur. Auf dem Weg zu einer liberalen Eugenetik?* Habermas obviously wants to protect the moral and political identity of the human being against the risks of the adventure of eugenics. When we compare his theses of 2001 with those published in former books, we may conclude that the differences between Habermas and Peter Sloterdijk are not so great as they used to be. Both might even need each other as allies against those pragmatic scientists who believe they can handle the problems themselves without philosophers looking over their shoulders. But what position do artists take? Which picture of the future do they present?

Deitch's biological era

On the occasion of the exhibition *Post Human*, held in Hamburg in 1993, Jeffrey Deitch spoke these prophetic words: "We stand at the eve of a completely new era, an era in which radical developments in the biological sciences will take place" (*Post Human* 1993).[1] Although I think that we were already in that new era in the early nineties, important and radical developments were still to come. Only five years ago a new milestone was reached when scientists announced that the atlas of the human being has finally been mapped. Meanwhile we have become used to all the possibilities of genetic and pharmaceutical manipulation. As I mentioned above, Deitch

1 Post Human. Prima Vista Special (directors: Ysbrand van Veelen and Rob Schröder) VPRO television 1993. All quotations are from this television program.

called this new era "the biological era" (*Post Human* 1993). His exhibition *Post Human* intended to show works that would perhaps symbolize the biological era, that is to say, our time or the near future.

In art history, there are works that represent their own era in an excellent and outstanding way. For example, Hans Holbein portrayed in the figure of Erasmus the era of humanism in one single painting, Houdon became the painter of the man of the Enlightenment, Gericault that of romanticism, Kokoschka of the psychological man, while Francis Bacon confronted us with the tormented face of the existentialist. So Deitch selected for his exhibition artists who presumably made a work that will forever be associated with the biological era. Would it be Jeff Koons, Deitch's protégé at that time, or Matthew Barney, or Cindy Sherman, or Clegg and Guttman? By the way, Deitch in fact betrayed the humanistic idea that man is capable of making history, which, paradoxically, does not seem to be a posthumanistic idea at all.

The idea of the biological man

The biological man is the man who celebrates the artificial. He is not satisfied with acknowledging that the body owes everything to culture, but takes an active position, using the phantasmatic to demonstrate the possibilities of manipulating the human body and bodily functions. In the eyes of Deitch, Jeff Koons was probably the embodiment of the artificial human being, while Jeff Koons himself points towards Michael Jackson as the perfect example of the artificial biological man (Figure 2). Koons: "Jackson does not want to wait for evolution, for the slow development of a Darwinian process" (*Post Human* 1993). He should exploit all available medical-technical means to create a new image in order to be able to respond "the longings of his audience". Koons obviously emphasizes

Figure 2. Jeff Koons, Michael Jackson and Bubbles (1988).

the "artifice in art"; it is only through the artifice that human beings can create beauty and perfection. "God creates nature, and this nature is so perfect that it is almost artificial" (*Post Human* 1993).

If Michael Jackson is Koons's exemplary posthuman man, others, like Linda Kauffman (1998), think Orlan, the French performance artist to be the best example. She has sacrificed her obsolete body in several of her cosmetic surgeries and thematized this process constantly in her work since the early seventies. Is she a posthuman woman avant la lettre? The idea of the posthuman implies total control over health and appearance. It is based on the idea that appearance as such will be more and more modeled after the images we can find in a certain culture or historical tradition. Orlan's ideal body was compiled from representations of bodily parts originating in the history of art. Nowadays – but this changes every day – the ideal body has the lips or eyes of Claudia Schiffer, the cheeks of Bridney Spears or the bottom of Jennifer Lopez. Drugs are not only used to cure people but to engineer their lives and to prevent or postpone degeneration.

In the 1993 exhibition, Matthew Barney, Cindy Sherman, Taro Chiezo, Yasumasa Morimura, Clegg and Guttmann, Paul McCarthy and others offered us images of the artificial human being. However, the differences amongst these artists are great. Paul McCarthy's installation with a man making love to a tree can hardly be taken seriously as the image or representation of the biological man. He belongs to another era. When we listen to McCarthy talking in a television interview about this installation, we notice a critical undertone that we associate with the political engagement of the seventies, apparently still alive amongst artists of his generation. This critical undertone was directed against the disneyfication of our society, against the loss of individuality, and against isolation and alienation. One of his more recent works, called *Chocolate*

Figure 3. Paul McCarthy, Chocolate Blockhead. In Between (Expo 2000, Hannover).

Blockhead (Figure 3), that he created for the Expo 2000 in Hannover, Germany, is a representation of a fake world dominated by consumerism. For five German marks you could get a phallic nose from Paul McCarthy's Nose Bar, which appears to be a thick, but hollow piece of chocolate. This Nose Bar is in the inside a 29

meters tall chocolate-brown plastic puppet with cartoon-like features and an axe in his nose. Obviously, this was an allusion to one of McCarthy's earlier works, a film with Pinocchio as the leading character. It is not difficult to find out what he is doing. He cheats us the way we are cheated always, the way we wanted to be cheated. The critical irony of McCarthy is totally absent with Koons; neither do we find it with Matthew Barney or Tedo Chieso, a Japanese artist who clearly was one of Deitch's new protégés at that time. Koons and Barney celebrated what I would almost call new-fangled man. Chieso, however, is more commonsensical when he states that the new Otaku man is a man or woman who in the privacy of his or her room spends time with the computer and other machinery as extensions of the body. Despite the differences, most of these diverse forms of posthuman art seem to have one remarkable thing in common. In posthuman art, the idea that the artist is capable of constructing the human body by way of new technologies and a new consumer culture goes together with explicit expressions and representations of primary libidinal drives: oral, anal, or genital. It goes hand in hand with things that bring human beings close to animals and nature. In one way or the other, most of these artists make use of the natural drives, of the sexually loaded mechanical, the ugly, the abject, and the uncanny, and of the bizarre qualities of the applied materials and representations.[2] What we see is that the traditional opposition of artificiality and naturalness is denied or even disclaimed. This opposition is not only valid in daily life but important with regard to the history of art, in particular modernist art.

2 For my former articles on abject art cf. Mechelen (1999a); Mechelen (1999b); Mechelen (2000) and cf. Mechelen, Marga. 1999. Arte abyecto. In Relaciones. Montevideo: Setiembre de 1999, 5-6.

Artificiality in modernism and posthuman art

In the tradition of modernism, the term "artificiality" has acquired an unfavorable connotation which has affected everyday usage. Originally, "artificial" meant "to be in accordance with art" or "obtained by art", and therefore artificiality was "on the side of art" and culture, as Koons would have it today (*Post Human* 1993). In modernism as well as in the performance art of the seventies, artificiality became something morally wrong. The artificial could be described in the same terms as Greenberg defined "kitsch". Let's quote from Greenberg's influential essay "Avant-garde and kitsch" and replace the word "kitsch" by "the artificial": "*The artificial* uses the academicized simulacra of genuine culture, it welcomes and cultivates this insensibility. [...] *The artificial* is mechanical and operates by formulas. [...] *The artificial* is faked, it is the epitome of all that is spurious in the life of our times".[3]

Koons re-valuation of the artificial should be understood, not only as a mockery of paternal modernism but also as an agreement with the way contemporary science considers the artificial. In science the possibility of replacing human organs by artificial ones is one of its highest achievements. Of course, one only replaces natural organs when this is really necessary, not only because of the costs of a surgery, but also because one is never sure that the artificial organ will function as well as the original. The artificial organ is always only second best. Nevertheless, the word as such does not have such pejorative meaning it has elsewhere. Koons's approach differs indeed from that of modernism. He takes an extreme position with the result that one can hardly believe him. According to Koons, the artificial is the only trustworthy, truthful, and credible thing. "I trust a little sculpture of a deer more than a photo" (*Post*

3 The "true" quotation can be found in Greenberg (1939).

Human 1993). If we notice the time and context in which this sentence was uttered, we must say: he is right. In the age of digital reproduction, the photo has lost its indexical sign function and consequently its reliability and truthfulness.

Semioticians used to declare that a sign vehicle is an index if it is "really affected" by its referential object. The problem, however, is that in the field of image production we can nowadays seldom be sure anymore about this "real affection".[4] Of course, a little sculpture of a deer is still a sign of a referential object, but nobody is interested in its referential object any more. The connotations are much more important. A little deer is a tender animal that can easily move the viewer to tears. I remember a picture hanging in our dining room, of a little deer with melancholic eyes, tender legs that aroused the feeling of being not strong enough for this angry, dangerous world. It connoted in the first place the emotions related to this kitsch image. The image looked like a hand-printed lithography but was in fact mass produced. This kind of image we can find anywhere. They are the referential objects of Koons's own images. If we look at his work from this point of view, we can state that his images are so to speak applied semiotics. Anyway, I think that his strategy is clear: put at stake what is the least trustworthy, what is so overtly a simulacrum.

The representation of the idea of authenticity

Koons's strategy operates at the same time at which artists are engaged with "a return of the real" as Hal Foster argues in his book about the avant-garde at the end of the 20th century (Foster 1996). The author thinks that this return of the real is the dominant tendency in the art of the nineties. Although Foster recognizes it in

4 Cf. Visio 4.1 (1999) on postphotography.

various art forms, his main evidence is the abject art of the 90s. In "Abject Art" artists make use of or refer to natural drives, to bodily fluids, to the ugly, the abject, and to the uncanny.

This return of the real is quite often a return to the strategies and media applied by performance artists in the seventies. However, more often a secondary *representation* of the idea of authenticity and reality as such is associated with performance art. The real and the authentic are, for example, connotations of the image of a man with sperm along his legs, or a woman with a white stuff, signifying milk that comes out of her nipples, or a dark brown pile that is associated with a turd. In other cases, the art of the nineties is also a representation of the false idea of authenticity or even a mocking of it. An example could be Paul McCarthy's ketchup (one of the materials he used often in his performances) referring to the blood in the performances of the *Wiener Aktionisten* and American mass consumption. In other words, signs are produced in order to lie.

So far I have only discussed examples taken from the visual arts. However, something comparable is going on in contemporary theatre and film. Apparently, theatre performers and film directors nowadays look closely at the way corporeality was presented in performance art, which, in its turn, was influenced by Artaud's theatre of cruelty. We only need to mention David Croonenberg's films as another example of applied semiotics. In theatre, one can think of Castellucci, the Italian playwright, who overtly stresses the reality of corporeality, bringing anorexic girls and women after breast cancer surgery on stage.

Performance art in general has not only inspired new developments in film and theater, it has not only stimulated the theoretical debate about performativity and "presentness" versus presence but it also seems to have everything to do with the wish to be credible, to be authentic, to create a work that is as real as possible, that has

no screen of protection – anything that is not a simulacrum.[5] Performance art is therefore the best example of those who want to deny the screen of protection. It implies a sign production that pretends to be no sign.

In performance art, autobiographical stories were used and are still being used, while at the same time, real time and space were involved and corporeality was stressed. Often the audience was made a witness of the prosecution. The viewers were not allowed to lean back in their upholstered chairs, as they can do in the theater, and say: This is not my responsibility. Not a judge or a legal agency, but the happening itself made them witnesses. This kind of art of the 1960's and 70's was not to be seen at the *Post Human* exhibition, or rather it did not fit into the conception of the exhibition, perhaps also because it was the subject of a concurrent New York exhibition, *Abject Art*, shown at the Whitney Museum of American Art at about the same time. However, both of these divergent tendencies or rather strategies, come together in their preoccupation with the abject, the ugly and the uncanny, especially with those things that are related to bodily fluids and to the openings of the human body or to waste and decay (Figure 4). Basically, this fascination refers to the old opposition between nature and culture, now in the Freudian, Lacanian, or Kristevian guise of an Id, the libidinal drives of human nature versus the subject that has entered the domain of social prohibitions and order. Both tendencies were inherently contradictory. Most artists of the *Abject Art* show were obviously not celebrating the artificial the way Koons did. Rather they showed off with the real, with an authentically real. These images were not meant to be plain simulacra, but in fact they were nothing but simulacra.

5 The idea of art without a screen of protection is Foster's (1996).

Figure 4. A room in the Whitney Museum for American Art (New York), with Kiki Smith, *Tale*, 1992 (front) and Mike Kelley, *More Love Hours Than Ever Can Be Repaid* and *The Wages of Sin*, 1987 (right), and a work by Kara Walker (left).

Jeff Koons, as I suggested, is already the ideal representation of Jeffrey Deitch's *Post Human* Art. He proclaimed the possibility of a true, in the sense of truthful, artificiality. Even in the age of digital reproduction and genetic manipulation, truthfulness seems to be a last value neither Koons nor the artists engaged with the real want to give up.

References

Abject Art. 1993. Repulsion and Desire in American Art. New York: Whitney Museum of American Art.

Deitch, Jeffrey. 1992. Post Human. FAE Musée d'Art Contemporain Pully/Lausanne, Castello di Rivoli Museo d'Arte Contemporanea Rivoli (Torino), Deste Foundation for Contemporary Art Athens, Deichtorhallen Hamburg, The Israel Museum Jerusalem.

Foster, Hal. 1996. The Return of the Real. The Avant-Garde at the End of the Century. Cambridge, London: MIT Press.

Fukuyama, Francis. 2002. Our Posthuman Future: Consequences of the Biotechnology Revolution. New York: Farrar, Straus and Giroux.

Greenberg, Clement. 1939. Avant-garde and kitsch. Partisan Review 4.5: 34-49.

Habermas, Jürgen. 2001. Die Zukunft der menschlichen Natur. Auf dem Weg zu einer liberalen Eugenik? Frankfurt a. Main: Suhrkamp.

Houellebecq, Michel. 1998. Les particules élémentaires. Paris: Flammarion.

Kauffman, Linda S. 1998. Bad Girls and Sick Boys. Fantasies in Contemporary Art and Culture. Berkely: University of California Press.

Kristeva, Julia. 1980. Pouvoirs de l'horreur. Essai sur l'abjection. Paris: Seuil.

Mechelen, Marga. 1999a. Ekelkunst – Diskurs über die Geschlechter. Zeitschrift für Semiotik 21: 363-385.

Mechelen, Marga. 1999b. Excreta in art. In Adrian Gimate Welsh (ed.). La Semiotica Interseccion entre la Naturaleza y la Cultura [Proceedings VIth International Congress of the International Association for Semiotic Studies] Mexico. (CD-Rom)

Mechelen, Marga. 2000. Performing the mundane presence of things. Visio 5.3: 91-105.

Sonesson, Göran. 1999. Post-photography and beyond. From mechanical reproduction to digital production. Visio 4.1: 11-36.

Technological poiésis. A new concept for digital aesthetics

Priscila Arantes

Artistic production is no longer restricted to its traditional domains, such as painting and sculpture. It has constantly expanded to other areas, especially if we consider the most recent artistic productions. The result has been aesthetic hybridism. Already a part of our culture, hybridism has a strong legacy in the so-called postmodern era. Lyotard (1993), Jameson (1997), and Baudrillard (1991), unbelievers of any totality of modernist doctrines, have predicted the death of totalitarian discourse and proposed an allegoric script which would admit the capacity of keeping together both discontinuities and partialities without invalidating, precisely, the differences.

Diana Domingues (2002: 59) defines this artistic practice as follows:

> The denomination of cyberart refers to the use of the cyberspace. Cyberart inserts in the artistic context the use of computerized technologies that result from scientific discoveries in microinformatics and telematics, generating interactive environments that use the expressiveness of cyberspace, space in personal computers or computers that are connected in through a network. Cyberart is one of many denominations for the art which is enabled through the intersection of computerized technologies in the artistic field, thus opening the use of numeric language and its qualities to feed creation and new relations of usufruct from part of the public.

Thinking of cyberart is therefore to step into a highly hybrid field of artistic practice. From the point of view of language, there has been a rupture. In contrast to the standard view of language production, the digital media have the capacity of transforming any type of information – sound, text, image – into a universal language. On the other hand, cyberart includes not only information technology but also numeric technologies themselves, with their confluence with other areas such as telecommunication and biology. It is precisely at this point that a very intricate question arises: how to conceive of such distinct areas within the same theoretical body?

Etymologically, the morpheme *cyber*, used in words such as cyberart and cyberspace, has its origin in the Greek etymon *kybernan*, which means "something that is controlled". The term has been introduced by Norbert Wiener (2001) to develop the theoretical basis of cybernetics in the 1950s.When applied to the word *cyberspace* the term points to the idea that such a space, contrary to the physical space which is a datum existing a priori, independently of those who live in it, presupposes the existence and activation of other spaces in order to exist. It is not by chance that Philippe Quéau (1995) turns to the idea of the Kantian revolution, when he refers to the concept of cyberspace. For Kant, the object is not a datum *a priori* but something that regulates itself through our cognitive faculty. Furthermore, cyberspace is not a pre-existing foundation of the real but a relative datum, a modeled reference commanded by whoever activates it.

The word *cyberspace* appeared for the first time in 1984 in William Gibson's science fiction novel *Neuromancer* (1984). Only in the 1990s did it gain currency with Michael Benedikt's classic book called *Cyberspace*: *First steps* (1991).

With parallels to the architecture of physical space, Marcos Novak develops in this book the idea of the fluidity of cyberspace. To the author, cyberspace has a dematerialized, fluid, and mutant architecture. It is not by chance that he focuses on the user, or rather on interactivity as a fundamental element to understand cyberspace. "Cyberspace", Novak says, "is liquid. Liquid architecture is an architecture whose form is contingent on the interests of the beholder; it is an architecture that opens to welcome me and closes to defend me; it is an architecture without doors and hallways, where the next room is always where I need it to be and what I need it to be" (Novak 1991: 250).

Pierre Lévy (1998: 104) also refers to cyberspace from the same perspective: "Cyberspace designates less to new kinds of support of information than to the original modes of creation, of navigating into knowledge, and to the social relations enabled by them".

Cyberart, interactivity, and poiésis

In fact, thinking of cyberart presupposes thinking of interactivity. However, the term is very controversial. Today, it is used "for the most ridiculous purposes, comprising a very broad semantic field", says Arlindo Machado (1997: 149). It is already a consensus that the term and the discussion about interactivity are not brought to us by computer technology. The participative arts of the 1960s, Lygia Clark's *Bichos*, Hélio Oiticica's gabbles, Donald Judd's installations, as well as the kinetic art of Jesus Soto or Júlio Lê Park have invited the public to dialogue with the work thus destroying the traditional dichotomy between the artist and its spectators. All this does not even take into account the diverse connotations the term may have in a broader sense. McLuhan (1995), in a certain way, already mentioned the participation of the public when he talked about low definition media. The discussion of interactivity becomes even more controversial if we consider it from the perspective of the user since interaction with a work in digital media depends on the possibilities already programmed by part of a programming environment.

It might be interesting to follow Kant's steps and invert the question, not asking what interactivity is but how it acts. As the word itself suggests, interactivity is before all action, an activity put into practice by the user. The users determine what they will see or do, no matter what has already been programmed. It is exactly this power of choice that creates a new field of possibilities opened by

this artistic practice, because it reflects a change in our comprehension of art as a field of possibilities and potentialities that must be updated by the user in real time.

As with cyberspace, which has a malleable structure arising during the time in which the user interacts with it, an interactive piece of art is built and projects itself as the user activates it. He or she is the one who commands an action that unfolds in real time. In this sense, we can say that interactive art is, above all, an art of action in real time, a work in process, which emphasizes transformation, metamorphosis, flow, and a constant process of becoming. According to Pierre Lévy (1999: 154), "the kinds of cyberculture are related to performance, such as dance and theatre".

This idea leads to the notion of Aristotelian *poiésis*, the ancient concept of aesthetics which turns out to be most relevant to cyberart. In his attempt at establishing the foundations of art, Aristotle gives a definition of *poiésis* that does not ask what art imitates but how it imitates nature's creative action and its potential for transformation. *Poiésis* in Greek means "creation", "manufacturing", and "production". It means to originate a creative process that organizes and initiates a new reality. Nature and all living beings are fruits of the poietic act of divine intelligence, of the demiurge who transforms matter from the state of initial chaos and indetermination to the state of reality. It is this poietic act creation that the artist imitates. It is through the action of the artist that marble, for example, may be transformed into a sculpture, and it is within this perspective that the Greek philosopher develops his theory of dramatic action in the *Poetics*.

Within this same perspective, Brenda Laurel, in her book *Computers as Theatre* develops the idea that the man/machine relationship can be considered according to the principles of Aristotelian dramatic action. Like dramatic action, digital production is a

set of possibilities that must be updated by a determined *script*. In the specific case of digital production, this script is not only the result of a determined program or software, but also of the relationship between the user and the machine:

> Whatever the duration or scale, human-computer activities can be seen to formulate a potential in the same way that drama does – as a progression from possibility to probability to necessity. [...] A human-computer activity, unlike a play, may be formulated uniquely every time it is performed. The source of variability is people, through their choices and actions which in turn reflect different goals, styles and capabilities. (Laurel 1993: 71)

In *Life on the Screen: Identity in the Age of the Internet*, Sherry Turkle (1995: 12) also explores the performing nature of cyberspace. Reflecting over the postmodern sensibility from Lacan's, Derrida's, Foucalt's, and Deleuze's points of view, Turkle affirms that cyberspace is a space that makes possible the construction of multiple and flowing identities

> MUD players are MUD authors, the creators as well as consumers of media content. In this, participating in a MUD has much in common with script writing, performance art, street theatre, improvisational theatre – or even commedia dell'arte. But MUDs are something else as well. As players participate, they become authors not only of text but of themselves, constructing new selves through social interaction.

The proximity of the performing artist with the digital media is indeed a most significant feature of digital art. Far from being a finished work of art, digital art is above all a process, a constant metamorphosis, the result of communicative flows that establish themselves among the diverse elements of poetic construction. However, the concept of *poiésis* opens up another perspective of digital aesthetics which draws our attention not only to its aspect of

performance, but also to the relationship between art and nature (art and science) proposed by Aristotle. Art as *poiésis* approaches nature and resembles it. Nature would be a kind of art of divine intelligence, and art the extension of nature in human activity. Eudoro de Sousa, in his introduction to Aristotle's *Poetics*, comments that the Aristotelian theory of dramatic action comes, in a certain way, close to Aristotle's theory of movement, as exposed in his *Physics*.

It is within this perspective that Philippe Quéau is able to establish a parallel between digital art and natural processes. Influenced by Aristotelian metaphysics and philosophical discussions about transformations in ancient Greek thought, the French philosopher develops the idea that movement, metamorphosis, and constant transformations are a defining characteristic of digital art. Far from imitating nature, as traditional artistic practices have done for centuries, digital art would emulate the intrinsic logic of nature and of living systems. Its constant metamorphic and transformation potential, "intermediary art", that is, digital art, "is a living art: it pulses like a plant or a tree", says Quéau (1985: 18).

Technological poiésis: A fundamental concept for the understanding of cyberart

In his *Poetics,* Aristotle discriminates different types of poetry and drama according to the type of action they imitate. Along these lines, *technological poiésis* can be considered as one of the fundamental aesthetic concepts for the understanding of cyberart. What distinguishes one work from another is the kind of action that the user is called to put into movement: an action of collective poiésis, an action in telepresence or telepoiésis, an immersive action or immersive poiésis, and so on.

It is important to remember that the history of art has always been impregnated by the romantic vision of the artist, who considered himself or herself as a sort of genius whose inspiration was almost "divine". With the advent of avant-garde currents in the beginning of the 20th century, this perspective was contested. Suffice it to mention Duchamp's *Fountain* or the surrealists' *cadavre exquis*. However, it seems that is was only with the advent of the interactive arts that this concept became definitely questioned. From this perspective, the concept of *technological poiésis*, as proposed here, is being explored from the interactors' – and not the author's – point of view, since it is only through interaction that the work can be developed.

Jeffrey Shaw's work *The web of life*, is very elucidating for our understanding of some of the questions proposed by cyberart. It is composed of four itinerant installations located at different points of the world and a fixed one located at the ZKM, Karlsruhe. In general, the installation allows users to interact and influence, in real time, the work's performance and its audio-visual architecture. As the user touches a device, the lines on his or her hand are being scanned and transformed into virtual images that become integrated into the work. Since the work is connected through its terminals in a network, these lines connect themselves with other lines (from other users' hands) creating a great collective *work in progress*, a great collective *poiésis*, in constant flow.

We can say that this work creates and reinforces a metalanguage of digital culture. The line of the hand, as its element, attributes identity to the subject. Its fusion in real time with other lines and thus with other subjects is a great metaphor of the idea of the collective subject, which is so much on the agenda in the current debates on digital culture.

However, this activity does not end there. From the title we deduce the artist's intention: *The Web of Life* is also the name of a book by Fritjof Capra on the scientific comprehension of living systems. The objective of this book is to present new perspectives on the nature of life by opening ways for interdisciplinarity in psychological, biological, physical, social, and cultural research. In the latter sense, the work by Jeffrey Shaw can be seen as a great metaphor of living systems. Hence, Shaw's work does not only establish a metalanguage of the web as a communication system, but it also creates the idea of a great living being by strengthening the notion of the web's fluid dimension:

> The projected image, which is computed in real time, has been continuously creating several types of structures and patterns evoking an organic web, such as the neuronal circuits in the human brain [...] the beating of the water in a river, the computer's circuit printed lights, the fine arteries in the human body [...] the visual work is programmed as a self-organizational system using biological metaphor, such as the neuronal growth. (<http: www.web-of-life.de>)

In fact, since the first phase of cybernetics in the 1950's, scholars have been asking themselves whether there is any fundamental difference between human beings and cybernetic machines. Wiener put the question of the nature of living systems in relation to cybernetic machines on the philosophical agenda when he wrote:

> The physical identity of the subject does not consist of the matter it is composed. [...] Such shape can be transmitted and modified. [...] When a cell is divided, or when one of the genes, which contains our body and mind patrimony, splits to prepare the reduced division of a germinating cell, we verify a separation of matter conditioned by the power of reproducing itself that has a living tissue model.

> If it is like that there is no absolute fundamental line for demarcation between the applicable transmission species to send a telegram from one country to another, and the theoretically possible transmission types to living organisms such as human beings. (Breton 1992: 48)

The aesthetics of artificial life

It is surprising that many cyberartists have worked with living systems in this kind of aesthetic interface, with an understanding of living systems not only in the biological sense, but also in the sense of artificial manipulation of the living.

A good example of the aesthetics of artificial life is the Karl Sims's installation *Galápagos,* exhibited between 1977 and 2000 in Tokyo. The artist used genetic programming software to create virtual beings in a computer. In his installation, twelve computers simulated the growth and the behavior of a population of animated abstract forms that could be controlled by the visitors.

Two other artists who have been working with artificial life to explore the interface between art and biology for quite some time are Christa Sommerer and Laurent Mignonneau. *Interactive Plant Growing*, created in 1993, makes this relationship between art and biology evident. The installation deals with the sensitive interaction among five real plants. The spectators, when touching the real plant, control in real time the growth of 3D virtual plants. In *A-volve*, an artificial life work by the artists in Tokyo, we find the projection of virtual creatures in a water recipient. As the user touches the creatures, there is a change in their artificial ecology. Both in Sims's *Galápagos* project and in *A-volve,* the technological possibilities of programming techniques to create forms of behavior similar to those of living systems become evident; the numerical, creative complex environments and virtual organisms develop, reproduce, die and

mate, as in nature, but the processes occur by means of evolutionary computing software.

In *Eighth Day*, Eduardo Kac developed an ecological system that aggregates transgenetic forms of life. Plants, amoebae, or rats were transformed by the insertion of a protein in their genes that emitted a sparkling light when exposed to blue light. Furthermore, the project also included a so-called biobot, a robot containing a colony of transgenetic amoebae which were responsible for its leg movements. Enclosed inside a glass dome, this strange world could be accessed via the internet, and the remote user could get immersed in this ecosystem through the biobot's eyes. The title of the work, *Eighth Day*, gives us a clue of its meaning. Who is the creator of the eighth day after God who created the world in seven days? The eighth day seems to indicate the time when men start to manipulate living beings. This is the era of artificial life and genetically modified organisms, the era when robots and humans can share the same body. The *Eighth Day* then turns out to be a metaphor of a culture that is no longer anthropocentric but has become posthuman.

Vilém Flusser (1998: 87), in his discussion of the influences of biotelematics and biotechnology on artistic production, has raised the following question: "How, after such discovery, can we keep on doing inanimate works (sculptures, paintings, books, music sheets, films, videos, holograms)? Will biotechnology, the art of the living and the living art not finish with all other arts?"

Whether biotechnology will or will not finish with art only the future can tell. However, the possibilities provided by cyberart, in its confluence between computing technologies and biotechnology, have certainly offered a new possibility for the artists to work with living systems. In these hybrid times, art and nature as well as art and science cannot be seen as separate areas anymore. Art is no

longer a metaphor of nature. It becomes nature itself, either by using natural living organisms or by manipulating artificial organisms that emulate nature's creative action, its self-organizational potential, in a kind of *self-action*, self-command, or technological autopoiesis. Here the "artists" assume the role of the demiurge, more properly of Prometheus who steals the divine fire, the matter of wisdom and creation.

References

Aristoteles. 1990. Poética, trad. Eudoro de Sousa. Maia: Imprensa nacional, Casa da Moeda.

Baudrillard, Jean. 1991. Simulacros e simulação. Lisboa: Relógio d água.

Benedikt, Michael. 1991. Cyberspace: First Steps. Cambridge, Mass.: MIT Press.

Breton, Philippe. 1992. A utopia da comunicação. Lisboa: Instituto Piaget.

Capra, Fritjof A. 2000. Teia da vida. São Paulo: Cultrix.

Domingues, Diana. 1997. A arte no século XXI: A humanização das tecnologias. São Paulo: Editora da Unesp.

Domingues, Diana. 2002. Criação e interatividade na ciberarte. São Paulo: Experimento.

Flusser, Vílem. 1998. Ficções filosóficas. São Paulo: EDUSP.

Gibson, William. 1984. Neuromancer. New York: Ace Book.

Hayles, Katherine. 1999. How we Became Posthuman. London, Chicago: University of Chicago Press.

Jameson, Fredric. 1997. Pós-modernismo: A lógica cultural do capitalismo tardio. São Paulo: Ática.

Laurel, Brenda. 1993. Computers as Theatre. New York: Addison & Wesley.

Leão, Lúcia. A teia e as mãos. <http://www.uol.com.br/tropico/novomundo_9_1441_1.shl> (30.03.2005).

Levy, Pierre. 1998. A inteligência coletiva: Por uma antropologia do ciberespaço. São Paulo: Edições Loyola.

Levy, Pierre. 1999. Cibercultura. São Paulo: Editora 34.

Lyotard, Jean-François. 1993. O pós-modernismo. Rio de Janeiro: José Olympio.

Machado, Arlindo. 1997. Hipermídia:o labirinto como metáfora. In Diana Domingues (ed.). A arte no século XXI: A humanização das tecnologias. São Paulo: Fundação Editora da Unesp.

Machado, Arlindo. 2001. O quarto iconoclasmo e outros ensaios hereges. Rio de Janeiro: Rios Ambiciosos.

McLuhan, Marshall. 1995. Os meios de comunicação como extensões do homem. São Paulo: Cultrix.

Novak, Marcos. 1991. Liquid architecture in cyberspace. In Michael Benedikt (ed.). Cyberspace: First Steps. Cambridge, Mass.: MIT Press, 225-255.

Quéau, Philippe. 1995. Lo virtual. Buenos Aires: Ediciones Piados.

Quéau, Philippe. 1989. Metaxu: Théorie de l'árt intermediaire. Paris: Editions du Champ Vallon.

Quéau, Philippe. 1986. De la vie des langages à la synthèse des images. Paris: Editions du Champ Vallon.

Quéau, Philippe. 1985. Metaxu: Théorie de Lárt intermediaire. Paris: Editions du Champ Vallon.

Santaella, Lucia. 2003. Culturas e artes do pós-humano: Da cultura das mídias à cibercultura. São Paulo: Paulus.

Schwarz, Hans-Peter. 1997. Media Art History. München: Prestel [Media Museum ZKM / Center for Art and Media, Karlsruhe].

Turkle, Sherry. 1995. Life on the Screen: Identity in the Age of the Internet. New York: Simon & Schuster.

Web of Life ‹http://www.web-of-life.de/› (30.03.2005).

Wilson, Stephen. 2002. Information Arts: Intersection of Art, Science and Technology. Cambridge, Mass.: MIT Press.

Wiener, Norbert. 2001. Cybernetics in history. In Randall Packer & Ken Jordan (eds.). Multimedia: From Wagner to Virtual Reality. New York: W. W. Norton, 47-54.

III Artistic Cyberbodies

The arts of the biocybernetic body

Lucia Santaella

Impressive advances in the physical and biological sciences as well as in information technology in the last decades have brought many philosophers and social scientists to the consensus that human beings are crossing a border the consequences and implications of which will probably be as epochal as those of the Neolithic revolution. Under the impact of developments such as artificial intelligence, robotics, nanotechnologies, virtual reality, and especially biotechnology, the real nature of humankind is being questioned to the point of receiving the new designation of posthuman, postorganic, postbiological (cf. Pepperell 1995; Haraway 1985, Ascott 1995). These attributes are used to signal the physical, psychical, mental, sensory, perceptive, and cognitive changes that human beings are undergoing. In the debate concerning this important issue, there has been a current insistence on the centrality of the changes in the human body (cf. Gigliotti 1999).

In fact, the growing expansion of the human body by means of various systems of technological extension seems to be just the beginning of a transformation of our body into a hybrid biocybernetic body. The reconstitution of the human body in its technological fusion and biomechanical extensions is creating the new hybrid nature of a cyber, prosthetic organism (cf. Hayles 1999a), which is creating a new form of relationship or electromagnetic continuity between human beings and space through machines (cf. Palumbo 2000: 31). This is the result of our body's increasing ramification in varied technological systems to the limit of its simulation in artificial life and in its replication by means of cloning. That is why I prefer the term *biocybernetic* to *prosthetic* body since the issue involves the problem of biological evolution which includes but goes beyond the mere idea of external and visible modification

of the body, an idea that the adjective "prosthetic" may suggest. By the way, concerning the biocybernetic body I believe that what is still not visible is much more important than what can already be seen.

"Our horizon is characterized by a paradigmatic reversal of perspective, making it essential to overcome the logic of opposition between the organic universe of the body and the mechanical universe of technology, in a new logic of complexity in which the life of the body and forms meet through the machine" (Palumbo ibid.: 5). In sum: at the beginning of the twenty-first century the human nature and the human body have become problematic and the questioning about a new anthropomorphism has been an important issue of the contemporary cultural debate. One of the most challenging tasks of our time is to find out which is the present image and form of the human body. This image is still largely concealed from our eyes, but my hypothesis is that it is being revealed through the sensitiveness of the artists. As far as I can see, a fundamental task that the artists working with new technologies are taking ahead is to create a new sensorial imagination for human consciousness and body in this new era.

Many possibilities of disembodiment, reembodiment, and noncarnal expansions of the mind have been explored by technological artists. In a previous article on the advent of posthumanism, I came to the conclusion that the current mutations in the human body have led to the emergence of at least seven types of biocybernetic bodies: the remodeled body, the prosthetic body, the scrutinized body, the wired body, the simulated body, the digital body, and the molecular body. These are exactly the types of bodies that the artists have been taking as experimental laboratories for their creative labor.

In what follows I will describe the characteristics of these seven types of bodies to select the case of virtual reality as the most radical experience between embodiment and disembodiment, whose ambivalence has raised many controversies. In this context, I propose that Peirce's concepts of immediate and dynamic object can help us to understand, beyond the usual simplified dualisms, the opposition and complementarities between the real and the virtual, the natural and the artificial, the material and its spectres.

Seven types of biocybernetic bodies

The remodeled body

The remodeled body concerns the aesthetic manipulation of the body. It is a body that is built through techniques for physical refinement, such as gymnastics, musculature, body building to the limit of modeling through implantation and plastic surgery aimed at the adaptation of the body to occasional aesthetic patterns. Orlan's well known work *Omnipresence* is a good example of this kind of body. The artist had a series of plastic surgeries turned into performances, the seventh of which was transmitted live via satellite to some art galleries in different parts of the world.

The prosthetic body

The prosthetic body is the hybrid body corrected or expanded by prostheses, that is, artificial constructions to substitute or amplify organic functions. These are fundamental alterations of the body aimed at increasing its internal functions. There is a wide range of possibilities for that. These spread from lenses for the eyes and hearing aids to functional prostheses to substitute parts of the body,

such as teeth prosthesis, artificial bones, to the limit of the substitution of organic functions as in pace makers, artificial organs, and biochips implants.

The prototypical artistic example of this type of body may be found in the worldly famous works of Stelarc. A radical version of the prosthetic body is the experience of Eduardo Kac's *Time Capsule* (1997a). The artist had a microchip implanted in his knee, in a carnal demonstration that the more technology comes near our body, the more it tends to permeate it (cf. Kac 1998; Machado 2001).

The scrutinized body

The scrutinized body is the body under the scrutiny of the machines for medical diagnosis. The most intimate recesses of the body are examined by non-invasive technologies. Under such machines the body is turned inside out and transformed into images. Examples of art that makes use of this technology can be found in *Corps Étranger* (1994), by Mona Hatoum. The artist used endoscopic and coloscopic cameras to explore the outside and penetrate the inside of her body. It can also be found in Diana Domingues's series of works under the name of *TRANS-E: Body and Technologies* where the artist looks for situations in which the body breathes, pulsates and lives in environments where its multisensorial is connected to machines (cf. Domingues 2002: 177).

The wired body

In the wired body we encounter the cyborg interfaced in cyberspace. These are the internauts who move inside cyberspace, while their bodies are hooked to the computer for the input and output of information data. When the bodies are wired they always present some level of immersion, which means that the perceptive system of

the user is submerged to a certain extent. The more a system is able to captivate the user's senses and block the stimuli from the physical world out there, the more this system is considered to be immersive. The most splendid metaphor of the immersive body can be found in the movie *Matrix*.

In this type of body, the wired, plugged in, or hooked up body, the levels of interfaces vary from the most superficial to the most immersive level. Here the body splits into the following five subtypes:

1. *Linking immersion*. The immersion of the body is kept at the level of internet links. The number of works of art exploring this kind of body connection is uncountable and they are labeled as net art. A very good example can be found in Lucia Leão's collaborative work, *Plural Maps*, where the artist uses informational spaces taken from the Web to construct a cartography of São Paulo. This cartography was created by internauts who sent their choices to the artist (cf. <http://lucialeao.pro.br/pluralmaps/index.htm>). Another example is Luiza Donati's *Incorpos*, where the artist uses the Web *in directo* images of bodies. These images are collected in a site that proposes ever new combinations of the physical bodies (cf. <http://wawrwt.iar.unicamp.br/Incorpos.htm>).

2. *Immersion through avatars*. Avatars are graphic figures representing inhabitants of the virtual worlds. When the immersion of the body proceeds to the level of such avatars, we are faced with *immersion through avatars*. Cybernauts can select and incorporate avatar bodies to move around in virtual bi or tri-dimensional environments, meet other avatars, or communicate with them. Examples of this kind of bodily interchange can be found in Suzete Venturelli's work, especially in *Kinetic World* (cf. <http://www.arte.unb.br/kw>) or in *Desertesejo* by Gilbertto Prado, which is a multiuser virtual inter-

active environment that permits the simultaneous presence of up to fifty participants (cf. <http://www.itaucultural.org.br/desertesejo>).

3. *Hybrid immersion*. This kind of immersion has been explored intensively in performances, especially in dance performances when the dancer's movements meet interface designs, interactive systems, 3D visualization, immersive data environments, virtual worlds, or other generative system designs. All this can be found, for instance, in the *Interactive Performance Series* of the Dance and Technology program at Ohio State University (cf. <http://www.dance.ohio-state.edu>). In Brazil, the artist Tania Fraga's present work is turned to the creation of cyber-beings and cyber-scenarios to interact with carnal dancers.

Outside the domain of performance art, another example of hybrid immersion appears in the work *Field Recording Studies* by Michael Naimark. This work, which emphasizes the relationship of the cyber-landscapes and the geographical landscapes, was developed in the context of the *Art and Virtual Environments Project* conducted at the *Banff Centre for the Arts* in Banff, Canada, from 1992-1994 (cf. Morse 1996: 203).

4. *Telepresence* is the next step of body immersion. It describes the feeling of being present in a distant physical location. In telepresence applications, virtual reality technologies are connected to a robotic system that is physically present in some distant place. The body of the participant sees, touches, and moves around the distant place due to the links with the robot's receptors (cameras, microphones, touch sensors etc.) and effectors such as the robot's arms. Eduardo Kac (cf. Kac 1997b) was one of the precursors in this kind of art work, when he presented his "Ornitorrinco in Eden" (<http://www.ekac.org/ornitorrincoM.html>) at the Festival of Interactive Art in 1994.

In Brazil, the artist Bia Medeiros directs a research group on "Informatic Bodies" which has been working on Performance Art in Telepresence through the use of internet (cf. <http://corpos.org/telepresence>). Also in Brazil, Diana Domingues has recently created her impressive work Ins(h)nak(r)es. Using robotics, sensors, and telematic communication networks, this work proposes the participant to share the body of a robot/snake that lives in a serpentarium (cf. <http://artecno.ucs.br/insnakes>).

5. Effective *virtual environments* constitute the last step in the typological scale of immersion. In this type of immersion, there is a delicate coordination of sophisticated instruments for the input and output of information. Each output instrument which connects the sensorial order to the external world is planed toward the aim of creating an illusion in the participant's eyes, ears, hands, or his or her whole body. The input instruments monitor the participants' body movements and their responses. Sophisticated software commands the states of illusion, while one or more powerful graphic stations orchestrate the instruments of input and output (cf. Biocca 1997: 205-6). There is a great variation of possible instruments and software for virtual environments from the most rudimentary to the most sophisticated. The most common is the HMD, acronym for *Head Mounted Displays*, and data-gloves. The most sophisticated is the Cave, an acronym for *Computer Aided Virtual Environment*, which places the human body directly inside a computer generated environment. Instead of wearing helmets which limit their mobility, the users are surrounded by a full circle, immersive digital environment (cf. Packer & Jordan 2001: xxix).

Some examples of virtual environment arts can be seen in the results of the *Banff Art and Virtual Environments Project* (cf. Moser et al. 1996, especially the *Artist's Statements*). Among these projects, *Dancing with the Virtual Dervish: Worlds in Progress*, by Marcos

Novac (cf. 1996: 3003-4), is one of the first virtual environment projects to synthesize immersive and interactive digitized new dance in a distributed performance environment that includes a head-display, dataglove, three dimensional sound, and interactive video projections (cf. Sharir 1996: 283).

In Brazil, Daniela Kutschat and Rejane Cantoni have been working on a project entitled *op_era* which aims at creating a real time generated space integrating body, sound, and image. It is a virtual environment composed of a cubic space of projection, four projection screens integrated by a controlling computer, and an interface for the detection of position and orientation. The computer is programmed to control the agency of the various interactors in real time, and a 3D interface will be developed specifically for the application.

The simulated body

The fifth type of biocybernetic body is the *simulated body*. It is a body made of algorithms, of stripes of numbers, hence, a completely disincarnated body. Given the extreme mathematical and physical sophistication of this disincarnation, its existence is still being studied in what Lainier calls *teleimmersion*, when the carnal body is plugged in while a virtual version of this same body is transported to another place (cf. Biocca: 1997: 220). A descendent of teleimmersion is "Reality-made-for-two", where two distant people interact in real time through graphic representations of each other. A simpler variation of the simulated body which does not imply teletransportation can be found in numerical beings whose appearance imitates the appearance of a carnal person. Also simulated are artificial life bodies, but this is a simulation of a different kind, since anything can be simulated from the hormonal system to the remorse of the body.

The digitalized body

This type of body is connected to the Visible Human Project, belonging to the National Library of Medicine, USA. This project refers to the experience of an integral digitalization of two cadavers of a man and a woman, which were donated after death for their transfiguration in digital data. The man's cadaver was sectioned at one millimetre interval and the woman's at one third of a millimetre interval. This resulted in a perfect digital three-dimensional representation of the bodies for purposes of research.

The molecular body

This seventh and last type of body has been at the center of our attention since the deciphering of the basic summary of the human genome whose first results were publicized recently. Through bioengineering and genetic engineering techniques, the manipulations of the genetic material can range from transgenic experiences to human cloning. A brand new trend in art, called bioart, incorporates the field of biotechnology, neurosciences, genetics, and molecular engineering into art. Eduardo Kac's work on transgenic art is one of the pioneers in this kind of art (cf. <http://www.ekac.org/transgenicindex.html>). Among his projects is *Genesis*, which was followed by *GFP Bunny*. The latter consisted in the genetic modification of a rabbit through the application of a luminescent gene. Under a blue light the animal becomes green.

The most recent of Kac's eco- and bioart projects is called *Eighth Day*. It is a transgenic work of art that investigates the new ecology of fluorescent creatures evolving worldwide. The work brings together living transgenic life forms and a biological robot (biobot) in a special environment that is meant to dramatize the fact that a transgenic ecology is already in place in the world.

A very complex project in bioart is also being developed in Brazil by Wagner Garcia under the name of *Cloathing Earth with Mind*.

The semiotic complexities of all these kinds of body are striking, especially when we consider their semiotic potential. It is not by chance that the theoreticians of cyberspace, when faced with the ambiguities of the so called "real" and virtual, call this opposition the representational dilemma of cyberspace. The most intriguing dilemma certainly concerns the body boundaries in the process of embodiment and disembodiment that takes place in the experience of virtual reality. This is the reason why the experience of the human body in virtual reality should be examined from a semiotic perspective.

The ambiguity of the body in virtual environments

What happens to the participant's body when he or she enters a virtual reality simulation? Let us hear what the commentators say. According to Hayles (1996: 14) body boundaries, first of all, become ambiguous.

> Body motions affect what happens in the simulation, so that one both is and is not present in the body and in the simulation. The body marks one kind of presence; the point of view, or POV, that constructs the user's position within the simulation, marks another. As a marker of subjectivity [...] POV functions as a pronoun, a semiotic container for subjectivity.

Morse (1996: 198-199) goes even further in her analysis of the multiple aspects of "personhood" and "agency" in the landscape of cyberspace. "Once 'inside' cyberspace", she asks,

> what happens to subjectivity travelling in the "nonspace" of a virtual environment? [...] While the visitor to the virtual environment moves in a very much circumscribed physical area, his or her motion is tracked and the appropriate shift in his or her point of view within a vast virtual landscape is constructed instantly. Cyberspace, then, is not merely a scenic space where things could happen; it also incorporates the artificial intelligence or agency that orchestrates the virtual scene (delegated human subjectivity). [...] Surrogates of the user within the virtual realm can be expressed in many different persons and degrees of immersion: an "I" or the subjective and "embodied" view of the world from inside it; a "me" as a corporeally separate persona or avatar, whose appearance and characteristics (often chosen from stock) represent the self in a screen-based world; a self that lurks as a ghostly, disembodied perception, marked or unmarked in that world; or a character, "he", "she" or "it", with a more distanced relation to the visitor's self – and there is the uncanny agency of the space itself.

The plurality of roles of the body in virtual environments is most impressive, especially in the art of virtual environments, since most artists "prefer to foreground the shimmering in exactitude between the material and the immaterial, and to allow for ambiguity in the apparent association of the virtual with the seemingly immortal, infinite, and sublime" (Morse ibid.: 204). Incapable of facing this ambiguity, some theoreticians emphasize the role of the physical body.

According to Bailey (1996: 36), for instance, "an awareness of the physical, "real" body is crucial to the disembodied projections of cyberspace. The physical body remains the referent. Cyberspace would not make sense without it". Tenhaaf (1996: 59-60) adds:

> Although the trip into data matrices through wetware interfaces is proposed to be more real than reality, it invokes a struggle to hang onto the knowledge that this space does not engage the whole self, the psyche clings to the memory that this space is a representation,

> that is, it clings to a memory of the real body and its formulation in physical space. The body is experienced as an image of the body engaged in a deep penetration or a momentary dissolution into space. The experience is intensified by the sense that this projected space has a metaphysical power, it seems to be or is imputed to be a self-sustaining controlling device beyond authorship, a symbolic apparatus outside the self with the capability of ordering representation and constructing the perceiving subject. Rather than a two-way flow, it is an absorption that reconstitutes control from a powerful external source.

Other theoreticians emphasize the role of the immaterial to the detriment of the physical body. Walser and Gulichsen are so radical in this position as to state (in Penny 1995: 243) that in

> cyberspace there is no need to move about in a body like the one you possess in physical reality. [...] There is no need for a body at all in VR. All one requires is an indication of the location of VR effectors with respect to one's virtual view-point. As the entire physical body is represented in VR by a larger and larger array of interface points, the potential diversity of one's image in VR will become more limited. The variety is possible now only because one can put just any shape between the image of the glove and one's virtual viewpoint.

Hayles (1999b: 69-94) reacts against this privilege of information over materiality and claims that it is a historical construction to believe that computer media are disembodied technologies. We cannot afford to ignore the materiality of the interfaces they create or the effects of these interfaces on the users.

This controversial debate testifies to the ambivalent nature of the body in cyberspace, an ambivalence that calls for a semiotic analysis. Given the complexity of the issue and the limits of this paper, in what follows I shall limit myself to the examination of what

appears to me to be the most crucial topic, that is, the divided condition of the body. This will be analyzed in the light of Peirce's notion of the object of the sign.

The semiosis of disembodiment in virtual environments

For Peirce, the object of the sign is something that the sign represents. At the same time, the object also determines the sign; the sign is a kind of emanation of the object, a mediation between the object and the effect to be produced in a possible mind. Furthermore, the object is the source of semiosis, that is, the source of the action of the sign.

There are two types of objects, the immediate and the dynamical object. The dynamical object is that something, generally outside the sign, which the sign represents and which determines the sign. The immediate object, in its turn: (a) suggests or alludes the dynamical object; (b) is the dynamical object as represented within the sign itself, as the sign manifests it, as the sign permits us to know it. The way the immediate object represents the dynamical object depends on the nature of the sign. When it is a symbol, then the immediate object really represents the dynamical object. If it is an index, then the immediate object is just connected to the dynamical object. If it is an icon, the immediate object can only suggest the dynamical object.

In sum: the notion of the immediate object is crucial for the understanding of the following: (a) there is no possible direct access to the dynamical object except through the mediation of the immediate object; (b) to fulfil this mediation the immediate object has to present some kind of correspondence with the dynamical object. This correspondence may be of the nature of a law, of a physical connection or of the nature of a mere quality (cf. Santaella 1988).

When we take into consideration the condition of the user's body in cyberspace, we recognize immediately that an indexical semiosis is involved and that this indexicality exists in the framework of perception and proprioperception.

At this point, Peirce's theory of perception may be of great help for the understanding of the connection between the immediate and dynamical object in an indexical semiosis and the process of perception, since, according to Peirce, the process of perception is also a process of semiosis.

Most theories of perception are dualistic. They describe perception as a process involving on the one hand something that is perceived and on the other a perceiver. With a view to reconciling and integrating the dichotomy inherent in perception into a coherent and logical whole, Peirce arrives at a triadic scheme (how could it be otherwise?) distinguishing three ingredients in perception: percept, percipuum, and perceptual judgment. These three components of perception are interdependent but irreducible, which allows them to be analytically isolated for examination of their respective characteristics.

When we perceive something we are alerted to an essential duality in which something exterior to our perceptions present to our senses which cannot be exhausted by this act of perception. To perceive is to perceive something external to ourselves. But we can say nothing about what is external to ourselves except through the mediation of a perceptual judgment. To that which is outside of us, Peirce gives the name of *percept*; that which tells us what we perceive is the perceptual judgment. Furthermore, perception involves a *percipuum*, which is the percept as it is immediately interpreted in the perceptual judgment. Hence, it is dependent on our motor, nervous, and sensorial systems, dependent on the way we

are sensorially equipped. Human beings, for instance, do not see the same way as flies do.

When we apply the network of semiosis to the ingredients of perception, we can see that the percept fulfils the logical role of the dynamic object, the percipuum performs the task of the immediate object, and the judgment of perception acts as the sign and the future interpretant (cf. Santaella 1993). Let us apply this network to the body of the user in a cyberenvironment.

In normal situations of perception, the percept, which is the dynamic object of perception, is something that is in the world out there, a stimulus forced upon us, compelling our attention and insisting to be recognized in its existence. In the semiosis of virtual environments, the logical position of the dynamic object, that is, the percept out there is occupied by a symbolic apparatus, a controlling device with the capability of ordering representation and constructing the perceiving subject. It is an agency that monitors the corporeal movements of the subject, his or her point of view. These movements are orchestrated in relation to simulated scenes, constructing the subject's position within the simulation. This radical change in the dynamic object of perception is what makes all the difference and brings all the complexities for the role of the participant's body in virtual environments.

In any perceptual semiosis, the subject's body, or better, his/her sensorial apparatus plays an important role in the percipuum. The percipuum, as we know, occupies the logical position of the immediate object and corresponds to the way the percept is immediately interpreted in the judgment of perception. The resulting interpretation depends on the agent's sensorial apparatus. In virtual environments, the sensorial apparatus is augmented because of symbolic devices that monitor the VR effectors in respect to the subject's virtual point of view, which can only work if the subject's

perceptual connection to the world out there is blocked. Thus, in virtual environments, the body is really divided into two different, albeit complementary, media. On the one hand, the body maintains the proprioception of its carnal existence in the space in which it exists. On the other hand, the monitored array of interfaces transport the body's augmented sensorial and perceptual apparatus toward an immersive journey into a spectral world.

This means that, for perceptual judgment that plays the role of the sign in this semiosis, involves two distinct and simultaneous representations of the body, the one of the carnal body and the one of the alternative bodies of disincarnated projections. This explains how proprioceptive coherence can be maintained despite the ever changing body boundaries in cyberspace.

As we can see, although the complexities of the role of the body in virtual environments cannot be underestimated, a semiotic analysis may bring some understanding of these complexities which may exemplify the adage that there is nothing more practical than a good theory.

References

Ascott, Roy. 1995. Le retour à la nature II. In L'esthétique des arts mediatiques, ed. Louise Poussant. Quebec: Presses de l'Université, 437-451.

Bailey, Cameron. 1996. Virtual skin: Articulating race in cyberspace. In Mary A. Moser & Douglas MacLeod (eds.). Immersed in Technology: Art and Virtual Environments. Cambridge, Mass.: MIT Press, 29-50.

Biocca, Frank. 1997. Realidade virtual: O extremo limite da multimídia. In Mônica Rector & Eduardo Neiva (eds.). Comunicação na era pósmoderna. Petrópolis: Vozes, 200-225.

Domingues, Diana. 2002. Criação e interatividade na ciberarte. São Paulo: Experimento.

Gigliotti, Carol. 1999. The ethical life of the digital aesthetic. In Peter Lunenfeld (ed.). The Digital Dialectic: New Essays on New Media. Cambridge, Mass.: MIT Press, 46-66.

Haraway, Donna. 1985. A Cyborg Manifesto: Science, technology, and socialist feminism in the late twentieth century. In Donna J. Haraway. Simians, Cyborgs, and Women: The Reinvention of Nature. New York: Routledge, 149-181.

Hayles, Catherine. 1996. Embodied virtuality: Or how to put body back into the picture. In Mary A. Moser & Douglas MacLeod (eds.). Immersed in Technology: Art and Virtual Environments. Cambridge, Mass.: MIT Press, 1-28.

Hayles, Catherine. 1999a. How we Became Post–Human. Virtual Bodies in Cybernetics, Literature, and Informatics. Chicago: University of Chicago Press.

Hayles, Catherine. 1999b. The condition of virtuality. In Peter Lunenfeld (ed.). The Digital Dialectic. New Essays on New Media. Cambridge, Mass.: MIT Press, 68-94.

Kac, Eduardo. 1997a. Aspectos da estética das telecomunicações. In Eduardo Neiva & Mônica Rector (eds.). Comunicação na era pós-moderna. Rio de Janeiro: Vozes, 175-199.

Kac, Eduardo. 1997b. A arte da telepresença na internet. In Diana Domingues (ed.). A arte no século XXI. São Paulo: Unesp, 315-324.

Kac, Eduardo. 1998. Time Capsule. In Ars telemática. Lisboa: Relógio d'água editores, 237-242.

Machado, Arlindo. 2001. Corpos e mentes em expansão. In Arlindo Machado. O quarto iconoclasmo. Rio de Janeiro: Rios Ambiciosos, 70-93.

Morse, Margaret. 1996. Nature morte: Landscape and narrative in virtual environments. In Mary A. Moser & Douglas MacLeod (eds.). Immersed in Technology: Art and Virtual Environments. Cambridge, Mass.: MIT Press, 195-232.

Novac, Marcos. 1996. Dancing with the virtual dervish: Worlds in progress. In Mary A. Moser & Douglas MacLeod (eds.). Immersed in Technology: Art and Virtual Environments, Cambridge, Mass.: MIT Press, 303-308.

Packer, Randall & Ken Jordan. 2001. Overture. In Multimedia. From Wagner to Virtual Reality. New York: Norton & Company, xiii-xxxi.

Palumbo, Maria Luisa. 2000. New Wombs. Electronic Bodies and Architectural Disorders. Basel: Birkhäuser.

Penny, Simon. 1994. Virtual reality as the completion of the enlightenment project. In Gretchen Bender & Timothy Druckery (eds.). Culture on the Brink. Ideologies of Technology. Seattle: Bay Press, 231-248.

Pepperell, Robert. 1995. The Post-Human Condition. Oxford: Intellect.

Santaella, Lucia. 1993. A triadic theory of perception. In René Jorna et al. (eds.). Signs, Search, and Communication. Semiotic Aspects of Artificial Intelligence. Berlin: Mouton de Gruyter, 39-47.

Santaella, Lucia. 1988. Charles S. Peirce's (object of the sign). Versus: Quaderni di studi semiotici 49, 53-58.

Sharir, Yacov. 1996. Dancing with the virtual dervish: Virtual bodies. In Mary A. Moser & Douglas MacLeod (eds.). Immersed in Technology: Art and Virtual Environments. Cambridge, Mass.: MIT Press, 283-285.

Tenhaaf, Nell. 1996. Mysteries of the bioapparatus. In Mary A. Moser & Douglas MacLeod (eds.). Immersed in Technology: Art and Virtual Environments. Cambridge, Mass.: MIT Press, 51-72.

Shattered embodiment. Cyberspace as a Cartesian project

Elke Müller

Cyberspace or Virtual Reality technologies are present in all shapes and sizes. Some examples of their omnipresence are the internet, multi-media CD-ROMs, and video games. Despite their differences, all these technologies have in common the current debate in terms of practices that lead to "embodiment" or "disembodiment". I would like to position myself in this debate by posing that people express their worldviews (which are either explicit or taken for granted) by "objectifying" these worldviews in technological artefacts.

In my opinion, the Western world is still based on a dualistic worldview inherited from Descartes. This dualism is normally conceived of as a mind–body dualism, but at the same time, it can be understood as a subject–object (human–world) dualism. If it is true that people objectify their conscious or implicit worldviews in technological artefacts, it is interesting to see how this dualism can be found in the domain of Virtual Reality technologies. An obvious conviction would be that Cartesian practices lead to disembodiment straight away. I will investigate this assumption.

In the first section, I shall describe the main dualistic characteristics of Descartes's work. After that, I will make a comparison between relevant topics in the work of Descartes and Merleau-Ponty. Merleau-Ponty uses a lot of examples from Descartes's work, in order to criticize his philosophy and to give a different interpretation of the same examples instead. After having given a short explanation of these two world views, I would like to illustrate in which way our still dualistic world view is objectified in Virtual Reality. In short, this objectified view causes "dualistic" experiences, which can increase our sense of "disembodiment". But perhaps, it is better to speak of "shattered embodiment", because our embodied experience gets reduced to certain senses and parts of the body. It

can even suffer from unusual "points of view" leading to dizziness, or time-lags which cause a feeling of being "discentered".

Given these brief outlines, it will be no surprise that I prefer a phenomenological to a dualistic world view. In the conclusion, I will propose a deeper reason for this preference to justify my rejection of Descartes's convictions and ideas.

Descartes's analysis of sense perception in *Optics*

In Descartes's dualistic ontology there are two kinds of substances. On the one hand you have the *res extensa*e which refer to everything that has corporeal substance, such as the world, stones, or the human body. When Descartes speaks of "bodies", he refers to everything which consists of matter in general. And as the Latin expression states, material things are extended. On the other hand you have the *res cogitans* which refers to substances that do not consist of matter and are not extended. In other words, *res cogitans* refers to the mind[1], to ourselves as "thinking things". Although the two substances are mutually exclusive, they are still related. The fact that there is a distinction and union at the same time between body and mind is very problematic in Descartes's philosophy. I will not elaborate on this further.

According to Descartes, material substance or bodies are extended in three dimensions: length, breadth, and depth. Depth is made up from the first two dimensions. Extensions thus have a geometrical connection. In fact, there is merely a conceptual distinction between Descartes's notions of extension (or material substance) and space (cf. Descartes 1999: 227). Also, it follows that truly empty space like a vacuum does not exist. Space must always be filled, for example, with air, even though we cannot see air. In short,

1 Descartes uses "mind" and "soul" to refer to the same thing: our intellect or capacity to think.

Descartes's notion of space has two aspects, a material and a geometrical one.

Descartes's philosophy can be understood by way of two dualisms: a mind–body dualism and a subject–object dualism. I already briefly sketched the mind–body dualism in terms of two mutually exclusive but related substances. Now I will explain what the subject–object dualism means. In general, it refers to our knowledge and experience of the world and the object of that knowledge or experience. Let me anticipate that Descartes is mainly interested in cognition, the way we gain knowledge of the world, whereas Merleau-Ponty stresses the importance of experience.

One of Descartes's most interesting works to illustrate his dualistic ontology is called *Optics* (*La Dioptrique* in the original French text). In *Optics*, Descartes states that "the conduct of our life depends entirely on our senses", and that "sight is the noblest and most comprehensive of the senses" (Descartes 1999: 152, 283). At first glance, Descartes seems to contribute to what Martin Jay calls "ocularcentrism" (Descartes 1994: 3, 69), which means that Descartes's *discourse* is dominated by vision. The question remains, whether his *philosophy* can be said to be ocularcentric too. As I will show, this question can be answered negatively. In *Optics*, Descartes uses four examples which can be used to explain and to illustrate his concept of artificial and human vision: two sticks used by a blind man, telescopes, engravings considered pieces of art, and the equation of human vision with the *camera obscura*. In order to say something about the relationship between a (human) viewer and the viewed objects, we also have to take a look at Descartes's concept of distance.

Some of the examples I mentioned are understood by the notion of resemblance. Before I turn to these examples, I have to say that Descartes refused any notion of resemblance. Resemblance theories

were addressed by Descartes to "scholastic" philosophy which still dominated the early and middle seventeenth century. Not only did the scholastics believe "that there is something in the object itself that resembles the ideas we have of them" (Judovitz 1993: 72), but they also believed that this resemblance is caused by our sensory perception. In short, the scholastics believed that little images, so-called "intentional forms", were flitting through the air to cause a resemblance in our mind. In other words: material objects transmit "forms" or "images" to the soul (cf. Descartes 1999: 154). Descartes's (1999: 165) objection to this view is: "We must take care not to assume [...] that in order to have sensory perceptions the soul must contemplate certain images transmitted by objects to the brain".

One of Descartes's arguments against any notion of resemblance involves that we have to "recall that our mind can be stimulated by many things other than images – by signs and words, for example, which in no way resemble the things they signify" (1999: 165), but Descartes somehow weakens his claim when he says: "It is enough that the image resembles its object in a few respects" (1999: 165; cf. p. 177). In the end, he concludes as follows:

> In order to have sensory perceptions the soul does not need to contemplate any images resembling the things which it perceives, [...] but in all this there need be no resemblance between the ideas which the soul conceives and the movements [of the nerves] which cause these ideas. (ibid. 1999: 166-67)

After this introduction to Descartes's ideas on resemblance, I would like to consider Descartes's alternative *vision* on vision. At the beginning of *Discourse Four* of the *Optics*, entitled "The senses in general", it turns out that Descartes, despite his vocabulary, is not as ocularcentric as he has often been considered to be:

> Now I must tell you something about the nature of the senses in general, the more easily to explain that of sight in particular. We know for certain that it is the soul which has sensory perceptions, and not the body. (Descartes 1999: 164)

Furthermore, "it is the soul which sees, and not the eye; and it does not see directly, but only by means of the brain" (1999: 172). Hence, what is really important in Descartes's philosophy is that sensory awareness and "to sense" in general refer to the internal and peripheral organs of the human body (cf. footnote 7), but far more important seems to be what Descartes means by the term "perception", i.e., the purely mental apprehension of things with the intellect. Reason alone, not the senses, which can deceive me, decides whether things are true. It is not that the soul or mind has sensory perceptions, says Descartes, but "it is through the nerves that the impressions formed by objects in the external parts of the body reach the soul in the brain" (1999: 164-165). In short, the model predicts the following sequence: stimuli → nerves → brain → mind.

Descartes says, for example, that "the movements in the nerves leading to the ears make the soul hear sounds; those in the nerves of the tongue make it taste flavors" (1999: 167). Although "the soul is joined to the whole body, there is a certain part of the body where it exercises its functions more particularly than in all the others..." namely in the innermost part of the brain where the soul is located in the pineal gland (Cottingham 1994: 146). There exists a causal connection between the stimuli and the soul and vice versa, but I will not elaborate the problem of the causal transactions between the two different substances in this paper. It must now have become clear why, according to Descartes, sensory perception does not start with an image of resemblance sent to our brain: it is by means of the movements of the nerves that our mind composes pictures, signs, or words.

In short, sense perception must be understood as perception of the mind, as a mental act. However, according to Descartes, we may not try to understand this as a reflective act because something in our brain changes in order to let our mind judge what it really perceives (cf. Descartes 1999: 170).[2]

The two sticks used by the blind man

If you ever had "the experience of walking at night over rough ground without a light", you must have found "it necessary to use a stick in order to guide yourself". However, the sensation in this experience will be somewhat confusing in comparison with them who are born blind, because "one might also say that they see with their hands or that their stick is the organ of some sixth sense given to them in place of sight" (Descartes 1999: 153). In his book called *The World or Treatise on Light* (which has been written before *Optics*), Descartes (1999: 82) already argued:

> Of all senses, touch is the one considered the least deceptive and most certain. Thus, if I show you that even touch makes us conceive many ideas which bear no resemblance to the objects which produce them, I do not think you should find it strange if I say that sight can do likewise. (Descartes 1999: 82)

2 In fact, this is a very important notion. It means that according to Descartes the mind perceives without the guidance of a conscious reflection. Of course, this is true because of the adjustments the brain makes according to Descartes (and the brain is generally understood as a material organ with material processes which we cannot affect most of the times). But it means largely that Descartes comes close to Merleau-Ponty when he states in the same section that "when we clasp some body with our hand, we adjust our hand to its size and shape and thus feel it by means of our hand without needing to think of these movements" (Descartes 1999: 170). Although Merleau-Ponty is known for his rejection of the materialistic approach of Descartes's philosophy, the quoted section shows that both philosophers share a belief in the intentionality of the body itself – even though Descartes remains a materialist and a reductionist in most of his writings.

In *Optics*, the blind man with the stick is used as the first example to reject the scholastic idea of resemblance. The intentional forms described earlier as visual "transmitters to the brain" can also be applied to feeling with a stick. Descartes says that when a blind man feels objects, "nothing has to issue from the bodies and pass along his stick to his hand" (1999: 153, 166, 169). Sensations can be caused in two directions. The objects can move against his stick, or his hand can make an action while the objects just resist the stick. Vision can be described in the same way: things are not only directed at our eyes, but the action in our eyes is also directed towards the things (cf. 1999: 154).

Knowledge does not come from the objects but depends solely on the parts of the brain where the nerves originate. In fact, our knowledge (which derives from our brains) can be understood as a natural geometry. The soul is able to perceive position[3] and "to know the place occupied by each part of the body it animates relative to all the others". The soul can also "shift attention from these places to any of those lying on the straight lines[4] which we can imagine to be drawn from the extremity of each part" (1999: 169). Figure 1 shows the famous picture that accompanied the following quotation from Descartes (1999: 169):

3 Position is defined by Descartes (1999: 169) as "the orientation of each part of an object relative to our body".

4 Descartes is very ambiguous with respect to perspectivism. In the quoted sentence, he gives credit to perspectivism in order to stress the equation with the natural geometry of the mind. In other sections he is more critical. For example, with regard to the judgment of distance by size, shape, color etc., he claims that "pictures drawn in perspective show how easy it is to make mistakes. For often the things depicted in such pictures appear to us to be farther off than they are because they are smaller. While their outlines are more blurred, and their colors darker or fainter than we imagine they ought to be" (Descartes 1999: 175).

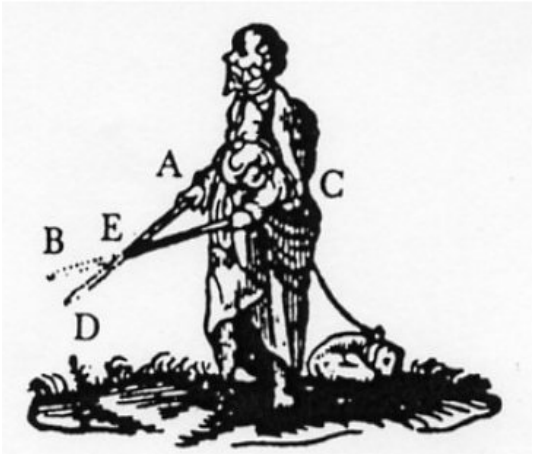

Figure 1. Descartes's blind man.

> When the blind man [...] turns his hand A towards E, or again his hand C towards E, the nerves embedded in that hand cause a certain change in his brain, and through this change his soul can know not only the place A or C but also all the other places located on the straight line AE or CE; in this way his soul can turn its attention to the objects B and D, and determine the places they occupy without in any way knowing or thinking of those which his hands occupy. Similarly, when our eye or head is turned in some direction, our soul is informed of this by the change in the brain which is caused by the nerves embedded in the muscles used for these movements.

Distance

In *Principles of Philosophy*, Part Two, art. 18, Descartes defines distance as follows: "Distance is a mode of extension, and therefore cannot exist without an extended substance" (1999: 231). The seeing of distance does not depend on the images emitted from objects (Descartes implicitly refers to the scholastic view), but depends on four things: the shape of the body of the eye adjusted by the brain, the relation of the eyes to one another, "the distinctness or indistinctness of the shape seen, together with the strength or weakness of the light" (1999: 170). Finally, we are able to judge the

distance with the knowledge we already have "compared with the size of the images they imprint on the back of the eye – and not simply by the size of these images" (1999: 172). Judging distances is thus a mental act. But this comparison does not rely on any resemblance of the pictures in our eyes "for these pictures usually contain only ovals and rhombuses when they make us see circles and squares" (1999: 172). Methods of measuring distance are highly unreliable, even for our common sense (the pineal gland), when a distance is greater than one or two hundred feet. This common sense is unable to measure the distance of an object far away, because there is "hardly any variation in the angles between the line joining the two eyes (or two positions of the same eye) and the lines from the eyes to the object".[5] Measuring distance with instruments – like telescopes – is also not always reliable.

Telescopes, lenses, and mirrors

Although Descartes states in one and the same section of *Optics* that sight must be regarded as the noblest and most comprehensive of the senses, he claims that we can increase the faculty of vision by means of the wonderful invention of the telescope. With telescopes we can attain knowledge of nature much better and more perfectly than ever (Descartes 1999: 152). Telescopes make it possible to bring distant and inaccessible objects closer, while microscopes bring objects that are close and already accessible even closer to our vision. All the things that concern this perfection can be reduced to three principles: "the objects, the internal organs which receive the

5 Cf. footnote 4. Notice furthermore, that in this section Descartes implicitly stresses that the pineal gland or common sense can not judge correctly if the external senses fail completely.

impulses of these objects, and the external organs[6] which dispose these impulses to be received as they ought" (1965: 114).

Engravings

According to Descartes, it is sufficient for an image to resemble an object in just a few respects. First, it is possible that we are deceived by what we sense. Secondly, the position of the nerves can be changed by an unusual cause, and "this may make us see objects in places other than where they are". Furthermore, "if our eyes see objects through lenses and in mirrors" it is possible that our eyes wrongly judge the objects to be smaller or larger than they really are (1999: 172-173). Finally, it is possible that a work of art for instance, is more perfect as an image and represents an object better because it does not resemble that to which it refers (cf. 1999: 165-166). Descartes uses engravings as an illustration of this fourth argument. An engraving represents things in the real world, but "it is only in respect of shape that there is any real resemblance [...], and even this resemblance is very imperfect, since engravings represent to us bodies of varying relief and depth on a surface that is entirely flat" (1999: 165). He concludes that in order to be more perfect as an image and to represent an object better, an engraving should not resemble the object. Improved representation is possible in accordance with the rules of perspective: ovals are represented

6 In *Principles of Philosophy, Part Four*, Descartes states that "there are only seven principal groups of nerves, of which two have to do with internal sensations and five with external sensations". The internal sensations are linked with the internal organs and parts like the stomach and the throat which deal with "the natural appetite" (sensations like hunger and thirst). "The nerves which go to the heart and the surrounding area [...] produce another kind of internal sensation which comprises all the disturbances or passions and emotions of the mind such as joy, sorrow, love, hate and so on" (Descartes 1999: 280). The external faculties of sense-perception are related to the five senses of vision, hearing etc. The internal and external sensations and faculties both refer to Descartes's use of the terms "to sense" and "sensory awareness". This is opposed to Descartes's notion of "perception", which must be understood as the purely mental apprehension of the intellect (cf. Cottingham 1994).

better than circles, rhombuses better than squares and so on (cf. footnote 5). Descartes also uses this example to make an equation with the images formed in our brain: it is important to know how these images can enable the soul to have sensory perceptions of the corresponding objects, it is not important to know how these images can resemble these objects.

Camera obscura

I explained above that in order to have sensory perceptions, the soul does not need to contemplate any images resembling the things which it perceives. But the things we look at do imprint quite perfect images of themselves on the back of our eyes. Descartes (1999: 166) compares this with a metaphor of the *camera obscura* (although he does not use the word *camera obscura* himself in *Optics*):

> Suppose a chamber is all shut up apart from a single hole, and a glass lens is placed in front of this hole with a white sheet stretched at a certain distance behind it so that the light coming from objects outside forms images on the sheet. Now it is said that the room represents the eye; the hole, the pupil; the lens, the crystalline humor, or rather all the parts of the eye which cause some refraction; and the sheet, the internal membrane, which is composed of the optic nerve-endings.

Merleau-Ponty's phenomenology: Some critical remarks on Descartes's philosophy and an alternative vision

One of the main goals of phenomenology is to overcome subject-object dualisms. In Merleau-Ponty's work we can find an interesting critique of Descartes's dualistic ontology. Merleau-Ponty often uses the same examples as Descartes (like the blind man and the engravings) in order to criticize Descartes and to give an alternative reading of these examples. In the next section, I will compare the

topics I discussed from Descartes's work with Merleau-Ponty's way of dealing with the same topics, which are the body–mind and subject–object dualisms, sense perception, body, space, distance, depth, and extensions. First, I will present a detailed critique of Merleau-Ponty's comments on Descartes. The I will proceed to give my own critiques on Descartes's ideas based on Merleau-Ponty's phenomenology.

Body–mind and subject–object oppositions

Descartes can be said to be an "ontological dualist" since he uses one method to describe the two different substances of res extensa and res cogitans. His definition of the human being is the one of a conscious mind or a thinking subject. Merleau-Ponty, by contrast, understands our existence in terms of a "psychophysical subject". A human being is merely one reality and this reality has two modes of being, a physical mode and a mental mode. However, Merleau-Ponty does not speak of a "unity" because the use of that term belongs to a dualistic vocabulary. Therefore, you cannot say that "you are in your body" because we are already "our bodies". A Cartesian way of seeing things would be to see myself as a subjective reflective consciousness and my body as a redundant object of the same ontological status as the rest of the material world. Merleau-Ponty does not want to draw an exact line between the physical, the mental, or the subjective and objective ways of being human. He rather proposes that our physical mode and our mental mode both have a subjective and an objective side. In fact, we are neither merely subject nor object. Sometimes our subjective side prevails, sometimes our objective side is more present. In his *Phenomenology of Perception*, Merleau-Ponty emphasizes the consciousness of the body itself. He calls the body as a subject a "lived body" because of its being present in the world and its being

intentionally engaged in or directed towards the world. When I take place on a chair, my body knows how to do it.

The subject–object dualism has also to do with what I called in my introduction a "human–world" opposition. For Descartes, the body and the mind are not only appreciated as two different substances, the mind is also rated as more important, even as primary, when it comes to sense perception and gaining knowledge of the world. Merleau-Ponty does not only criticize Descartes's putting emphasis on the perceiving mind (because of the disembodied state it gets into) but also criticizes the fact that in Descartes's analysis of sense perception, the perceiving mind is cut off from the perceived world or objects.[7] In phenomenology, the subject and object constitute each other, just like the body and the mind are two sides of the same thing.

(Sense)Perception

For Descartes, perceiving is a mental act. Although he cannot deny that "perceiving" starts with embodied sensory awareness (cf. footnote 6), Descartes ultimately tries to get rid of the body by stressing the importance of our deciphering and judging mind. Only the mind is able to decide what true knowledge is. Merleau-Ponty objects, among other things: "There is no vision without thought. But *it is not enough* to think in order to see" (1964: 175). His objection is that we cannot do without our body in sense perception: all consciousness is perceptual, and consciousness can be addressed to both our mental and physical modes of being. For Merleau-Ponty, perception can never be a "disembodied spectator with an objectifying gaze". Instead, perception is always embodied

7 Notice that the "perceived world" can be my own body as well! In *The Visible and Invisible*, Merleau-Ponty gives the example of my one hand touching the other hand while the touched hand is touching another object.

as a sensory awareness of my body and the world. Perception is an experience and not a mental act of the mind. "To perceive is to render oneself present to something through the body" (Merleau-Ponty 1964: 42). Sensory perception is prior to any knowledge. Even knowledge which seems not derived from experience has a background in the perceived world. Before we can understand a geometrical "circle" for example, we have experienced what "round" means for us.

Merleau-Ponty also rejects Descartes's materialistic approach, which implies a model of sensory perception reaching the mind through the nerves and the brain. He argues that by adopting a materialistic approach, Descartes does not investigate what seeing is, but focuses solely on the question of how it is achieved. *Optics* "is the breviary of a thought that wants no longer to abide in the visible and so decides to construct the visible according to a model-in-thought" (Merleau-Ponty 1964: 169).

Another aspect of our embodied perception is rendered by the fact that perception is sensory-motor behavior according to Merleau-Ponty. In order to see something, I move my body all the time. In fact, seeing and moving your body presuppose each other.

> My mobile body makes a difference in the visible world, being a part of it; that is why I can steer it through the visible. Conversely, it is just as true that vision is attached to movement. (Merleau-Ponty 1964: 162)[8]

According to Merleau-Ponty, Descartes hardly speaks about moving your body in order to see something, with the exception of

8 You can apply this to all kinds of sense perception: we adjust our bodies all the time in order to see, hear, touch, smell and taste.

Descartes's example of the hand of the blind man that moves the stick.[9]

Many examples which Descartes uses in *Optics*, like the telescope and the *camera obscura* for instance, implicitly presuppose a view of perception as an "isolated" act. Merleau-Ponty stresses that perception is possible because of a "field". This means that we always perceive a figure against a background. We may change our perspective all the time, but unlike a camera that zooms in or out. Seeing is limited because I can only see the things that are in my field, but it is not limited in the sense that my field of perception has clear boundaries; I do not see a "frame". We can *think* of objects and spaces as "isolated" (by objectifying them mentally), but in fact perception is never isolated due to the perceptual field. The hidden side of objects is present to us also, not because we can imagine them or because they are possible perceptions but because the hidden is in my vicinity. I can touch things; I just have to extend my hand. In other words, "the unseen side is given to me as 'visible from another standpoint'" (Merleau-Ponty 1964: 15). I can never see the whole object because of my point of view on the world (cf. p. 183), but I can move my body in order to gain another side.

A last comparison between Descartes and Merleau-Ponty with respect to sense perception is in retrospect on the above comments on Descartes's analysis of sense perception as a disembodied mental act. One could argue that because of Descartes's neglect of the importance of the body, he does not only draw a line between the perceiver and the perceived but he also treats the senses as separate, similar to the body which is conceived of as consisting of parts.

9 Although Descartes recognizes that things are not only directed towards our eyes, but the action in our eyes is also directed towards them (cf. 174), I would like to defend Merleau-Ponty's analysis because in Descartes's example served as an argument to demonstrate the geometrical qualities of the mind in dealing with right angles, distances, and so forth.

Merleau-Ponty will not deny that a methodological distinction between body parts and the five senses is possible, but ontologically speaking, they have to be considered as a whole.

The body

I already discussed the problematic consequences of a disembodied spectator. Although Descartes tries to deny the body, he still acknowledges a first person perspective, even though the experiences of this first person are reduced to a *cogito*, a thinking I/eye.[10]

According to Descartes, the mind grasps the object in itself. Phenomenology would emphasize that an object appears first of all as an object to me; in fact the things I perceive sometimes appear ambiguous to *me*. In Descartes's writings, one can recognize the mind as a very "hard worker" that has to refine every ambiguous feature into "true knowledge". It is then interesting that according to Merleau-Ponty the body has to be understood in terms of its point of view (POV) of the world. My body is in itself the central perspective; it defines which sides of the objects I perceive (1964: 5, 16). Merleau-Ponty calls this the "phenomenal body", meaning that I experience from an embodied first person perspective. The crucial difference between Descartes and Merleau-Ponty is that Descartes considers perspective as something attached to the things themselves, with geometrical qualities, such as in Renaissance paintings, whereas Merleau-Ponty understands that my own body is in itself the central perspective of the world. Furthermore, for him perception always arises in the *here and now* perspective of the body (cf. Bannan 1967: 61).

10 Since the body and the perceived world are objectified by the mind (as extensions of the mind) in the work of Descartes, one could also defend a definition of the Cartesian subject in terms of a third person perspective.

Finally, I should like to elaborate the consciousness of the body itself as mentioned above. This embodied intentionality can be understood in terms of the body schema (BS). By means of this BS, the body has a tacit knowledge or tacit *cogito* (cf. Merleau-Ponty 1997: 18, 183) not to be confused with Descartes's mental *cogito*. Consider my example of taking a seat without thinking about it. In this example, the BS may neither be reduced to brain calculations, nor to mechanical, automatic, or reflexive bodily actions, because the body has to adjust its positions etc. in every situation anew by means of the BS, even though some situations may be more familiar to us than others – for example, to me, riding a bike is easier than driving a car because I have never driven a car.

Space

According to Merleau-Ponty (1964: 174), we cannot understand space as the sum total of its three dimensions. According to Descartes, the three dimensions of space are materially extended, and they are not just categories of the mind. Instead of a geometrical account of space, Merleau-Ponty takes the body into account. He makes a distinction between a primary lived space and a secondary space (cf. Kwant 1968: 38). Secondary space can only be understood because primary space is experienced prior to it. Primary space or the natural, lived space is an "oriented space". Space exists because I have a body. My body is the a priori condition of my spatial experience because the structure of my body is spatial itself. The spatiality of the body itself is already explained by the intentionality of the body in terms of the Body Schema. Not only do I inhabit space, I fill it with life from within. Space is presupposed; it does not exist and does not appear as an objective entity separated from my self. Space is always "space for me". I have to adjust to real dimensions. When I experience the

table as near or a door as far away, it means that they are "near and far" to me. As soon as our body changes, for example, by growth or a disease, the oriented space changes with us. In general, dimensions like near and far are not fixed features of the objects themselves, but my experience of objects changes when I move towards them or away from them.

Furthermore, Merleau-Ponty speaks of secondary space, which he also calls abstract or objective space. This kind of space can be understood as a construction of the mind. We are able to have a mental picture of a space in which every perception is positioned. In other words, we objectify our oriented lived space into a mental map. The fact that we are able to imagine ourselves in fictive spaces for instance, "borrows from vision and employs means we owe to it" (Merleau-Ponty 1964: 187).

> Space is no longer what is was in the *Dioptrique*, a network of relations between objects such as would be seen by a witness to my vision or by a geometer looking over it and reconstructing it from outside. It is, rather, a space reckoned starting from me as the zero point or degree zero of spatiality. I do not see it according to its exterior envelope; I live it from the inside; I am immersed in it. After all, the world is all around me, not in front of me. (Merleau-Ponty 1964: 178)

The problem of Descartes's concept of *res extensa* lies in its reducing bodies and things to one and the same order: they are just materially extending in space. Merleau-Ponty says that there is a crucial difference between objects and bodies. Things are in space, they are just "placed" in objective space. As "lived bodies" on the other hand, we "inhabit" the oriented space; we live it from within. Secondly, there is a difference between moving a thing and moving your body. Objects are placed and can be moved from A to B. As my body is not in objective space, I do not move it from A to B. I

never have to "find myself" first before I want to move. I have direct access to space because I *am* my body (cf. Merleau-Ponty 1964: 5). For this reason too, my body can never be something that is "in front of me". However, on a very close examination of Descartes's ontology, one might conclude that the body is an "in front of me" indeed because identity, according to Descartes, ends with the nonextended *cogito* – even though this seems a phenomenal and empirical impossibility.[11]

Another difference between Descartes's and Merleau-Ponty's concepts of the body and of things is that the former assumes that both are positioned in space, while the latter claims that the body can never be positioned, because it does not refer to a determinate position or external co-ordinates. The body is here rather situational; the "lived space" again is referred to (cf. Bannan 1967: 70; Merleau-Ponty 1997: 144, 189). By means of my sensory-motor capacities, I can perceive and act at the same time, for example, grasp or point out. Except for my "actual body", I thus also have a "habitual body" ready for all kinds of bodily movements at all times (cf. Bannan 1967: 70). In the same way, my body is the precondition for space, "my body is that by which there are objects" (Bannan 1967: 64).

Distance and depth

Similar to the other dimensions, Descartes considers distance and depth as something that can be calculated and deciphered by the intelligible mind. Merleau-Ponty, on the other hand, argues that things are not perceived by a mind that adds a geometrical perspec-

11 Space and bodies perceived like an "in front of me" also derive from a reduction of sense perception to a disembodied spectator who perceives isolated sense data. Of course, Descartes's view has been influenced by the invention of technical instruments in his age, such as the telescope and the *camera obscura* in which the act of perceiving is constructed by the technology and the perceived objects get framed.

tive to measure distances and so on. We cannot understand depth in terms of a third dimension because this does not say anything about the *experience* of depth (cf. Merleau-Ponty 1964: 180; 1997: 307). Merleau-Ponty goes on to say that, according to Descartes, it seems as if things are situated behind each other, as described, for example, in Descartes's description of the engraving, while according to Merleau-Ponty, unseen things or sides are in reach of the body; distances and directions are understood intentionally by the body. It depends on my POV.

> We are always on this side of space or beyond it entirely. It is never the case that things really *are* one behind the other. The fact that things overlap or are hidden does not enter into their definition, and expresses only my incomprehensible solidarity with one of them – my body. (Merleau-Ponty 1964: 173)

When you compare a man who is at the distance of two hundred paces to one who is standing only five paces away, the former is not seen "smaller", he is simply the same man at a greater distance. We perceive things just as "here" or "there" (ibid.: 180). Like perspective, distance, depth and space are not measurable objects and are not features of the things themselves "They are the best hold our body can take upon the world" (Bannan 1967: 95; Merleau-Ponty 1997: 314), and they belong to the POV of my body.

Extensions: The blind man

A last comparison has to be made between Descartes's and Merleau-Ponty's notions of extensions. The example of the blind man discussed in the Descartes section, is taken up by Merleau-Ponty in his work *The Phenomenology of Perception*. First of all, it should be recalled that Descartes describes extensions mainly as bodies or objects which are materially extended in space. In the example of the blind man, the stick leads Descartes to the phrase "a

blind man sees with his hands". Merleau-Ponty objects that "the Cartesian concept of vision is modeled after the sense of touch" (1964: 170). He exemplified in many ways what "seeing" means, but it must suffice to mention the following definition that Merleau-Ponty gives in *Eye and Mind*: "To see is *to have at a distance*" (1964: 166).

Let us return to the extensions. According to Merleau-Ponty, extensions can be understood as expansions of my Body Schema. This means that objects, instruments, prostheses, and the like are incorporated in my BS. When you drive a car or wear a hat, your body knows if you can pass an alley or a door. You do not measure the breadth and do not compare that with the distance it takes from there to your extension. The same goes for the blind man. His stick is no longer experienced as an object. It is an instrument through which he perceives. The world does not start at his sensing hand (as it does in Descartes's writings), but at the tip of his stick. His eyes are virtually at the tip of his stick: "When a blind person explores the world, he knows the length of his stick through the objects, instead of the position of the objects by means of his stick" (Merleau-Ponty 1997: 189). According to Merleau-Ponty, Descartes's analysis of the blind man conveys the idea that "the body is not the means of vision and touch but their depository" (Merleau-Ponty 1964: 178). In conclusion, bodily extensions, according to Merleau-Ponty, do not mediate our perception. Even to the one who needs a stick to see, the objects are still immediately present in his or her experience (cf. Merleau-Ponty 1997: 189).[12]

12 In light of advanced Virtual Reality technologies such as telepresence, it is doubtful whether Merleau-Ponty's account of bodily extensions and his claim that perception is never mediated can be maintained. Extensions in Virtual Reality are not always (completely) in contact with our body. One might argue however, that even these kinds of extensions are incorporated in the BS, namely by means of the interface (typing your keyboard, clicking a mouse). However, what happens if the interface becomes the body itself (next section)? The answer to this question goes beyond the scope of this paper.

Shattered embodiment

Virtual spaces and possible body positions

Before I can explain what I mean by shattered embodiment, I would like to distinguish three types of virtual space (Figure 2). Each of these types relates to one or more possible body positions.[13] By on-the-screen space I mean that your "here-body" (the lived body or phenomenal body) is behind a (computer) screen lacking any experience of "depth" or "distance", for example in e-mail, word processing, hypertext, etc. One might call this "the surface level". The first person perspective means the POV of my real body: I see the surface of the screen through my own eyes.

Virtual space types	Possible body positions
Screen space on-the-screen space	*here-body* my own first person perspective
Screen space through-the-screen space	*here-body* my own first person perspective *avatar* first person perspective *avatar* third person perspective
CAVE space through-the-screen space and surrounding space	*interface body* the here-body (my own first person perspective) and my virtual body mix up

Figure 2. Types of virtual space and body positions.

13 I adopted the following terms from Don Ihde: "the here-body", "on-the-screen space" and "through-the-screen space". However, my use of these definitions differs in some points from Ihde with respect to their meaning and grouping. The other descriptions are made by me in so far as they are not general like "avatar" and "virtual body" (cf. Ihde 2002a).

In a through-the-screen space, you are still behind a (computer) screen, but you experience a virtual spatiality that goes "beyond" the surface.[14] With this type of space, there are two possible combinations, namely the here-body combined with the first person perspective or the here-body combined with an avatar for which there are again two possible perspectives: a first person and a third person perspective. In each combination, the here-body is always present, because I cannot do without my own POV or first person perspective.

In the first case, the first person perspective is just my here-body surfing the net or playing a video or an online game without an avatar. For example, when I enter the site of the Dutch writer Harry Mulisch (cf. <www.harrymulisch.nl>) I can navigate through a virtual house by clicking the mouse, and I may encounter elements taken from his books or related to his personality. In the second case, my body may be doubled by an avatar, and in this case I am looking through the eyes of the avatar. My own first person perspective then coincides with the one of my avatar. In the third case, there is again a doubling of my body by the use of an avatar, whereby I see my avatar from a third person point of view, made possible by my own body's first person perspective.

14 According to Reneé van de Vall, Richard Wollheim makes a difference between being aware of the surface and being aware of what is represented on the surface, with respect to artworks. I would like to apply this difference to the two screen spaces mentioned above: in on-the-screen space you are "a spectator of the picture", and in through-the-screen space, you are "a spectator in the picture". With respect to virtual reality however, we can not simply speak of "representation", though, because the virtual can present worlds that do not correspond to reality. Furthermore, Van de Vall argues that Wollheim's "twofoldness" results from overemphasizing the difference between the real and the virtual world. An "in between" position is also possible according to Van de Vall. (Source: Van de Vall's unpublished comments on Vivian Sobchack's paper "The Address of the Eye. A Phenomenology of Film Experience", presented at the international Workshop Multimedia and the Interactive Spectator held at the University of Maastricht, in May 2002.)

The third kind of virtual space I would like to describe is more advanced than average computer screen spaces. I want to introduce here the CAVE™, a 3D environment where virtual reality (VR) computer images are projected on three panels and on the floor.[15] It is noteworthy that the projections are also visible in the space that surrounds the user. In a visit to a CAVE, I made a walk in a 3D "drawing". In this VR environment, butterflies were projected on the panels and even into the very space around me, which created the impression that they were actually flying in open space. The CAVE space is thus a combination of a "surrounding space" and a special kind of "through-the-screen space". This special kind of screen space is in fact very distinct from the average computer screen spaces I described before. There are three screens, i.e., the three panels. These screens have a very impressing effect because they measure three by three meters each. Because of this size, the projections can be done on a 1:1 scale, so when I walk a virtual building, the dimensions are experienced in a "realistic" way. In the CAVE, any perspective can be taken. All this causes the user's body to be fully intentionally engaged in the CAVE. I propose that in the CAVE, the body in fact becomes the interface itself. The bodily movements affect the head tracker and thereby change the user's POV, and this change of perspective influences his or her bodily movements once more. This is why I call the interface body of the CAVE a mixture of my here-body with my virtual body.

15 In this VR environment, the user stands on the floor in between three panels and uses special kind of glasses equipped with a "head tracker" (a device that measures movements of the user's head in order to locate him or her with respect to the projections) and a "wand" (a kind of 3D-joystick in order to navigate through the virtual space). It is also possible to add objects to your outfit, e.g., "gloves". CAVES are, among other things, well-known for their application in engineering, architecture, medical visualization and biotechnology. One of the reasons of these applications of CAVE technology is to experience the spatial form of a designed object before the product is marketed.

Cartesianism revisited in cyberspace

In this section, I will clarify why I call cyberspace technologies a "Cartesian project" and what I mean with "shattered embodiment". Let us begin with some Cartesian aspects of Virtual Reality (VR) in general.

In virtual domains, sense perception is highly visual. Visual perception is doubled: we see through our embodied eyes and through a virtual camera perspective (which sometimes may include an avatar). VR offers camera perspectives such as the bird's eye view which the human eye could never have without the help of technology. The camera can also zoom in and out, neither of which is a capacity of the human eye. In VR vision, we may even feel like the blind man: in order to see, we have to touch our keyboard and mouse. If we touch something in a virtual world "on" or "through" the screen, we do not really feel it but use our minds to place actions in a symbolic order. Our perceptual field is literally framed by the boundaries of the computer screen in VR. What we see "on" or "through" the screen becomes quite isolated. The phenomenological aspect of the perceptual field, namely the figure-ground structure, is extremely reduced in this framed way of seeing. Furthermore, Merleau-Ponty states that seeing (and perception in general) cannot take place without the moving body. In a cyberspace experience, however, a large part of the body remains motionless, except for the hands and rolling eyeballs. If I want to find out more of a hidden (aspect of an) object, I can send my avatar to go there, provided, of course, I have one. The avatar may turn the object around to inspect it in detail. But still, the entire camera position has to turn to the reverse side in order to allow me a glimpse of it. In this way, objects or sides are never in my direct vicinity, even though we perceive them in 3D.

In order to continue our bodily intentionality in VR, we need a virtual double of our body, an avatar. If there are bodies in cyberspace, one might argue, why should cyberspace still be considered Cartesian at all? The issue of embodiment is a complex one: even though I may perceive and act in the VR environment via the avatar's first person perspective, I cannot feel the avatar's body myself. We can describe this phenomenon in two ways: either we assume that the avatar's gaze is disembodied or we consider the avatar's perception as being perceived only by my own body, which would deny the avatar's real embodiment. The avatar's body remains an image, a representation of an embodied being. When I see my avatar and the virtual world in the third person perspective, the avatar's body is stretched out in front of me literally – quite Cartesian indeed. Moreover, there is no difference between the virtual bodies and the objects in cyberspace; they are all placed in front of me in similar ways. One might argue that avatars are unlike objects but that they can be situational bodies nevertheless, because in contrast to objects we make them act. On the one hand this is true, but on the other hand, avatars are still objects if we consider the fact that in some virtual worlds the avatar gets lost from your perspective, namely when it dies; in that case, you have to find it again. In terms of phenomenology, I never have to *find* my body in order to move or perceive. As argued above, "I *am* my body".

In general, space is objectified in VR in "through-the-screen-spaces". In some way, virtual space is not Cartesian at all, because it is not materially extended. Compare my descriptions of the surrounding space in the CAVE, however.

For two reasons, CAVE space seems to be least Cartesian as a virtual space, compared to screen spaces. First, the body as interface plays a central role, and second, the projected surrounding space gives a more realistic representation of the real space. It seems as if

for these reasons, the CAVE bore more likeness to the phenomenal body and phenomenal space. Paradoxically enough though, the experience one has in the CAVE testifies to the opposite. While you are immersed more bodily in the CAVE than in screen spaces, Cartesian ruptures are also experienced more strongly. One of my "journeys" in the CAVE was a virtual visit to a square in a Belgian city. The camera position was moving everywhere: to the left, to the right, up, down, flying, landing, turning, slow, fast, etc. Since there were so many similarities in comparison with perception in real life (the 1:1 scale, the environmental space, the surrounding panels, etc.) the body took everything that happened for real (even knowing that I was not at all in Belgium). What happens in such a situation is that the personal POV tries to attune to the POV of the camera, but fails. For this reason, one experiences a shattered embodiment: on the one hand, my body tells me I am standing with my two feet on the ground, on the other hand, my sense perception tells me I am flying. My sense perceptions are rendered incompatible and this contradictory way of experiencing leads to feelings of nausea and instability. This is what I define as "shattered embodiment".

Philosophically speaking, my "here-body" and my "virtual body" become mixed.[16] Another way of analyzing these phenomena is in terms of a mixing of the two kinds of spaces distinguished by Merleau-Ponty, the oriented space (as the lived space) and the objective space (as the objectified space). What happens in the CAVE then is that the objective space seems phenomenologically more reproduced than the screen space. The reasons are again the

16 Merleau-Ponty (1997: 301) describes some interesting experiments (Kwant 1968: 70-74). In one of them, a test subject is placed in a mirrored room. Immediately, he loses grip on the objects placed there. After a while, his "virtual body" (the habitual body) comes into play and represses his "actual body" (the here-body). This means, the test subject is now able to live in the mirror room, i.e., it is as if he lived inside a spectacle because he is experiencing the legs he should have to be intentionally engaged in this room. Normally, my actual and my virtual bodies coincide (see conclusion).

surrounding panels and the projected surrounding space. The experience of oriented space, on the other hand (the spatiality of my body itself), suffers from Cartesian ruptures. When I am intentionally engaged in the CAVE, the motor and sensory aspects of my bodily intentionality do not coincide. This is where the Cartesian breaks come into play. Moreover, the oriented space and the objective space get blurred because the objectified space becomes divided in my experience. Visually, the three by three meter platform I am standing on in front of the panels gives me the false illusion that the space I am occupying with my feet is merging smoothly into the through-the-screen space of the panels. But when I am taken in a virtual journey to a square in Belgium, I experience a break between the space of the platform I am standing on with my feet and the virtual space projected on the panels.

Conclusion

One of my aims in this paper was to illustrate my hypothesis of an objectified Cartesian world view expressed in VR technologies. In order to do so, I had to take two preliminary steps. First, I explained the main ideas of Descartes's *Optics* concerning vision, perception, space, and the body. Second, I compared these ideas in Descartes's dualistic philosophy to the alternatives offered by Merleau-Ponty's phenomenology. This discussion served as a background to illustrate some Cartesian features of cyberspace. With respect to the three forms of space distinguished in this paper, the CAVE seemed to evince the strongest kind of Cartesian ruptures involving an experience of "shattered embodiment". With this expression, I wanted to avoid opposing "embodiment" with "disembodiment".

A question that has not yet been answered is: in which way can a Cartesian "shattered embodiment" experienced at all if we consider that Descartes's philosophy is about *thinking* ourselves and the

world and not about an *embodied existence*? Evidently, Descartes elaborated a false analysis. He was wrong in reducing perception, the experience of space, and of the body to perceptions of a disembodied mind. Although the terminology of the "lived body" was only coined in the 19th century, Descartes certainly had a notion of the "lived body" himself, as early as in the 17th century. To answer the question then, Don Ihde may be helpful again. In his most recent work, *Bodies in Technology*, Ihde draws a distinction between our "here-body" (RL body) and our "virtual body" (VR body) (cf. Ihde 2002b: 3-15). Ihde (2002b: 6) describes the virtual body in terms of a disembodied third person perspective:

> It is the here-body in action that provides the centered norm of myself-as-body. This is the RL body in contrast to the more inactive or marginal VR bodies that make the shift to quasi-disembodied perspectives possible.

The reason then when I can have a virtual or ruptured experience is because the "here-body" is always prior to experience.

References

Bannan, John F. 1967. The Philosophy of Merleau-Ponty. New York: Hartcourt.

Cottingham, John. 1994. A Descartes Dictionary. Oxford: Blackwell.

Descartes, René. 1965. Discourse on Method, Optics, Geometry, and Metrology. New York: Bobbs-Merrill.

Descartes, René. 1985 (1999). The Philosophical Writings of Descartes, vol. 1, transl. J. Cottingham et al. Cambridge: University Press.

Ihde, Don. 2002a. Multistability in cyberspace. <http://nibbler.tk.informatik.tudarmstadt.de/public_www/arun/Darmstadt_Don_Ihde.pdf> (19.04.2005)

Ihde, Don. 2002b. Bodies in Technology (=Electronic Mediations, vol. 5). Minneapolis: University of Minnesota Press.

Jay, Martin. 1994. Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought. Berkeley: University of California Press.

Judovitz, Dalia. 1993. Vision, representation, and technology in Descartes. In Modernity and the Hegemony of Vision, ed. David M. Levin. Berkeley: University of California Press, 63-86.

Kwant, Remy C. 1968. De wijsbegeerte van Merleau-Ponty. Utrecht: Spectrum.

Merleau-Ponty, Maurice. 1964. The Primacy of Perception and Other Essays on Phenomenological Psychology, the Philosophy of Art, History and Politics, ed. James M. Edie. Evanston: Northwestern University Press.

Merleau-Ponty, Maurice. 1997. Fenomenologie van de waarneming, transl. R. Vlasblom & D. Tiemersma. Amsterdam: Ambo.

Intelligent environments. Body architecture and op_era

Rejane Cantoni

Virtual worlds are sets of computer-generated binary digits of information accessible by means of technologically generated interfaces. Under the rule of the current dominant user interface paradigm, such interfaces produce the perceptual effect of making users believe that they are typing on virtual paper on a flat rectangular screen.

Xerox Star (1981), followed by the *Apple Macintosh* (1984), were the first commercial systems that featured a Graphical User Interface (GUI). The "desktop metaphor" was introduced to facilitate user interaction with the computer. From the perspective of design and usage, both *Star* and *Macintosh*, when introduced, represented a tremendous progress in the field of human-computer interfaces. A single touch of a finger on a mouse, a tap on a keyboard, or the use of a light pen could activate so-called icons and open windows on the screen, thus allowing non-specialized users to master complex computational tasks.

Despite a myriad of technological innovations, progress in the conceptual design of the human-computer interface has been slow since 1981. Millions of personal computers have been sold over the past few decades – thanks mainly to the persuasive power of *Microsoft Windows* – but for most users, the computer or the laptop have remained strange boxes hard to use. After all, we can only fully interact with a computer through the articulation of a complex computational language, which is usually something that has nothing to do with the tasks we want it to perform.

In addition to the human-computer interface problem, another important issue has to be considered. The actual configuration of computers, featuring a flat rectangular screen, virtual windows, a keyboard, and a mouse, does not comprise the real potential of information technology. According to Randall Davis (MIT), the state of the art of hardware interface technology suffers from a historical

accident: “Somebody had a brilliant idea to connect a typewriter to a computer and, since then, we are typing. This is stupid. We do not type to talk with others, why do we have to type to communicate with a computer?” (Kahn 2001: 110).

Bits everywhere

The search for an alternative to the *desktop* computer has put many researchers, scientists, and artists to work. Considering the new trends in man-machine interface design, the solutions that have become most popular are those which immerse the users completely in a virtual world. A fictitious example of such a procedure has been modeled in the movie *Trom: An Electronic Odyssey* (starring Jeff Bridges), where the hero is fully assimilated to a computational domain. In the existing versions of such systems – of which virtual reality systems are the best example – the main research effort is dedicated to creating human-centered devices that allow the users to get immersed into and interact within the simulated world.

In virtual reality research, interfaces go mainly in two directions: *wearables* and immersive environments. The idea of wearables, is to “pack” the entire surface of the human body into a matrix of small tactile sensors and vibrators, hundreds of them on a few square centimeters.[1] Ears and eyes, skin and nose, as well as other body parts can be interfaced according to the current technological state of the art, that is, these human senses may be extended by receiving and transmitting computational data. In the most exotic scenario, a part of the body is transformed into “hardware”, which is achieved by implanting silicon chips right into the living flesh, for example,

1 A prototype of such a tactile bodysuit is being developed by the Italian engineer Danilo de Rossi at the University of Pisa.

into the central nervous system. By means of such methods, the human mind may be linked directly to a computer.[2]

In immersive environments, the second major trend of virtual reality interfaces, the body becomes part of a hardware-controlled chamber called a *CAVE*, the walls of which resemble large projection screens.[3] In both cases, it merely takes a projectionist to "turn a switch" and the bodily perception of the technology as a separate tool will disappear. The user will have the impression of being immersed into another world (cf. Cantoni 2001).

In contrast to virtual reality systems, which aim at creating a "world" within a computer by means of a complex apparatus simulating the physical world, a quite different technological approach

2 The first successfully realized human brain interface was implanted in Johnny Ray's brain in 1998. The technique was developed by the neuroscientists, Philip Kennedy, Roy Bakay and their team, affiliated with the Emory University in Atlanta, Georgia. Although the technique is still very rudimental, according to the report of the scientists, the patient, Ray (who became totally immobilized after a cerebral stroke), via electrical patterns that correspond to move an arm, could move a cursor on a computer screen (cf. Hockenberry, 2001: 96).

3 CAVEs (CAVE Automatic Virtual Environment) are cubic rooms of variable dimensions with walls composed of panoramic projection screens. On the screens, computer-synchronized video projectors create a single projection field that wraps the interactors with images and 3D sounds. In this system, you are asked to wear a kind of stereoscopic glass with a track device that helps to generate a 3D personal perspective of the scene. Another position track interface (being developed at the University of North Carolina) is a bodysuit covered with optical sensors that are interpreted by a set of diodes spread about the room. With the help of such a device, the movements of users are mapped, informing the computer of the orientation and position of their bodies when they walk or move within the CAVE. The CAVE technology (the name of which refers to the "Myth of the Cave" in Plato's Republic) was developed in the Electronic Visualization Laboratory of Illinois University, Chicago, by Thomas DeFanti, Daniel Sandin and Carolina Cruz-Neira in 1992 (date of the first public demonstration at SIGGRAPH'92 computer conference). It should be noted, however, that the concept of an interactive mediatic room is not new. In the fiction The Veldt (1950), Ray Bradbury describes an environment that by reading children's minds is capable of generating hyperrealistic simulations to the point of transforming those fantasies into experiences.

has been developed[4] to create an overlay of virtual space, including a cyberspace domain, to the perceptual world outside the computer. Here, the main challenge is to devise practically "invisible" interfaces (that is, interfaces contrived in a human-centered way) capable of overlaying virtual data to the physical world instead of recreating such data within a computer.

This idea was first suggested by Mark Weiser (XEROX PARC) in his article "The computer for the 21st century" (1995), published in the journal *Scientific American*. Coined *ubiquitous computing*, this proposal focused on research in, and the development of, technologies that would expose the virtuality of the computational data in relation to the physical world. According to Weiser, one way of imagining *ubiquitous computing* is to think of a totally new design for computers (of course, not resembling Steve Jobs's *Sunflower*). Their technological design protruding from their plastic casings projects the "ubiquitous" computers into the environment to cause the sensation that we live in an extended world filled with invisible engines.[5] In such a world, users are surrounded by thousands of networked systems designed to satisfy their needs for information, communication, services, and entertainment.

4 According to this trend, one of the problems with virtual reality systems is that the "external world" ceases to exist for the interactor. Users cannot see things or relate to people who are not linked to the system. The missing liaison between the physical environment and the data world – between atoms and bits – obliges us to interact in a parallel way, i.e., in one or the other space.

5 Examples of ubiquitous computers are tabs, pads and boards. Tabs are clip-on computers with small screens and track sensors that help to identify themselves to receivers placed throughout a building. This attachment allows people or objects to be localized. Pads were conceived to function like scrap paper. Spread out like sheets of paper over a table, this device has no individual use – it may be used by anybody, anywhere. The prototype, designed by Robert Krivacic (Xerox PARC), is something like a crossing between a conventional laptop and a sheet of paper. It has two microprocessors, one display, a multibutton pen and a radio network that supports several devices per user per room. Boards are similar to 40 x 60 inch blackboards. They can be used as various tools, such as video screens, bulletin boards, or digital bookcases containing texts that can be downloaded to tabs and pads. Interaction with boards occurs via a wireless electronic piece of chalk.

Other substantial efforts towards highly interactive man-machine interfaces are *tangible bits* and *augmented reality*. In *tangible bits*, the challenge is to transform everyday objects such as doors, tables, books, lights, or even the flux of air and water into computational interfaces. According to the director of the *Tangible Media Group* at the MIT Media Lab, Hiroshi Ishii, these interfaces would allow users to access and manipulate digital data (such as videos, graphics, and 3D models) merely by use of the innate knowledge they have acquired in their dealings with the physical objects of the real world: "If you can pick up a mothball, you can run Ishii's computer" (Ishii & Ullmer 1997). The "computer" developed by Hiroshi Ishii and his team is a small room augmented with light, sound, air and water flow all controlled by a computational system. In this space, patterns of light projected from the surface of moving water reflect on the lab's ceiling to communicate the activities of a hamster (the lab's pet). Other light and sound signs (for example, bird songs and thunder) signal incoming e-mails. Other *Net* traffic and past activity can be retrieved by turning back the hands of a physical clock.

In *augmented reality*, the hybridization of physical and virtual spaces is accomplished through devices designed to overlay graphics, texts, and other computational data to the interactor's perception of the environment. Most of the research focuses on developing head worn "see-through" displays that track the 3D position and orientation of the user's head (with six degrees of freedom: three of position and three of rotation). Based on the tracker's input, the system can overlay digital data, that is, visual and audio information, aligned with the user's point of view of the physical environment. For example, graphics and text overlaid on the surrounding environment could indicate how to operate, maintain, or repair a broken piece of equipment without requiring the user to refer to a separate paper manual (cf. Feiner 2002).

Body architecture

Inspired by these ideas, I have been developing an intelligent environment called *Body architecture* (Figure1). This environment is a research platform for investigating different forms of natural multimodal human-computer interaction. *Body architecture* involves computer vision as well as speech and gesture recognition systems connecting the medial and physical spaces to what their inhabitants are, to what they do or say. The system is conceived to be invisible to the users, so that these can communicate and interact with it in a natural way.

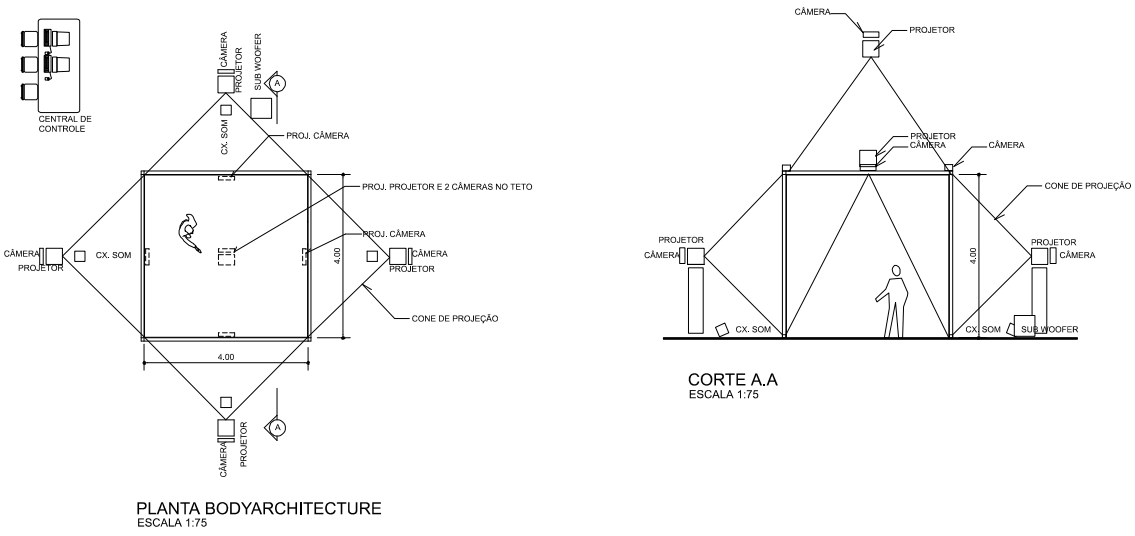

Figure 1. Body architecture.

An example of interaction with this system is the following: A user walks into a room, which measures four by four meters and is four meters high. The four walls, the floor, and the ceiling are blank and two-dimensional. As the user walks in, the thump of his or her feet alters the balance of the inert space until the center is reached. At this moment, the bodily activities are projected against the walls, which creates an impression as if the walls begin to move in a three-

dimensional, fluid manner. Furthermore, a hidden audio stereo system records and broadcasts the body sounds, such as the heart beats, the sounds of breathing or of vocal utterances. By such embodiments, the user will receive an impression of the architectonic impact which the complexity of changes may cause. The system also supports verbal interaction. By means of vocal commands, the users may not only reshape their surroundings, but also manipulate, control, command, explore, and record the data produced by the system. For example, the users may command the walls to disappear, and the system will provide actual external information and capture scenes from the surrounding world converted to digital video signals by means of a video mixing technology similar to the one developed for special TV effects.

The physical installation of *Body architecture* is the 4x4x4-meter room described above, furnished with six LCD projectors, one covering each of the four walls, on for the floor and one for the ceiling. There are ten video cameras, five used by computer vision systems and five for showing external information, an audio stereo system, and an array of computer controlled devices, such as temperature and pressure sensors and motion detectors. The workstations that perform the room's computation, so to speak the system's "brain", are placed in an external area.

The early stages of design and construction of *Body architecture* have focused on computer vision and speech recognition systems. The next phase will be directed toward connecting the various components of the room, for example, tracking and speech recognition systems, to each other and to internal and external information stores (interactor, cameras, and internet data). To accomplish this objective, a software architecture that allows the room to run in real-time will have to be developed.

op_era: A journey through parallel dimensions and multisensorial experiments

A second project, *op_era*, is a VR (interactive and immersive virtual reality) environment conceived and implemented in co-authorship with Daniela Kutschat (Figures 2 and 3).

Imagine a world in which your eyes are of no use and the only way to communicate is through sound. You are blind so that information exchange and spatial cognition occur only through acoustic interfaces. This is the design of the first dimension of *op_era*. There is nothing but darkness filled with sound.

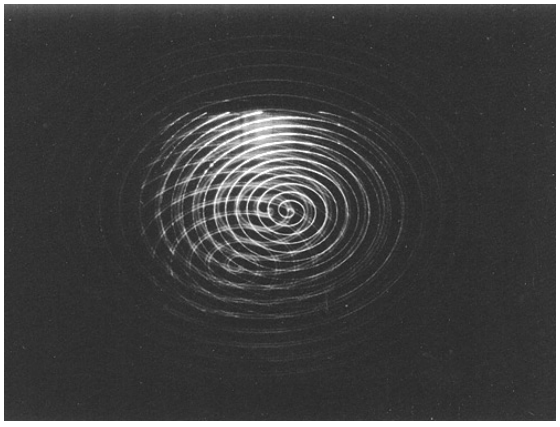

Figure 2. opera01.

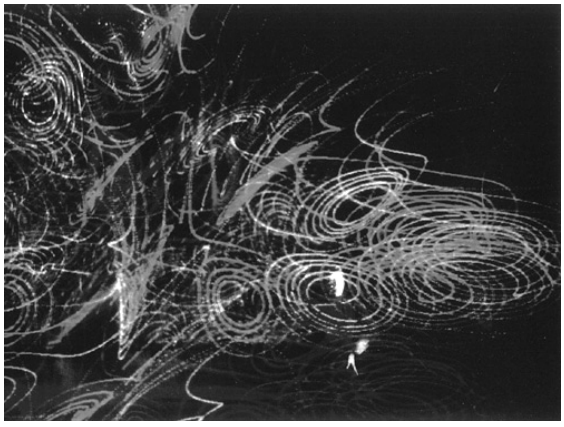

Figure 3. opera18.

Conceptually, this first dimension is a straight line realm. Space is a finite segment to which users are restricted. Since both the body and the space in which the users move in *op_era* are conceived of as integrated mutating fields the body alters the "linescape", and, conversely, the "linescape" gets its revenge by altering the user's perception accordingly. Thus, sounds may come from the left, from the right, from nearby, or from far away as a result of the user's specific position within those imaginary segments which determine the users and how much they can know about this world. The rule

is that the user, by emitting sounds, changes the condition and the shape of the entire environment, but users should take care since they may also fall into another dimension. However, they should not be upset if they do, since an extra dimension may also be of benefit for the user within this environment. Even if the user is still confined to a finite and limited space, it is nevertheless a huge flat plane, and the user has a lot more room to move around. In this "flatscape" there are four points of orientation, unimaginatively called N, S, E, and W. Since the user's body is part of the spatial scheme, the user can move in these four directions forward, backward, to the left, and to the right.

As the user wanders around, he or she reshapes the world. By touch, the invisible is revealed. What was once straight may become curved, and thus, what was once a humdrum "flatscape" may unfold into "multiscapes". Nevertheless, the users must not get carried away by all this dynamics. Instead, they should remember that space is here still confined to a finite, limited plane, and in trying to exceed its limitations, users might step out of it.

Consider the following descriptions and comments as living examples of experiences in this environment:

> Watch out! There is a green triangle crossing your path. – Duck! A blue circle is orbiting round your head. Now, a tiny red square is suddenly growing exponentially and threatening to fill the entire space. This is one hell of a situation, but, don't panic – you have your choices. If you remain perfectly still, the intruding forms will avoid you and change their directions, transforming themselves randomly, according to the intrinsic qualities of their shapes. If, however, you choose to confront the intruders (like a super cy-hero) and collide with them, the resultant shock will cause them to dissipate into brand-new, meek forms and colors from the generative matrixes.

In this progressive digital scenario, newly born forms start to emerge chaotically throughout the environment. As they emerge, they rush to entangle the user. It must be noted that users and each of the forms act as particles of the same evolving system. Any action taken, as well as any interference with other forms changes the shape of this "timescape". Even the users' thoughts may trigger unexpected turbulence.

The first public demonstration of this prototype took place on 24 and 25 May, 2001, at *Centro Cultural Banco do Brasil* (CCBB) in Rio de Janeiro.[6] We are now developing at ItaúLab in São Paulo[7] resembling a prototype of an automatic virtual environment (*CAVE*). Its implementation focuses on research and development of: (1) scientific and artistic models of space (the first version encompassing 1D, 2D, 3D, 4D-spaces); (2) man-machine interfaces (hardware and software), especially designed for environments where human agent and artificial engine are symbiotically interconnected; and (3) alternative ways of spatial perception and cognition.

References

Cantoni, Rejane. 2001. Realidade virtual: Uma história de imersão interativa. São Paulo: Phd thesis, Pontifícia Universidade Católica.

Feiner, Steven K. 2002. Augmented reality: A new way of seeing. Scientific American 286.4: 34-41.

6 Credits: concept and realization by Daniela Kutschat and Rejane Cantoni; choreography concept and performance: Ivani Santana; music and performance: Fernando Iazzetta; technical support and input device: Pedro Perez Machado; software: Márcio Calixto Cabral; light: Simone Donatelli; graphic designer: Eduardo Phillip; costume: Lena Kosnett; executive producer: Dora Leão; research founding agencies: FAPESP, CAPES. Co-sponsors: Centro Cultural Banco do Brasil (CCBB) – Rio de Janeiro. Thanks are also due to Universidade Anhembi Morumbi, CAP-ECA/USP, LSI Poli/USP.

7 ‹http://www.itaucultural.org.br/index.cfm?cd_pagina=228› (19.04.2005).

Hockenberry, John. 2001. The next brainiacs. Wired (August): 94-105.

Hiroshi Ishii & Brygg Ullmer. 1997. Tangible bits: Towards seamless interfaces between people, bits and atoms. In Proceedings of CHI'97: ACM Press, 234-241.

Kahn, Jennifer. 2001. Let's make your head interactive. Wired (August): 106-115.

Weiser, Mark. 1995. The computer for the 21st century. Scientific American. Special Issue: 78-89.

Website: ‹http://www.itaucultural.org.br/index.cfm?cd_pagina=228› (19.05.2005).

Mapping the territories of being

Christina Ljungberg

In the last century, we have witnessed the development of painterly techniques that allowed for an existential subject-object inversion, with the artist's body functioning as both. At the beginning of the twenty-first century, sophisticated technologies have enabled artists to probe further by providing them with unprecedented means to explore what it means to be a body, to have a body, and to be in relation to other bodies of the inorganic, organic, institutional and digital kinds. In this sense, the body is not only a noun but also a verb: it is not only a state of being or possession but also a set of dispositions and abilities that make performance possible.[1]

In particular, these explorations concern body boundaries which, in view of the changing nature of the human body, have become both ambivalent and problematic. The insight that our bodies are not material entities but are made up from cells and tissues that could rather be seen as "regulatory interfaces of interaction occurring between their internal and external environments" (Julio Bermudez 2001: 169), makes even life itself a "boundary conditions" phenomenon (Brooks and Wiley 1988). In a constantly changing environment, each organism's or system's "boundary conditions" must be incessantly monitored, since they are forever acting towards responding to internal and external demands.

As Jesper Hoffmeyer (1998) argues, these natural processes have a semiotic dimension which makes them instances of "semiotic emergence". Even a biological system as simple as a bacterium is capable of selecting and interpreting information from its environment according to an internal standard created through evolution and which manifests itself in highly complex information processing, corresponding to what C. S. Peirce (CP 1.372) called "semiosis" or sign interpretation. Despite the fact that a system's semiotic dimen-

1 I would like to thank Vincent Colapietro for useful comments on an earlier draft of this paper.

sion depends on the organization of its constituent material components, our universe has an inherent capacity to produce organized systems that increasingly achieve more autonomy, thanks to the second law of thermodynamics. This process ultimately leads to the creation of self-conscious and intelligent beings in a culture that these both actively form and are formed by.

Hence, as Lucia Santaella (1998) has shown, the differences between nature and culture cannot be resolved by looking at the two as opposites. Instead, they represent stages in the range from more rudimentary forms of life and culture to more complex ones, such as human societies with our unique capacity for using symbols. This ability evolved with the development of the neo-cortex and coincided with the biped position which freed our hands to make gestures and tools, which, in turn, led to the development of painting, drawing, writing, and other extensions of sign-making outside the body itself. The so-called postbiological era is thus not a passing fad, but, rather, the result of an evolutionary process that started with the emergence of the neo-cortex and the beginning of speech; a process which has since developed with the aid of sensory (visual and auditory) and intelligent machines to extend cerebral growth outside the human body – to the point that it no longer corresponds to the body we see in the mirror.

This development has also caught the attention of artists who are problematizing the boundary conditions between humans and machines, constantly redesigning them in order to create interfacial disturbance to voice their visions and their concerns. This is by no means a new development. In all places and at all times, artists have used technology to mediate their visions and aspirations. What is striking about today's artists are the means at their disposal to, for instance, remodel the body; to scrutinize it by means of various medical equipment; to wire it into cyberspace or to extend the

bodily parameters by augmentation, that is, by various kinds of prostheses, in order to transgress the borders between the real and the virtual, and to blur the distinctions between the rational and the sensory and the individual and the collective.

That it should be artists who are at the forefront in the biocybernetic re-dimensioning of the human body is also not surprising, because, since time immemorial, exploring the body and negotiating its boundaries has been a main object of interest in art. In particular, since, as Yuri Lotman (2001: 136) notes, boundaries are "the hottest spots for semiotizing processes of the semiosphere" – they also constitute the space where art thrives, as a mediator between the conventional and the radical, between the internalized and the new and, therefore, uncomfortable. The notion of boundary is in itself ambivalent, simultaneously separating and uniting; it is also where what is "external" is transformed into what is "internal". This ambivalence is what N. Katherine Hayles (1999: 251) has in mind when she says that, in cybernetic fiction, the narrative is "driven by anxiety about body boundaries", as, for instance, what would happen if humans were either taken over by their own components (cells or organs), or were made to function as if they were "components of another entity" (Perriman, quoted in Hayles, ibid.).

These are also the questions addressed by the artists I will discuss here, who all represent different strategies for dealing with various interfaces of interaction between humans and machines. Whereas Pipilotti Rist's video work blurs the boundaries between the human and the machine, between the artist's "psychosomatic symptoms" (2001: 124) and the technical disturbances displayed by her video images, between performer and spectator, and between private and public, Mona Hatoum challenges the body boundaries by turning the scrutinized, scientific body's inside into an "outside",

making the spectator both subject and object, both penetrator and engulfed. Stelarc, finally, presents alternative strategies in the form of various prostheses for a body that, in his view, has become obsolete, in the sense that it has become inadequate and needs to be redesigned. The skin thus no longer functions as the boundary of a body connected to cyberspace; instead, the body becomes metaphysically reconfigured and telematically scaled to sense and function in electronic space.

According to Lotman (2001: 140), "the function of any boundary or filter (from the membrane of the living cell [...] to the boundary of the semiosphere) is to control, filter and adapt the external into the internal". But transformation is never one-sided: it is an ongoing exchange that also has consequences for the internal under pressure of the external. With this in mind, I would like to argue that, by mapping these new territories of being, these artists force us to rethink concepts of identity, boundary and bodily potential by rendering bodily qualities and even hitherto invisible body parts visible, and by extending bodily parameters.

This opens up both interesting and sometimes disturbing visions of a future increasingly prosthetic and biocybernetic humanity, or posthumanity; it also raises intriguing questions about the semiotic implications involved in the representation of the body in cyberspace.

Pipilotti Rist's "boundary blurring"

The video stills (Figure 1), with jagged streaks and bleeding colours blurring the images, show how a woman in red keeps fainting and falling, on the asphalt, on the street car tracks, in the cornfield or on a green lawn. In the next scenario, she jumps into a swimming pool where a mysterious hand is trying to push her under the water surface (Figure 2), and then she tries to climb over a fence but is

Figure 1. [Entlastungen] Pipilotti's Fehler / [Absolutions] Pipilotti's Mistakes: "Falling Series" (Bronfen 2001: 82-83).

constantly pulled back towards the ground as if overcome by the gravitational force. These scenarios from Rist's video work *[Entlastungen] Pipilotti's Fehler / [Absolutions] Pipilotti's Mistakes* (1988) all suggest a struggle against external constraints, of someone struggling against a hostile world and always losing out; they also evoke bodily imperfections and shortcomings – "failures" that are reflected in the bleeding colors that blur the video image, in the jagged streaks across the screen distorting the image, in the crooked vertical holds disturbing our balance, and in the gurgling video sound tracks; in short, all errors of sound and vision that categorize a "bad picture".

According to Peggy Phelan (2001: 43), these technical errors all allude to "symptomatic knots in transmission", which could imply "the charged crossing of the human and technological unconscious". By juxtaposing her mapping of bodily imperfections and failures with the technical mishaps that can happen in the production

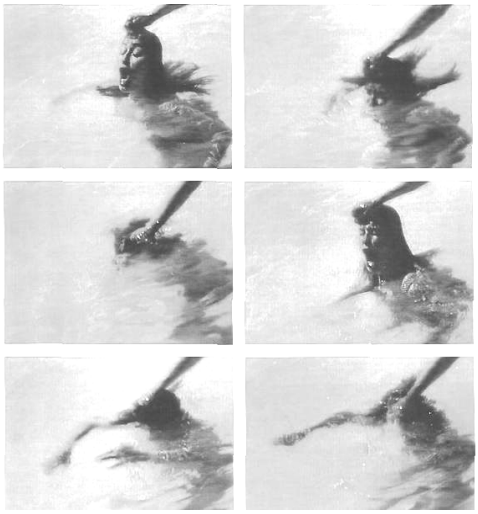

Figure 2. [Entlastungen] Pipilotti's Fehler / [Absolutions] Pipilotti's Mistake: "Submerging Series" (Bronfen 2001: 86).

of audio-visual images, Rist seems to use her video work in order to suggest that this "technological unconscious" might help explain its human counterpart. I would suggest, however, that it is Rist's use of her body to express psychosomatic problems that is particular to this work. In an interview, Rist (2001: 124) talks about how she subjected the images to all kinds of disturbances in order to produce a technological, cybernetic equivalent of a body subjected to societal interference and constraints, and draws a clear parallel between her own body and the machine's ability to perform: "Asking too much or too little of the machines resulted in pictures that I was thoroughly familiar with, my inner pictures – my psychosomatic symptoms".

Rist's technological unconscious seems to exist somewhere between the machine's expression and the viewer's encounter with it, creating a liminal space in-between – analogous to the space produced between a patient on the couch and a psychiatrist. As Elisabeth Bronfen (2001: 80) notes, in *[Absolutions]*, there is a clear allusion to the language of hysteria, the invention in the late nineteenth century by Jean-Martin Charcot in his clinic in La Salpétrière outside Paris. This impression is reinforced by the histrionic quality

of the voice-over alternating with the sound of percussive instruments, which makes the woman's behavior, at the same time hysterical and passionate, performance-like. In addition, the video-work's German title, *[Entlastungen]* – which Rist herself translates as "absolutions" – suggests a staging, too: on the one hand, of the very act of clearing oneself of debt, which is indicated by the woman's gesture of asking for absolution; on the other, of the process of recording failures and inadequacies. As Bronfen (2001: 84) argues, by placing *[Entlastungen]* within brackets, Rist seems to indicate that the relationship between "absolution" and her faults is disproportionate, as if trying to "learn from and even capitalize on the act of representing her faults, her imperfections, along with situations that trouble her or place her at a disadvantage". Despite the video's rhetorical character, it is primarily a performance, alluding to the classical idea of the feminine body as an object of the gaze; at the same time, the woman's self-conscious behavior, her awareness of being seen – also revealed in the voice-over's "I"-narration – make any attempt to localize this body appear problematic.

Rist's thematic and structural celebration of disturbances creates a liminal space in-between which resists conventional categorization and interpretation. Instead, the blurring of the boundaries revokes the division between the feminine body and its spectator, and raises doubts as to whether this body is human or technologically produced, that is, if it is "real" or "virtual". By employing the "technological unconscious" of the video – a profane, everyday object – as a metaphor for the psychosomatic symptoms caused by the constraints of the human unconscious, Rist uses the space in between in order to expand metaphysical limitations by blurring and eroding the divisions between subject and object, performer and spectator, and, in particular, between human and machine.

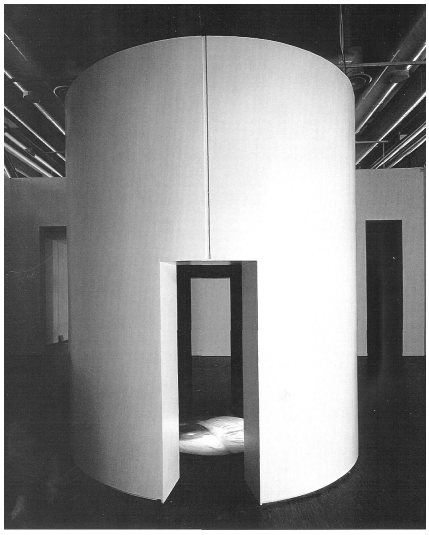

Figure 3. Corps étranger cubicle (Brett 1997: 72).

Mona Hatoum's boundary transgression

By mounting a minute video camera used for medical examinations such as endoscopy/coloscopy inside the openings of the body, Mona Hatoum has her *Corps étranger* (Figure 3) present a more arresting challenge of body limits. Hatoum's video installation shows the movements, the noise and the colors inside the body. In order to watch the video, the spectator has to enter a small, enclosed, intimate space alone, in which the body is – so to speak – entered and watched, from the inside, magnified many times over as to reduce to viewer, in comparison, to microscopic size. The whole scenario forces the spectator to stare down, into a tunnel of churning viscera recorded in claustrophobic detail projected onto the floor beneath the viewer's feet, with the effect as if you would disappear into the huge body enveloping you.

Hatoum (Spinelli 1997: 138) says that *Corps étranger* started as an idea of surveillance and of a "penetrating gaze" when she was an art student. In one early project, she put surveillance cameras in pub toilets and then relayed the live images on a monitor in the bar

area outside for people to see themselves. In another, she used a hand-held camera to film the audience while helpers in an adjacent room mixed the live images with images of naked torsos. By focusing on someone's chest or crotch Hatoum then pretended that she could see through people's clothing by making the clothes fade away and have naked chests, breasts or genitals appear on the video monitor, sometimes mixing up genders or doing "gender-bending". It took her, however, almost fourteen years before she succeeded in finding someone that would film her insides with an endoscopic camera, by which time her project had developed into a video installation.

By forcing spectators to step inside a small viewing cubicle, Hatoum emphasizes that she wants them to feel as if they are on "the edge of an abyss that can swallow you up, the devouring womb, the vagina dentata, castration anxiety" (ibid.: 138). Her cylindrical viewing space functions as a metaphor for a "real" body, giving the spectator the sense of claustrophobia in what seems like a intrauterine existence, a feeling that is reinforced acoustically by the loud heartbeat resounding in the cylinder.

The work's metaphoric title, *Corps étrange*r – "foreign body" – could thus allude to the invasion of the camera into the body similar to that of a virus into the immune system, causing the anxiety about the ambivalence and frailty of body boundaries that seems so symptomatic of the posthuman (cf. Hayles 1999). At the same time, this anxiety could also derive from the feeling of the body's vulnerability in the face of the scientific eye, which invades the body's boundaries and objectifies it.

The title could thus also describe the alienation felt by patients exposed either to the medical establishment, or to the "foreign" insides of their own bodies as they are penetrated and made visible by scientific equipment; it might also refer to the male exploitation of

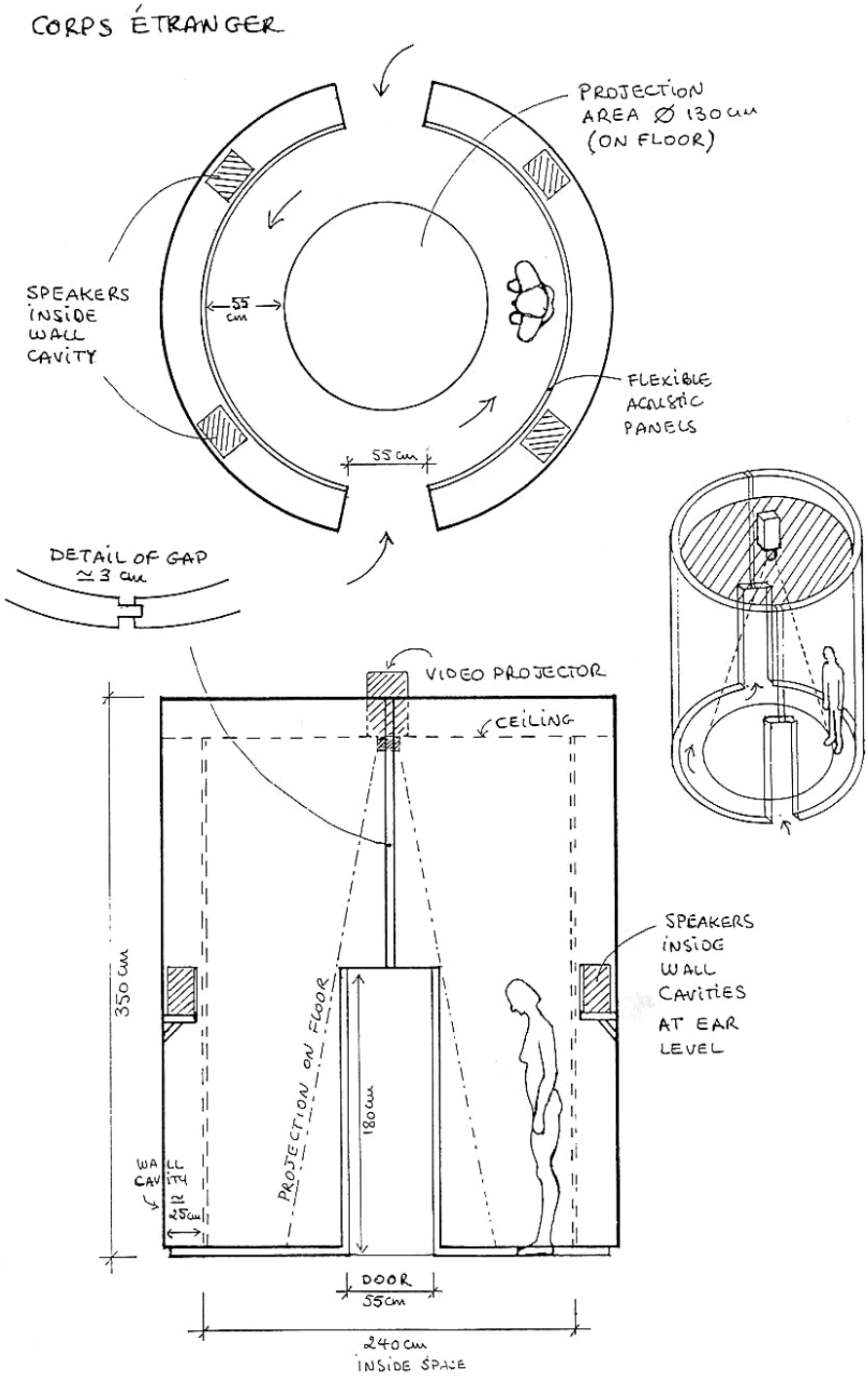

Figure 4. Hatoum's diagram of the viewing cubicle (Spinelli 1997: 137).

the female body as the Other. What is interesting is that, as Guy Brett (1997: 71) notes, in *Corps étranger*, the highly intimate experiencing of the body makes it both genderless and classless, as it mixes "the emotively subjective and objective documentary in an almost hallucinatory way for each spectator" – thus making it represent each and everyone of us. Moreover, Hatoum's work could be interpreted as a commentary on the "abject" in Kristeva's sense, as when one is neither subject nor object since, in the state of abjection, the borders between the object and the subject can no longer be maintained (cf. Penwarden 1995: 22). In *Corps étranger*, the viewer becomes both subject and object, both penetrator and engulfed. The work thus challenges the limits between the outside and the inside of the body, between self and other, between permanence and decay and between present and past. In this way, as Mieke Bal (1999: 142) points out, Hatoum's video installation also wavers both space and time. Space, because the spectator's entire body is inside the visual detail of the body of the Other; time, because the wavering of space entails a temporal dimension: the image of the body was produced earlier, but is only activated once the viewer steps inside (it). The time of the tracking camera, accompanied by the rhythmic sound of the body's movement, when the image tracks from tunnel-like tubes (Figure 5) to the eye itself (Figure 6) is the "real" viewing time, which defines time as both duration and rhythm (ibid.).

Hatoum's posthuman body thus demonstrates the problematic nature of the body in cyberspace. Playing on the ambiguity of body boundaries, on the anxiety of being engulfed by a primordial abyss, the body's churning viscera, on the one hand, and, on the other, by having the camera "probe" the body, invade its boundaries and

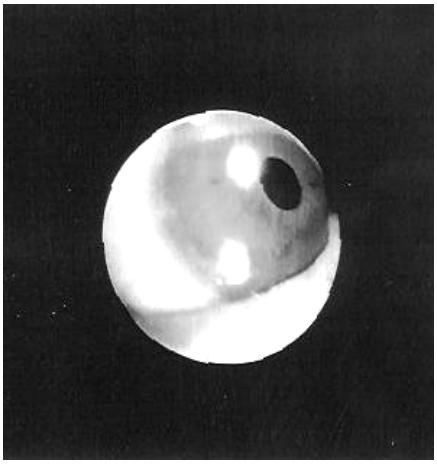

Figure 5. Image from tunnel-like tubes.
Corps étranger (Bal 1999: 144).

Figure 6. to the eye itself.
Corps étranger (Bal 1999: 144).

objectify it, Hatoum transgresses the innermost space of a human being, scientifically documenting and scrutinizing its physicality and its processes in the midst of change.

Stelarc's *Obsolete Body*: Boundary erasure

In a different vein, the Australian performance artist Stelarc presents alternate strategies that do not necessarily represent disembodiment. Rather, the body is becoming "obsolete" in the sense that its peculiar form and its peculiar functions have become inadequate to operate in an intense information field of alien bits of data beyond sensory comprehension, and thus needs redesigning. Stelarc got first known for his Suspension pieces (Figure 7) in which he inserted hooks into the flesh to which single cables were attached. Then the body was hoisted up in the air, the skin stretched and the body assumed its full weight. These cables were the forerunners of the electrical cables used in the Obsolete Body performances, a much later work in which Stelarc is trying to redesign the body by the means of various prostheses in order to overcome the body's short

Figure 7. Stelarc's "Street Suspension". New York, 21 July, 1984.

comings (Figure 8). As he argues (1998: 7), the body's metabolism can no longer "cope with the speed and power, and precision of technology" but, instead, finds itself in alien environments "unplugged from its biosphere". That is why Stelarc finds the body obsolete, in the same way as he finds the notion of an ego-driven body invalid, like a "simplistic, zombie-like body being driven by a psyche, mind or self" (ibid.). The body, then, is not a site of inscription but a physiological structure; it is no longer an "object of desire", but, instead, an "object for redesign". Stelarc (1998: 8) thus differentiates between the common notion of cyborg as a "sci-fi, macho, military, metallic-phallic construct" that undergoes a traumatic loss of organs and, therefore, receives implanted metallic parts, which projects a medical body on life-support systems. Instead, he sees this redesigned body as the opportunity for a multiplicity of bodies that can be separated spatially but connected electronically to become

connected and thus, evolve into a greater operational entity. The Internet, in Stelarc's view, is not a strategy ideal for disembodiment, since you need a physical body to be plugged into the system; instead, it offers a potential for both intimate and involuntary experiences, such as in Stelarc's use of his "Third Hand" and by electronically wiring his own body.

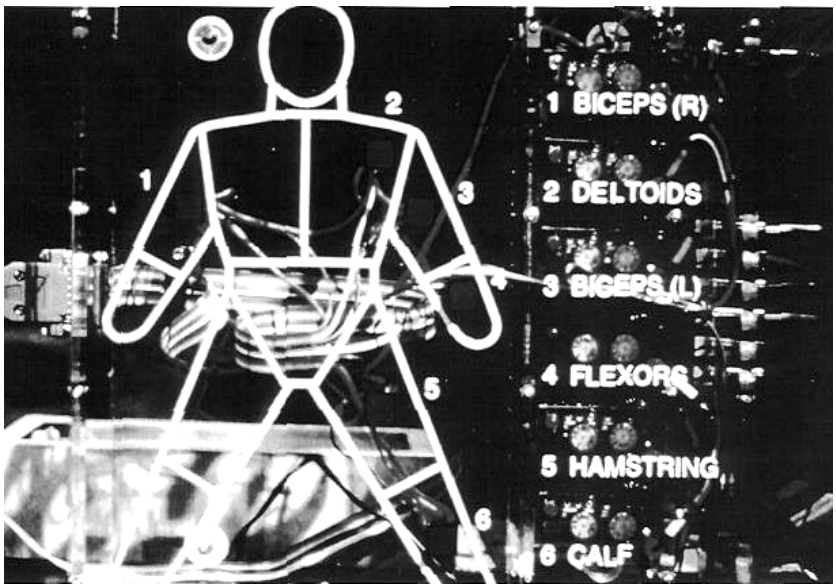

Figure 8. Stelarc's Muscle Stimulation System.
Empire Ridge, Melbourne. Photo: Tony Figallo.

Hence, in a performance such as "Fractal Flesh/Telepolis" in 1995 (Figure 9), during which Stelarc's physical body in Luxembourg was electronically connected with the Pompidou Centre in Paris, the Media Lab in Helsinki and the Doors of Perception conference in Amsterdam, people in these three cities could access Stelarc's body and remotely choreograph its movements using a touchscreen interface. This enabled them to enter another body, namely Stelarc's, in another place, at the same time as Stelarc's body became "a host for the behavior of remote agents" (Stelarc 2002).

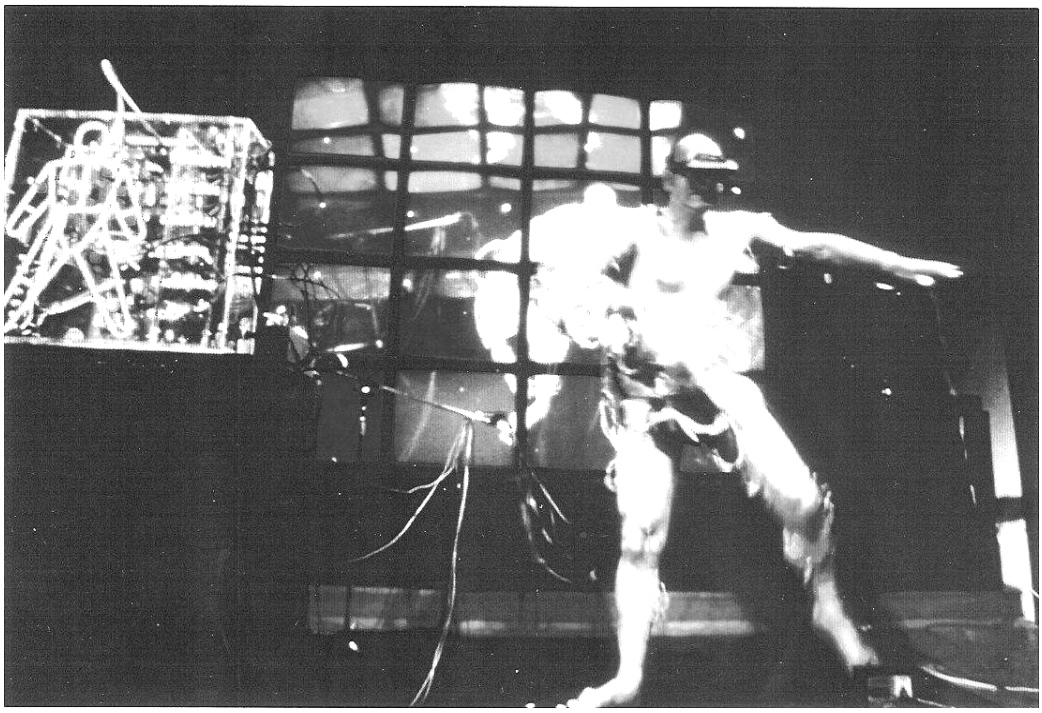

Figure 9. Stelarc's Split Body Performance,
Galerie Kapelica, Ljubljana. Photo: Igor Andjelic.

A different approach was taken at the "Ping Body" performance in 1996 (Figure 10), when the ping protocol (the onomatopoeic word for the sound generated by sonar equipment in submarines) in Unix was used to transmit reverberating signals to global locations – live during the performance – that "pinged" back to the host computer in Luxembourg. The time it took was measured in milliseconds, and these durations were mapped onto the body's muscles through the simulation system.

Thus, this time, the body was moving to the ebb and flow of Internet activity. In "ParaSite" (1997), another Internet performance, a search engine that scans the Internet for images of the body – medical, anatomical, or robotic – was constructed (Figure 11). These images are optically displayed, and JPEG data of these images are then mapped onto the body's muscles, producing involuntary motion.

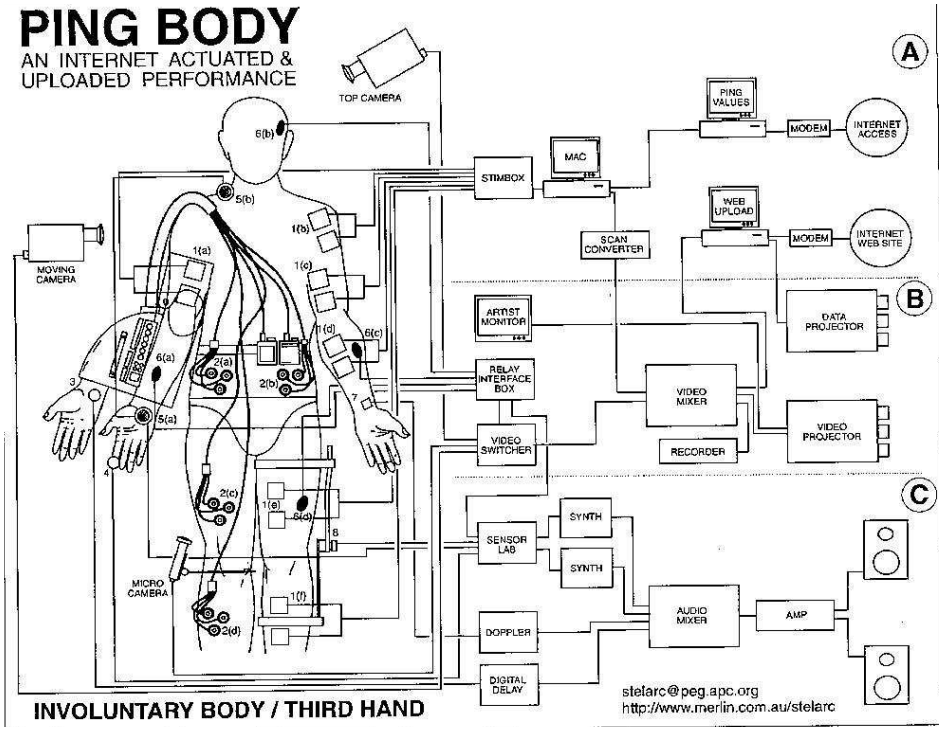

Figure 10. "Ping Body" diagram (1996).

These three performances all indicate attempts to get away from the common notion of a cyborg consisting of a few mechanical organs. Instead, the body is perceived as an operational entity, consisting of a multiplicity of bodies, which are separated spatially but electronically connected by the external nervous system of the internet's search engine software codes. Hence, in Stelarc's performance, the human body has become a "controllable machine" – a manageable entity that can move; moreover, the body's vulnerability and the increasingly complex semiosphere surrounding it are transformed into mechanized muscles and replaceable body parts, as an attempt to surpass our physical evolution and, eventually, our humanity. In particular, the use of the Internet to access, interface and upload the body itself, offers powerful individual and collective strategies for projecting body presence and shaping body awareness. Stelarc (2002) comments:

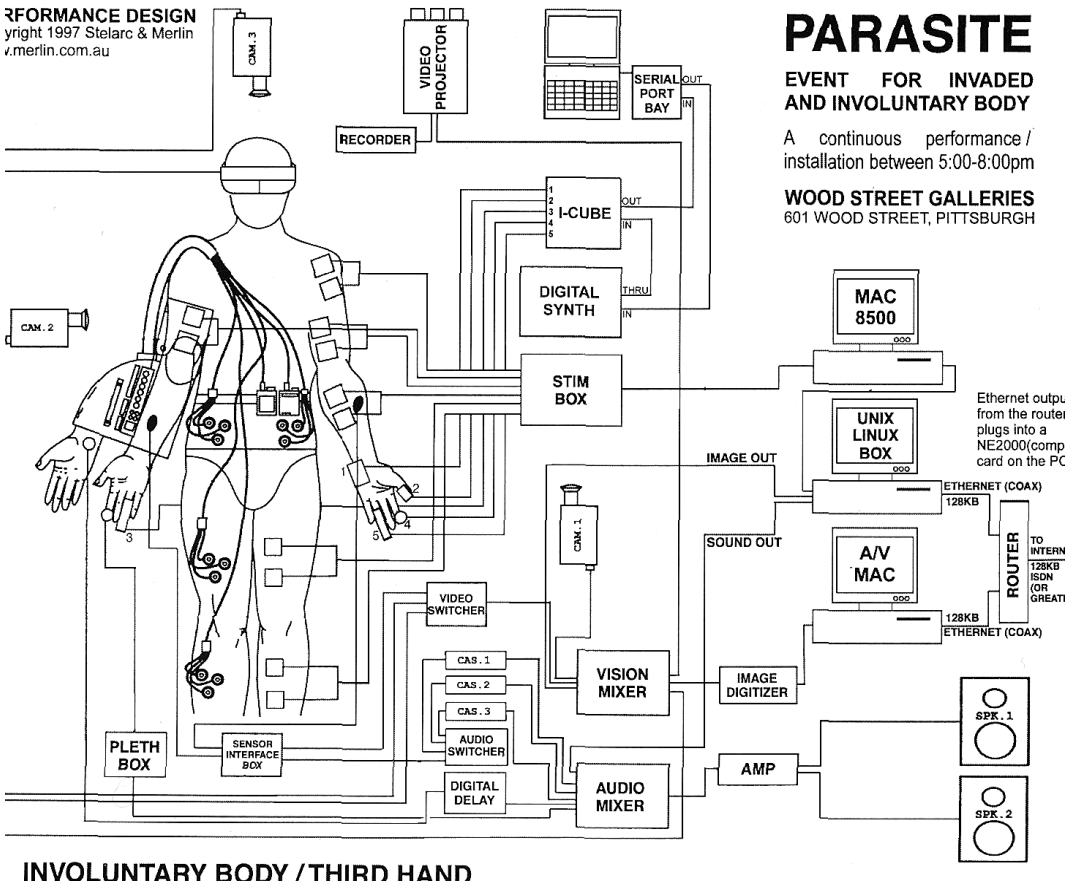

Figure 11. "ParaSite" diagram (1997).

> The Internet does not hasten the disappearance of the body and the dissolution of the self – rather, it generates new collective physical couplings and a telematic scaling of subjectivity. What becomes important it not merely the body's identity, but its connectivity – not its mobility or location, but its interface.

Stelarc's manipulations and probings of "the body" – as an object for redesign – can thus be characterized as a quest to explore and examine the very process of what it means to be posthuman. His work actually engages directly with current ideas of feminist and semiotic interrogations of the body, of identity and of cyborg, even though his ideas are at the extreme. By using the Internet to both

create and question the ways in which the body may exist in cyberspace, Stelarc is incessantly exploring not only the potential for extending our bodily parameters by prosthetic augmentation but also our relationships to the cybernetic technologies surrounding us that we have created; and, perhaps most interesting, how we can imagine ourselves in virtual space today, how we might exist in a cybernetic future, and how we, as physical bodies, can interact with it.

Semiosis of the body in cyberspace

What are then the semiotic implications of the representation in art of the body in cyberspace? From a Peircean perspective, the relationship between sign and object can either be iconic, indexical or symbolic, i. e., characterized primarily by its similarity to its object, its spatio-temporal or causal relationship to it or by its conventionality: the relationship between a symbol and its object depends on cultural conventions. In image production, this relationship is directly dependent on the medium: as Lucia Santaella (1997: 129) notes, whereas painting, the manual production of images, is primarily symbolic, since it is determined by cultural considerations; a photographic (or video) image is mainly indexical, by way of its production and because it functions as a "double" of the material world. Images in cyberspace, however, despite their being the result of abstract and logical calculations, are predominantly iconic and function as "gateway[s] to the virtual world" because of the iconic effect they are able to produce (ibid.).

Looking at the representation of the body in the works by the three artists we have discussed, we see that, the body in Pipilotti Rist's *[Entlastungen] [Absolutions]* is reproduced as a "double" of the material world. It has been "seen" by a video camera and focalized by the artist. However, the various kinds of disturbances that Rist has exposed the video images to – about twenty-five different

kinds of interference (Rist 2001: 124) which have caused the bleeding colors, the jagged streaks across the screen, and the unsteady vertical holds, among others – make her representation of the feminine body reminiscent to that of manual art forms such as painting, where the artist streak by streak creates an image. Rist herself also sees her video images as being closer to "paintings behind glass that move" (2001: 124) than to the electronically recorded images usually produced on video. Hence, the comparison of the machine's and the body's "psychosomatic symptoms" functions in a traditional metaphorical sense, as an artist's vision by way of a machine of how to deal with the pressures put on the feminine body in society. The representation of the body serves to close the gap between the image and the world, which makes it predominantly symbolic (cf. Santaella 1997: 129). In this case, the immediate object, i. e., the female body the way it is represented in the sign, "really" suggests the dynamic object, the object outside the sign, which is the "real" female body, although this is a reality that is ultimately unattainable.

In contrast, Hatoum's scrutinized body thrusts us into an illusionary intrauterine experience in which we are enclosed by the cylindrical viewing cubicle and the loud heartbeat. Although this experience, too, has a strongly metaphorical character, the representation of the body is much more problematic because it is ambiguous. In *Corps Étranger*, we are both "inside" the churning body viscera which is strangely familiar and "outside" this representation of a body, looking at it as a foreign object. As Lucia Santaella (2003) suggests, in cyberspace, the body, as object of the sign, exists in a divided condition, which makes its representation in cyberspace an example of primarily indexical semiosis. In this example, it assumes an existing connection between the immediate object, i. e. the body viscera in the projection, and the dynamical object, the "real"

human body outside the sign. This is also supported by the strongly indexical relationship which, in turn, is created between the viewer's body and the projected inner body passages, which makes this a simultaneously emotionally subjective and objectively documentary experience. The almost hallucinatory feeling that stepping into this "scrutinized" body produces would, I think, qualify for an analysis along these lines and thus foreground the indexical element.

But what about the biocybernetic, prostethically augmented body in Stelarc's work? I would suggest that the representation of this body, too, predominantly involves indexical semiosis, since, as Stelarc himself points out (1998: 8), he depends on a physical body to be plugged into the system both to use his Third Hand for a remote control performance such as "Fractal Flesh/Telepolis" (Figure 9), to map the body muscles through a simulation system (Figure 10) or, by connecting it with the Internet, to make the human body a parasite to the parallel virtual world (Figure 11).

How do we perceive these bodies? As Santaella (1993: 43) argues, according to Peirce, perception is triadic: not only is there a perceiver and a perceived, since we are "alerted to an essential duality, in which there is something which lies outside us and which is presented to us" but we also need the mediation of perceptive judgement. By introducing the term *percipuum*, Peirce has the percept fulfil the logical role of the dynamic object, the *percipuum* that of the immediate object while the perceptive judgement acts as the sign-interpretant, the sign of the future sign.

In Stelarc's case, his biocybernetic body is not only augmented through various prostheses but also through symbolic models. The virtual body created by the digital setups in, e. g. the "Ping Body" (Figure 10) signal duration or, in the case of the "ParaSite" (Figure 11), the transformation of the body by various types of Internet JPEG images, thus turns it into a dynamical object or a percept

deriving from a symbolic, abstract model. In fact, the biocybernetic body becomes divided into two complementary media (cf. Santaella 2003): one body which remains carnal and "real" in the environment it exists and its avatar, which is the virtual, disembodied projection of the "real" body. For us, as viewers, it is thanks to our perceptive judgement that the physical body remains carnal and "real" that we are able to maintain proprioception, the sensation of self from within the body, which is a crucial ingredient in the interaction between perceiver and perceived that allows for the growth of signs. This is, after all, what also helps us to maintain our sense of self and, as such, forms the bodily basis of our ego, which prevents us from losing ourselves in cyberspace.

References

Ayers, Robert. 1998. Obsolete body/Alternate strategies: Listening to Stelarc. Live Art Letters 3 (February): 1-2.

Bal, Mieke. 1999. Quoting Caravaggio. Chicago: University Press.

Bermudez, Julio. 1999. Between reality and virtuality: Toward a new consciousness. In Roy Ascott (ed.). Reframing Consciousness. Exeter: Intellect, 16-21.

Brett, Guy. 1997. Itinerary. In Mona Hatoum, eds. Michael Archer et al. New York: Phaidon, 34-87.

Bronfen, Elisabeth. 2001. Focus: [Entlastungen] Pipilottis Fehler ([Absolutions] Pipilotti's Mistakes). In Pipilotti Rist, eds. Peggy Phelan et al. New York: Phaidon, 78-91.

Brooks, Daniel R. and Edward O. Wiley. 1988. Evolution as entropy: Towards a unified theory of biology. Chicago: University of Chicago.

Hayles, Katherine N. 1999. How we became posthuman. Chicago: University Press.

Hoffmeyer, Jesper. 1998. Semiotic emergence. Revue de la penseé d'aujourd'hui 25 (7/6): 105-117. ‹http//www.molbio.ku.dk/MolBioPages/abk/PersonalPages/Jesper/SemioEmergence.html› (19.04.2005).

Lotman, Yuri. 2001. Universe of the Mind: A Semiotic Theory of Culture, transl. Ann Shukman. London: Tauris.

Penwarden, Charles. 1995. Of word and flesh. Interview with Julia Kristeva. In Stuart Morgan & Frances Morris (eds.). Rites of Passage: Art for the End of the Century. London: Tate Gallery, 21-30.

Phelan, Peggy. 2001. Opening up spaces within spaces: The expansive art of Pipilotti Rist. In Peggy Phelan et al. (eds.). Pipilotti Rist. New York: Phaidon, 32-77.

Peirce, Charles S. 1931-1958. Collected Papers, vols.1-6, eds. Charles Harthorne & Paul Weiss, vols. 7-8, ed. Arthur W. Burks. Cambridge, Mass.: Harvard University Press.

Santaella, Lucia. 2003. Culturas e artes do pós-humano: Da cultura das mídias à cibercultura. São Paulo: Paulus.

Santaella, Lucia. 1997. The prephotographic, the photographic, and the postphotographic image. In Winfried Nöth (ed.). Semiotics of the Media. State of the Art, Projects, and Perspetives. Berlin: Mouton de Gruyter, 121-132.

Santaella, Lucia. 1993. A triadic theory of perception. In René Jorna et al. (eds.). Signs, Search and Communication. Semiotic Aspects of Artificial Intelligence. Berlin: de Gruyter, 39-47.

Spinelli, Claudia. 1997. Interview with Claudia Spinelli 1996. In Mona Hatoum, eds. Michael Archer et al. New York: Phaidon, 134-143.

Stelarc. 2002. Performance at the Hochschule für Gestaltung and Kunst, Lucerne 16 April 2002. ‹http://www.stelarc.va.com.au/› (19.04.2005).

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