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Reassembling the Literary

Toward a Theoretical Framework for Literary Communication in Computer-Based Media

"*New* topics, that's what you need ANT for."
Bruno Latour (*Reassembling the Social* 142)

1 Literary Processes: Continuities and Discontinuities

Literature does not appear from nowhere. It is usually created by human beings using certain social practices, falling back on cultural traditions and employing certain technical means. In these hybrid arrangements one finds that on the one hand anthropological dispositives and on the other historically variable roles, literary procedures and structures like genres and media dispositives and infrastructures (ranging from the printing press and the book to modern computers, networks and interfaces) are connected in a very complex way. These constellations determine and simultaneously restrict the possibilities of literary communication. They create a flexible connection between "technological-mediated" and "literary-aesthetic" moments that actually upholds *all* literary processes in *all* media.

However, it has been taken almost for granted until the present that research in *literary studies* largely concentrates on those texts that have been written by known authors, and then afterwards edited by publishers and distributed as literary "works" in printed books or periodicals in order to be read by anonymous readers in silence. Even though on the one hand almost all aspects of this literary system have been problematized—at times even radically challenged—both in theoretical considerations and in detailed historical studies during the last decades, on the other hand, the subject areas of the disciplines in literary studies have been successively widened within the framework of an expanded concept of literature, including the analysis of theater performances, radio plays, audio books, movies and TV broadcasts to computer games and works of "electronic literature." Nevertheless, one has held on to the traditional personal and institutional attributions as a rule for (quite understandable) reasons of research-pragmatics and -strategies in everyday discourse as well as in practical research. And this is the case even though such dissimilar analyses like Friedrich Kittler's media-archeological studies, Gérard Genette's ideas on paratexts, or the works by Elizabeth L. Eisenstein and Michael Giesecke on

the history of book-printing have shown that book culture as we know it today is a phenomenon built on a multitude of requirements, a culture that in no way is prevalent in all cultural and social contexts, and that is at the same time historically quite young and possibly also—at least as a dominant medium—a transitory one.

With the far-reaching reorganization of a large part of our everyday private and professional production, transmission and reception of messages to the latest computer-based and networked media technologies, however, the conditions have become all the more complex since by way of these media no one element of the series of activities of production, distribution and reception can be changed or replaced without leaving the others untouched. Rather, with the new media-technological appliances and infrastructures, *all* the social possibilities of action and cultural practices of the human actors are shifted. Specifically, the question of the agency of non-human actors raised by the Actor-Network Theory (ANT)—originally in a much more general reference to all non-living objects—acquires considerable significance:[1] Computer systems and networks are not mere channels for the transmission of messages. In contrast to print media that only aim at storing and transmitting its input, computers are able *to process* signifiers according to a program and thus to generate an output that can neither be predicted nor kept fully under control by writers or by readers. Dispositives of media emerge that were unknown beforehand, encompassing an unfamiliar and insufficiently tested spatial and temporal organization, demanding of its users quite different ways of behavior dealing with technical apparatuses and in communication with other human actors.

But this is only one side of the story: As the science historian Olaf Breidbach correctly underlined, technical innovations "stellen meist nicht den gesamten Prozeßablauf in Frage; sie werden an vorhandenen Strukturen angesetzt oder modifizieren einzelne Prozeßschritte" ('usually don't challenge the whole process; they are applied to existing structures or they modify individual steps of the process') (39) within contexts that otherwise remain mostly unchanged. This means that regarding the literary pieces I am focusing on, we are always dealing with both complexly interwoven persistent chains of tradition *and* with discontinuous moments.

2 New Associations: Actor-Network Theory in Literary Studies

Below, following Breidbach's thesis, I will therefore deal with shared literary "structures" and "processes" on the one hand; on the other, however, with the momentous change of "steps of processes" that are influenced by the use of

programmable and networked media using ever-changing interface and display technologies. In the course of this, I will also raise the question where the common interests in concrete cases lie that still connect genuinely *literary* communications in *all* media dispositives. In other words, the question will be asked in what way *the literary*—that has been analyzed as a phenomenon of a quite specific experience of difference for literature in book culture—continues to be valid for literary processes in computer-based media.

Not only does this seriously challenge traditional literary studies that have been forced to take the role of the latest media technologies into consideration, but also the electronic literature and new media art communities that until now have mostly tried to avoid the difficult task *of joining both aspects*—the question of the changed media dispositives and possibilities of acting, just as much as the question of literariness of the observed objects. Instead, they often amount to nothing more than limiting themselves in the analyses of the *conditions* of interaction and communication. Therefore I believe that some approaches from (interdisciplinary) directions of research—such as the Actor-Network Theory (e.g., Bruno Latour, Michel Callon, Antoine Hennion, John Law) or the latest approaches from semiotics, linguistics, neurosciences, computer sciences, game studies, etc.—should also be used for questions about *literary* studies, thereby playing a decisive part for the further development of theories and methods in the future.[2]

If one wants to understand how moments of historical continuity concur with those of discontinuity, then several factors—or more precisely: above all the "translations" *between* these factors—have to be considered in order to reconstruct the *new associations* resulting from this. Below I would like to provide some cornerstones of a theory of literature in computer-based media and foreshadow some promising perspectives of further research. We will have to consider—and this will be a constitutive part of my suggestions—whether analogous to Latour's attempt of newly defining *the social* we can also attain a similar definition of *the literary* by attempting to define it "not as a special domain, a specific realm, or a particular sort of thing, but only as a very peculiar movement of re-association and reassembling" (*Reassembling the Social* 7).[3] Literature then would result from "an association between entities which are in no way recognizable as being [*literary*][4] in the ordinary manner, except during the brief moment when they are reshuffled together" (65).

In order to do this, I will proceed heuristically considering the following factors that in reality cannot be clearly differentiated from each other and of which each of them is not sufficient to define "literature." My contention is that nevertheless the *association* of these factors sharpens our knowledge of the literary. My further contention is that this shows especially clearly with the example of literary processes in computer-based media:

- *Language and text*: Any form of literature appears in texts, i.e., in principle it operates with letters in the medium language; that is, with discrete, discontinuous and arbitrary alphanumeric signs und with the combination of these signs.[5] I hold on to this important premise specifically to continue delimiting "literature" from other forms of art—something that in no way precludes that intermedial references occur. With Ludwig Jäger's theory of "recursive transcriptivity," which in the transcriptive logic of language is the basic principle of any production of meaning, different forms of intra- and intermedial references can be analyzed.

- *Media technologies and infrastructures*: Linguistic signifiers must be inscribed into some kind of material medium in order to be communicated. To understand the difference between media operations in computer-based and in other technical media, the relationship between human language and computer code—quite literally as a rule for translating a piece of information—has to be especially considered. Computers can process digital data in a *program-controlled* way, they allow for *interactive* interventions by users via different interfaces and they can be *networked* via data lines with other computers. By way of these characteristics, the medializing of cognitive processes has changed and a new logic of the processing of linguistic signs within and between different media has been establishd that so far for literature has only been analyzed rudimentarily with regard to changes.

- *Social practices*: Thereby also the traditional activity-roles in literary communication change. In place of the translations between temporally successive, spatially separated and clearly delimited steps of production, distribution and reception of communication via the medium book, now chains of translations enter in which the agency of human and non-human actors is distributed in a completely different way. This also changes the physical practices in dealing with linguistic signs.

- *Literariness*: As a final point, I will concentrate on the blind spot of these notions of agency, namely the literary characteristics of such chains that has to emerge from the interplay of "author(s)," mediated "works" and "reader(s)" in computer-based media.

3 Theory of Mediation: The Emergence of the "Work of the Work"

3.1 Chains of Translations

Even though ANT has not been designed as a theory of media, it nevertheless contains an *implicit* theory of media (cf. Thielmann, Schüttpelz and Gendolla). The increasing interest in ANT in cultural and media studies thus can be mainly substantiated with the fact that it does not define media through the traditional media-technological apparatuses alone. Rather, ANT's ideas are focused on the concept of *mediation* that takes its point of departure from recursive processes in social *and* technical *chains of translations and operations*. In principle, *all* mediating factors of the socio-technological world are seen as so-called *mediators* in these chains.[6] This makes it possible to reconstruct the steps of mediacy made by way of chains of translations between *persons, artifacts, and signs,* by which the forms of agency between the factors involved are being built, connected and redistributed (cf. Schüttpelz 236f.).

With these translations, people, material artifacts and signs are per se *mediated*; one could say just as well: they are constantly referring to each other recursively.[7] Thus, during each process of translation *all* factors included and thus their relationship to each other are changed. Such a concept avoids a media-terminological determinism by exposing every seemingly decisive factor as a factor of translation which through its "in-between" is always at the same time an effect of antecedent linkage as it is a cause for the following. Therefore, the agency is to be found in the *operative process* itself to which all actors coordinated by it are adapted, i.e., every kind of unit has to be seen no longer as a precondition, but always *as a result* of media operations as well.

This concept of chains of translations was first developed by Latour in *Science Studies* and finally taken up again in his critical revision of sociology.[8] By contrast, aesthetic questions have rarely been of interest to ANT. For example, Antoine Hennion has taken up the concept for music studies; *musical* mediation serves him as a model for the "collective" production of *aesthetic* processes. This is of interest in our context insofar as in the case of music the traditional subject/object-divisions as well as the ideas of the "closed work" do not at any rate function in the same way as they seem to function in the realm of the arts or literature. The "reality" of music, according to Hennion, lies in its time-dependent and fleeting event-character, or rather in its *appearance*; it can only be found when different media, instruments, scores, languages, physical techniques, competences and tastes etc., are mobilized in a *common space*:

> . . . speaking of mediation is acknowledging that something effectively "happens" in this process, which transforms the ways things were before; an "event" occurs which has a positivity of its own that cannot be limited to its origins and determinants, no more than to its effect. (Hennion and Grenier 346)

Thus, the theory of mediation transgresses the traditional work-model, replacing it with a processual description of the object in which chains of translations are conceived of as "circularité des médiateurs" ('circularity of mediators'): "une théorie de la médiation qui la définisse non par un état, mais par une oscillation entre deux états" ('a theory of mediation that defines it not by a state of being, but by an oscillation between two states') (Hennion, *La Passion musicale* 369f.). If we still want to speak of a "work" as a unit that can be addressed, then we find it only in the chains of translations *themselves*, i.e., the "work" *is* the mediation or rather—as Hennion and Grenier are expressing it in an illuminative *bon mot*—the "work of the work":

> The mediations are neither mere means of the work, nor substitutes which dissolve its reality, and their revelation is not an act of unveiling which leaves the king naked. . . . And then, at certain moments, on top of it all—that is to say, in addition to this set of mediations—something might happen. Something may emerge from this mix and that may be the "work of the work" of art. (Hennion and Grenier 348)

3.2 From Language to Cybertext: Recursive Transcriptions

Latour's recourse to semiotic theories has been repeatedly criticized and with partly convincing arguments.[9] Since in literature we are dealing with a linguistic subject area, we can initially put aside these concerns since they can be dispelled by considerations on the intra- and intermedial linguistic form of the kind of mediation as it was developed by the German linguist Ludwig Jäger with the term *recursive transcriptivity*. As he illustrates in his contribution to this book, a theory of the literary human-machine communication can also profit from considering the *transcriptive logic* of language as a fundamental procedural logic of mediality for the creation of cultural semantics. Language is the anthropological *archetypal medium* of cognitive integration. Thus it is only by semiological processing that meaningful inner representations are created in people's minds. This happens by forming networks of signifiers from multisensory experiences. These networks are the starting point for the creative invention of mental episodes, which then need to be externalized by communicating them

through media, whereby technical media, i.e., "things" in Latour's sense, are explicitly included.

Linguistic signs then are not to be understood as storage- and transfer-media for contents independent of language and media-indifferent; rather, as *operative media* they are themselves—quite in the sense of the mediation approach—the condition for the possibility of mental form-creations. Carrying on neuro-biological descriptions of the encoding of perceptions, of intermodal integration, and of the parallel processing of information in neuronal networks, Jäger is describing the process of semiological transformation as a *synthesis of linguistic signs*. The human apparatus of cognition connects the cross-modal products of association with the modality of signs and thus positions them in a semiological horizon.

Preliterate language then is the *semiological* processual form that in the very first place makes the building up of inner mental episodes in the network of linguistic signs possible (cf. Jäger, "Zeichen/Spuren" 18f.). These interreferentialities between "prescripts" and "scripts" in the process of transcription in all media dispositives develop in a specific way and I would argue that they distinctly appear specifically in computer-based and networked media.

Therefore, it is not by chance that with Espen Aarseth's cybertext theory one of the most effective approaches is also based on the (even though quite schematized) idea of translation between different linguistic "levels." The crucial point of Aarseth's theory is his idea of regarding any text in a very literal—and not only metaphorical—sense as a *machine* for the production, transmission and reception of verbal signs. This machine consists of a material medium, a user, and strings of signs that are divided into so-called "scriptons" (defined as strings as they appear to readers on some material surface) and "textons," which are "strings as they exist in the text" (62). Hence such a text does not consist of one single syntagma but of two layers, which—and this is crucial—are *recursively* related to each other by what Aarseth calls the "traversal function," i.e., the "mechanism by which scriptons are revealed or generated from textons and presented to the user of the text" (62).

I could name some more theories of translation that confirm the central importance of such a "cybernetic" thought for theories of media studies. It is the twist of all such theories, however, that recursive loops are not just a simple means of reproduction. Rather, they combine repetition and variation in a very specific way with the objective of creating *something new* that cannot be predicted in advance. This is due to the fact that recursions allow the repeated application of a processing instruction onto a variable, which has already been the result of the same instruction itself. The variable value varies with each passing of the loop; but this repetition does not result in the production of identity but in pre-defined variation (cf. Winkler 173).

If we thus see "meaning" as a result of such recursive linguistic transcriptions, then this also has far-reaching consequences for the understanding of literature. With reference to Jäger and Aarseth, my point of departure is that the function of language does not lie in the task of representing reality alone; rather—in order to be able to achieve this at all—that it has to reserve a certain potential going beyond the function of representation that is expressed in literary texts. Literature can thus be described as a specific form of the use of language that activates a *surplus of the possibilities* of language. And so, Andreas Kablitz takes his starting point from the paradox that even though language can say more than one can assert, it can at the same time also say nothing without asserting anything: "Das Potential, das aus diesem Paradoxon erwächst, ist der Fundus, aus dem alle Fiktion schöpft" ('The potential arising from this paradox is the fundus from which all of fiction draws') (272) and thus it is an essential source of all literature. Literary texts, then, mediate the assertive statements of a "sense of reality" with the "sense of possibility" of language.[10]

4 New Media for Literature: From "Immutable Mobiles" to "Permanent Mutability"

4.1 "Techno-Semiosis": The Computer as Medium of Transcription

I have discussed the linguistic approach by Jäger and the approach from literary studies by Kablitz because they underline that the mental, and therefore the literary as well, are the result of *linguistically mediated transcriptions*, and I have referred to Aarseth because he makes clear how mechanical or media-technological processes collaborate in the exteriorization of the "Ur-mediality" and thus already point out the important difference between the hidden (computer) code and the text legible by humans. If we assume the constitutive role of the linguistic sign's mediality that in the first place is founded in its communicative use of recursively combining production and reception of linguistic utterances, then the history of *media technologies and practices* can be described as "techno-semiosis" (Jäger, "Zeichen/Spuren" 32), i.e., as a *technical differentiation* of this original mediality of signs within the changing dispositives of media. In other words: The very basic semiosis in the mind of a person is to be extended in time and space *by media*—and these media and their relations to each other have been complemented again and again in the course of media history: from spoken language in face-to-face communication to written inscriptions, from printed books to modern computer systems:

Historically, the most successful method of this externalization of "inner" linguistic signs is script, allowing for the storing and transporting of information over spatial and temporal distances. Book printing marks another decisive caesura for the history of media; according to Latour "a device that makes both mobilization and immutability possible at the same time" ("Drawing Things Together" 31) by producing so-called *immutable mobiles*. In ANT, this concept had been developed originally in order to explain how symbolic representations on paper materialize from scientific observation or everyday experience. Writing and the printing press located or locked down within constant strings of fixed symbols what in fact were originally performative processes, thereby securing a high degree of textual stability.

However, if performative processes can be arrested then such arrests can in principle be reversed again. This is precisely what happens in computer-based media, which quite conversely are characterized by the "permanent mutability" of data that can be made temporarily visible on all kinds of displays by way of complex steps of translation:

> In der elektronischen Welt . . . ist der Augenblick des "Druckens," in dem ein bestimmter Datenzustand eingefroren wird, lediglich ein Punkt auf einer fortlaufenden Zeitachse; der Datenabruf bietet nicht mehr als eine Momentaufnahme des permanent wandelbaren Datenflusses. (Chaouli 68)
>
> In the electronic world . . . the moment of "printing" in which a certain state of data is "frozen" is only a point on a progressive temporal axis; the data recall provides no more than a snapshot of the permanently variable data stream.

Due to these properties, the computer *additionally* affords (and forces) its users (into) a *technically controlled* interaction. In contrast to the printed book it does not only store and transmit data, it also *processes* them. In this respect the human-machine interaction has to be understood as a transcriptive *and* technical process in which the program-determined signal processing (on an operative *"subface"* level) inside the machine is linked on the performative *"surface"* level of the interfaces with the sense-generating semiosis and its affiliated activity of the user as "author" and "reader" (Nake 104ff.).

Since such "algorithmic signs" *per se* mediate between human and machine processes, the media logic is *inherent* to the computer. This was true even at that time when there was no talk at all of the "computer-as-a-medium," and in general this logic is also valid if computers are not ostensibly being used as media but as control automata:

> Im Prozessieren des Programms vollzieht der Computer Übersetzungen zwischen *Notationen*. Dies ist eine allgemeine Beschreibung des Wirkens des Computers. Sie trifft auch zu für den Computer als Steuerungsautomat, der direkt in die Wirklichkeit eingreift, bei der Schaltung von Maschinen, der Steuerung von Fabrikanlagen oder bürokratischen Verwaltungen. . . . Als Medium verändert er die Wirklichkeit vermittelt, als Steuerungsautomat direkt. Als Steuerungsautomat enthält er seine Steuerung medial und als Medium enthält er eine wirkliche Steuerung. (Robben 54)

> In processing the program, the computer executes translations between *notations*.[11] This is a general description of the operations of computers. It is also applicable for the computer as a control automat that directly interferes with reality: operating machines, controlling factory plants or bureaucratic administrations. . . . As a medium it indirectly changes reality, as a control automat it does this directly. As a control automat it contains its control in a mediated way and as a medium it contains a real control.

In order to enable human users to perceive these mediated translations between sub- and surface levels with their senses and to influence them physically, and in order to enable computers to actually control the appliances connected to them, interfaces—displays as well as input devices[12]—with different spatial-temporal relations between human and non-human actors have to be made possible.

Here the theory of chains of translations offers a frame as well; in ANT, it had been developed originally in order to explain how scientific observations or everyday experiences are converted into symbolic representations on paper, i.e., "immutable mobiles." But these superpositions can occur on all displays, so that this model is suited very well to describe "den Datenwandel Analog-Digital/Digital-Analog *und* den Formenwandel als Teil einer Operationskette" ('the data change analog-digital/digital-analog *and* the change of form as part of one single chain of operation') (Thielmann 206).

4.2 Reflecting Translation: Stephanie Strickland's *slippingglimpse*

In computer-based processes therefore we have to differentiate quite clearly between the "surface" or "interface text" and the computer code. A computer code is a command that translates a character-set into signal sequences within the machine controlling state transitions which can be made accessible in the surface text. As was underlined for example by John Cayley, this is a difference

of fundamental importance since only if the code is executed (which is always directed at the machine), can *something* become visible on the surface, e.g., a text legible by humans as a representation of the code as it is running:

> These processes *are* the work. The writing is not the record of an inscription or prior composition. It is a program running. It is the sum of all the phenomena which occur when a program—a "prior writing" in anticipation of performance—is set in train. ("Screen Writing" 609)

For example, in pieces like Cayley's *translation* or *riverIsland,* the recipient is confronted with so-called "transliteral morphs"—coded transformations of letters from source texts into target texts. Accordingly, the letters of the source texts are replaced step by step with programmed algorithms, making it possible for the recipient to observe the performance of the appearance by "monitoring a 'runtime performance'" of the "text as a complex, temporal object," as "ever-changing, ambient manifestations of writing on complex surfaces" ("Writing on Complex Surfaces").

Still more complex steps of translation can be observed in the "digital poem" *slippingglimpse* that the poetess Stephanie Strickland produced in collaboration together with both the programmer Cynthia Lawson Jaramillo (who was responsible for the flash programming and the interface design) and the video artist Paul Ryan, who contributed video recordings of water movements that seem to run chaotically, yet reveal recurring patterns, so-called "chreods."

slippingglimpse consists of recursive feedback loops between these various human and non-human actors: On the screen, the recipient watches moving images of "chreods" in which a video tracking software looks for color changes. As soon as the algorithm localizes such a change, the program matches the position with words and phrases from Strickland's poem-texts. The piece thereby allows the aesthetic experience of very complex chains of translations between human actors as programmers, writers and readers as well as non-human actors such as natural processes, video tracking technologies, computer hard- and software, poetic text fragments, and so on. Thus it exemplifies how meaning in a computer-aided and networked environment is created through the interplay of various mediators. In a certain way this is the case as well in the "reading" of the piece by the human recipient as it is in the "reading" of the poem-text by the water: "water reads text; text reads image-capture technology; and image-capture technology (that is, videography and video-editing) reads the water, thereby coming full circle" (Strickland).

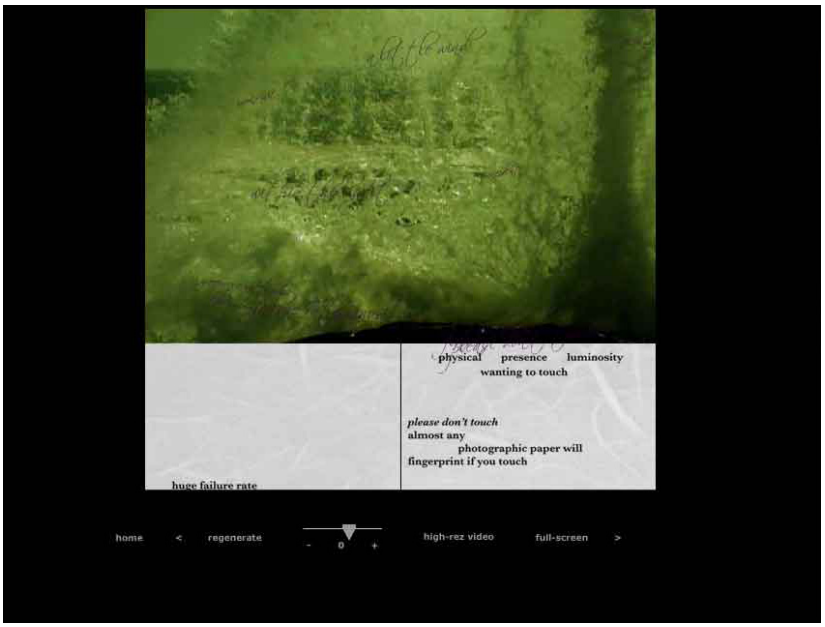


Fig. 1. In the scrolling text view of *slippingglimps*, the poem text "reads" image/capture technologies by sampling and recombining words of visual artists describing their use of digital technologies. Courtesy of Cynthia Lawson Jaramillo.

It can in no way be unequivocally differentiated who or what is "reading" whom or what in these chains of translations. It is precisely this automation of the mutual observation of human and non-human actors that is made available to literary *aisthesis* as a distinct and reflexive perception of perception. In a piece like *slippingglimpse*, literature maintains its function by creating an aesthetic distance—that is to say, a deliberate rupture of the increasingly densely "fed-back" and (partially) automated social and technical interactions. However, now far more complex media-technological and social conditions have to be reflected in theory. If Jäger describes disruption as "any state in the course of communication producing the operative loss of transparency of a medium" ("Epistemology of Disruptions" 83), then this certainly holds true for a general concept of the emergence of meaning. Literary pieces like *slippingglimpse* clearly show that in current media dispositives technical "disruptions" of the transparency of media also participate in the constitution of meaning.

4.3 Spatially Defined Media for Literature: Mixed Reality Environments and Mobile Media

Even though *slippingglimpse* is still viewed on a conventional display, it has already made a further question imperative; namely, in what way the computer configures new spatial organizations in media in which mental spheres, real three-dimensional realms of action, computer-generated "virtual" environments and the telematic spaces of the computer nets are dynamically correlated to each other. The spectrum of media dispositives for literary processes in such spaces evidently has widened considerably in recent years and it can be expected that this will continue: Displays are no longer limited to monitors and also the interactions with linguistic signs are now not only implemented through keyboard or mouse.

Rather, with the application of *mobile media devices* such as mobile phones, GPS and PDAs and the development of literary *mixed reality environments* in museums, galleries or research labs, new combinations of physical, virtual and symbolic spaces are realized. On such "complex writing surfaces," as Cayley argues, spatial "depth" not only emerges in the literary virtuality of the reader's imagination; it also comes to the fore on the intrinsically temporal materializations of transcriptions resulting from "complex, recursive interrelations of writing surfaces and surfaces that are, literally, formed by writing, at least in so far as the graphic surfaces of letters are 'formed by writing'" ("Writing on Complex Surfaces"). Thus, in these informational spaces changes of the temporal-spatial organization occur, i.e., of the culturally conventionalized coordinate systems in which communicative interaction is taking place with linguistic signs. The recipient "must be able to see and read what the screen presents rather than recasting what passes before our eyes as the emulation of a 'transparent' medium" ("Writing on Complex Surfaces").

Texts, objects, bodies and spaces combine in a largely uncharted way, electronic media take the interplay of embodied language and "body language" to a new level since more and more the whole body is involved in the media activity. Increasingly complex sensors (integrated into vehicles, clothes and environments) "realize"—"hear," "see," "feel," in other words: *measure and translate*—the movements of the body, its mimics and gestures. This "multimodal" body itself then also exchanges information with the "products" of this kind of technology. Such mediated couplings and framings enable the co-operation of non-symbolic activities, symbolic language activities and algorithmic processes of computer systems.

The central discussion regarding processes of the spoken performance of communicative acts and the performing arts is turned into another direction by pieces such as Camille Utterback's *Text Rain* or Noah Wardrip-Fruin's *Screen* as

well. If the related studies, e.g., those by Erika Fischer-Lichte, once concentrated the attention especially on *non-textual* or *non-literary* aspects, i.e., on non-linguistic physical activities, *now* the text surprisingly catches up with performative elements again. With the latest media technology it becomes possible "to do things with words" in a way that speech-act theory could not foresee.

Especially for the spatially defined literature, the text is an integral, physically present part of the performances: As a three-dimensional projection of light in the Cave or as the directive for movement in locative narratives, it becomes a practically acted out reflection or critique of habitualized activities, rituals or techniques of social control. Attention is challenged in another, precisely *aesthetic* way: It is directed to the links between texts and bodies and to the transcriptions taking place between them in the realm of the linguistic signs of the projects.

In Camille Utterback's interactive installation *Text Rain* the recipients, situated in front of a projection screen, use their bodies for playing with falling letters. The installation initially disassembles the elements of its own basis—namely "Talk, You," a poem by Evan Zimroth on the difficulties of communication and physical nearness—at the outset dissolving it into letters and words falling from up above with which the recipients then can "play" with their hands, arms, legs, and the silhouettes of dark objects: they can catch them, gather them, divert them and hold onto them. Occasionally they succeed in catching an entire word or a phrase, ephemeral successions of signs that for a short while seem to have "meaning" that, however, can directly dissolve again.

Francisco J. Ricardo, in his subtle close reading of *Text Rain,* notes that the readerly function is strongly challenged:

> When the baseline wanes, text appears *visually*, not *lexically*. . . . But in its dual existence as text and visual sign, this type of work conveys a multimodality that is unsettling and refuses reduction to singular classifications. . . . That *Text Rain* is thoroughly transmodal is additionally evidenced by considering it ontologically, as it exists, or perceptually passes, through a series of more or less distinct phenomenological stages, lives, or moments. (59-61)

Traversing these different phases, the relationship between image and language, for which all media dispositives delineate specific realms as stages of their semiological performance, becomes a question. By referring to the phylogenetic antecedence of sign language to spoken language, Jäger points out that there is no categorical opposition between image and language. Rather, language can occur both as spoken language (vocal-auditive communication, temporal-sequential) and as sign language (gestural-visual communication, tem-

poral-sequential *and* spatial): "Der Raum des Bildlichen exkludiert Sprachlichkeit keineswegs, wie umgekehrt Sprachlichkeit sich gerade auch als Bild-Sprachlichkeit realisieren kann" ('Visual space by no means excludes language, as vice versa, language can also be realized visual-linguistically') ("Bild/Sprachlichkeit" 8).

In *Text Rain,* from the conflict between the writing surface and the imagination, between the two-dimensional medium of letters on a surface and the multidimensional imaginative realm of the reader, develops aesthetic experience. This conflict—indissoluble in the traditional space of the medium book—now, in the three-dimensional space of the installation is solved in a quite specific way by returning the words back to the bodies. However, the conflict on this level is also renewed: The body or the bodies may move as they like; they are unable to reassemble the poem *as a whole*. Aesthetic difference as a perceptional conflict or tension between the senses and sense in this installation has been transcribed into the electronic-organic coupling.

In locative narratives as well, with location-based media the relationship between physical and discursive spaces and the interplay between the physical action of the recipients with the fictional characters of the narrative spaces become the theme. In his "geopoetical" story *Wasser* [*Water*] (2004), Stefan Schemat integrates real places and landscapes into his narrative spaces.[13] Recipients, equipped with "augmented reality outfits," a backpack with a notebook, a GPS device and headphones are sent through a town or a landscape on a one-hour walk; i.e., the recipient has to fulfill a mission under constraints of time. The concrete narrative sequence—i.e., the sequence in which the computer system connects the narrative fragments depending on the location—and the duration and speed of the narrative depend on the choice of the route the recipients take.

While they are on their way, the story of a blind detective searching for a missing person is told to them. Schemat here is taking up a known motive from literary history—especially in crime fiction, but for example also in one of the key texts of the avant-garde, André Breton's *Nadja* (1928). However, the imaginary "co-search" of the reader in the fictional space of a novel here is expanded into a hybrid "real-imaginary" search. Thus, admittedly, the space in the real world and the narrated space are connected to each other—"text and environment merge" (Kwastek, *Ohne Schnur* 203)—but then again, with a diegetic break a paradoxical division between the two realms is staged, because the recipients take over the fictional role of a *blind* detective. In the space of the real world, they are part of a performance in which as seeing persons —who nevertheless themselves are "directed" and controlled by way of the media technologies used—they "embody" a blind character and "lead" him

Fig. 2. Recipients experiencing Stefan Schemat's *Wasser* at the beach of Cuxhaven, Germany. Courtesy of Cuxhavener Kunstverein.

through a space in which the missing person, however, cannot be found; i.e., they act just as "blindly" as the blind detective does.

In the narrated space, a peculiar literary organization of space is effective: despite the fact that the recipients are the ones who—first of all by their movements in real space and the technical steps of translation initiated by this—constitute the narrated space, and even though they are thereby technically "controlling" the narrative voices, in the intradiegetic story they are nevertheless dependent on the "control" of just these narrative voices—the more so as the narrators "are sometimes distanced observers, sometimes the protagonists of the plot and they get into conflict with each other (*'Don't listen to the voices . . .'*), wavering between fiction, reality and dream and between present and past" (203); i.e., they jump back and forth between homo-, hetero- und autodiegetic voices. Although Schemat assumes that "the location of the narrative can be found in reality" (203), the relationships between author, recipient, narrators and literary characters in narrated space are still to a great degree subject to narratological parameters like narrative perspective, focalization, temporal structures etc.; i.e., the analyses of the chains of translations, by which locative narratives are constituted, has to include the categories of literary studies (cf. par. 6.2 in this text).

5. Aesthetic Engineering:[14] Actor-Networks and Distributed Agency

The different aspects of a recipient's activity with *Text Rain* or *Wasser*—the cognitive processes activated by reading or listening and the physical movements in space, the interaction with the computer-generated graphic or acoustic "language objects"—and the computer-controlled activities of the technical system show that in such computer-based media dispositives it is all the more necessary to focus our considerations on the investigation of the *interaction* of different human and non-human actors as hybrid socio-technical "collectives." This can be illustrated with theories of socio-technical, self-reflexive networks as well as techno-sociological thoughts on *distributed agency* or *distributed cognition*.

For the analysis of literary processes, the interesting element in these approaches lies in the fact that they—differing from the ordinary models of sociology of literature—take their point of departure on the one hand not from the option that the agents are clearly discernible, nor, on the other, that they necessarily have to be human beings (e.g., as "writer," "editor," "lector," "publisher," "reader"). Instead, they point to associations that are "made of *concatenations of mediators* where each point can be said to fully act" (Latour, *Reassembling the Social* 59). Thus, the term "network" acquires a special significance since it stresses specifically the uncertainty about sources of action, i.e., the mediations or transcriptions are not to be ascribed to clear causes, particularly not unequivocally to the intentions of human actors. An *actor-network* is a *heterogeneous* network of *different* actors who are, however, *unidirectional*. This means that as many "causes" as possible are replaced by way of actor chains of translations. All observable events are not attributed to simple causalities; such local interactions are rather always the result of the *interference* of circulating heterogeneous entities, or, in Latour's own words, of an "assemblage of all the *other* local interactions distributed elsewhere in time and space, which have been brought to bear on the scene through the relays of various non-human actors" (194). What is observable therefore is always restricted to fleeting effects of long chains of *processes* of mediation or transcription:

> In most situations, actions will already be interfered with by heterogeneous entities that don't have the same local presence, don't come from the same time, are not visible at once, and don't press upon them with the same weight. The word "interaction" was not badly chosen; only the number and type of "actions" and the span of their "inter"-relations has been vastly underestimated. Stretch any given inter-action and, sure enough, it becomes an actor-network. (202)

Latour's principles of symmetry and hybridity, which in a far-reaching sense assume the equality of all actors, have often been criticized.[15] It cannot be decided here whether this criticism is justified; my only concern is retaining the claim that actor-networks are always socio-technological "collectives" made up of human and non-human *elements* and that in these collectives the machine elements accrue a rising degree of autonomy.

Specifically in computer-based systems or networks such an agency—distributed into many activities and instances—appears more often. "Action" emerges here as a result of mutual influence, delegation or even substitution within socio-technological constellations. This means that action is not only changed by "adapting" technologies to the needs of human beings; rather, activities are *distributed* between human and "artificial intelligences"[16] that in no way are entirely determined but become increasingly reflexive and in part also indeed able to learn. Thus, computer-based action continues a long story of human self-invention in technical systems in which social and technological abilities are amalgamated into "hochkomplexe anthropotechnologische Netzwerke" ('highly complex anthropotechnological networks') (Hagner 34).

It has consequences also for literary studies when in the place of a subject-centered notion of action—taking its point of departure from the intentional acts of autonomous individuals—the concentration is on the collective dimension of creativity and artistic production. One can regard this quite explicitly as a turn against the very idea of artistic creation, indeed against "creativity" as an activity of particularly gifted individual persons. They are being supplemented or replaced by different forms of distributed agency or by actor-networks, in which creativity, on the one hand, is either distributed between various human beings or between human and non-human actors and, on the other, can be distributed across time and space.

To illustrate this with my previous literary examples:[17] In John Cayley's *translation* the agencies of the "author" are assembled with that of the software but also with that of the hardware used and of the interfaces, with the author of the source text (in this case Walter Benjamin, and strictly speaking also the translators of the English edition of his text), as well as with the interactive interventions of the recipients. In *slippingglimpse*, for example, the recorded movements of water, the intentions of the writer of the poem or different navigational decisions of the recipients are added to this. In *Right as Rain* by the artists collective 34 North 118 West (i.e., Jeff Knowlton, Naomi Spellman, and Jeremy Hight), the current weather in the different places has its own agency. In Wardrip-Fruin *Screen* one could name—apart from the factors already named—also the physical movements in three-dimensional space or the diverse steps of translation of the VR machine. *The Breathing Wall* by Kate Pullinger reacts to the recipient's rhythm of breathing, thereby influencing the

narration of the story of a prisoner who is communicating through the wall of his cell with the spirit of his girlfriend.

In these examples—and with regard to the distributed agencies this is initially a contradiction—there is nonetheless always talk of an *author*: of "John Cayley," "Stephanie Strickland," "Noah Wardrip-Fruin," "Kate Pullinger" or of an author-collective like the group "34 North 118 West." In computer-based media collective works regularly appear since programmers, interface designers, artists, or musicians also take part; Strickland, for example, works together with Lawson Jaramillo and Ryan; Pullinger with Stefan Schemat and babel, and Wardrip-Fruin has even more numerous collaborators.

Apart from this, still and all *titles of the works* exist for these literary pieces. Therefore, the question should be asked to what extent such open aesthetic processes can continue to be (or maybe even have to be) studied with the same categories of observation—even when important activities have been delegated to "intelligent" machines—in order to be understood by the recipients (and especially by those who are interested in literary studies).

For these attributions or framings, ANT has developed the concept of *blackboxing*, by way of which a complete network itself becomes a node in another, more extensive network:

> . . . if a network acts as a single block, then it disappears, to be replaced by the action itself and the seemingly simple author of that action. At the same time, the way in which the effect is generated is also effaced: for the time being it is neither visible, nor relevant. So it is that something much simpler . . . comes, for a time, to mask the networks that produce it. (Law, "Notes on the Theory of the Actor-Network" 385)

Of course, this is in principle true for every actor-network. In transferring this to literary communication, this would mean that author names such as "James Joyce" or "Thomas Mann" are hiding an extensive network that was necessary for the writing and publishing of *Ulysses* or *Buddenbrooks* as well. Clearly there are conventions, forms of co-ordination or "translation regimes" (Callon 147) that regulate to whom a superordinated agency is attributed. In such "convergent and irreversibilised networks" (155) behind the author function, however, all other factors have disappeared and the multiple chains of translations can only be made visible again with philological finesse.

By contrast, in literary works in computer-based and networked media, such "framings" or "indurations" cannot succeed in the same way. "Translation regimes" drawing on general conventions exist here as well, but as I have tried to show, the conditions of translation fundamentally change between

authors and readers as human actors, as well as between computer-based media and their interfaces as non-human actors, since they are incorporated into significantly more divergent and reversible networks.

Thus, for example, Simon Biggs remarks on his early piece *The Great Wall of China* (1996) that as an author he had not written the text but a "meta-text"—or rather a "parent text" from which "children texts" develop according to principles of inheritance:

> The author has written a "parent" text, from which innumerable other texts are written through the act of reading. The reader does not write these texts, but participates in an ecology of behavior (involving themselves, the author, and the semi-autonomous text itself) from which emerges a particular instance of the text. At this level, once the meta-writing is done, the author becomes just another reader of the work. (191)

When the "work" is not a closed object but is itself a processing entity, the activity-roles enter new constellations and dependencies. Normally, a *text* in literary studies is understood as a linear arrangement of words and punctuation and it becomes a *work* by being used communicatively as a fixed, completed and reusable unit, as an "immutable mobile." In computer-based media these two definitions are not tenable: the signifiers of a text are not stored in linear order in data files, and a text or a "work" only becomes visible on a display as an ephemeral materialization of an ongoing process. This process that not only contains data files but also running programs and hardware devices[18] therefore is dependent on the respective spatial and temporal contexts: "*The materiality of an embodied text is the interaction of its physical characteristics with its signifying strategies*" (Hayles, *My Mother Was a Computer* 103).

And thus, a technical processing is inserted that brings to the fore—quite in Latour's sense—an assemblage of various local interactions of human and non-human actors in place of the work, directed at the cognitive processes of the recipient.[19] This illustrates that the traditional concept of "work" is not only based on the physical and social characteristics of an object, but that it also presupposes a quite definite understanding of the subject, namely that of the intentionally acting author. Within the terms of a distributed agency, this changes since "the computer is also a writer, and the software programs it runs to produce the text as process and display also have complex and multiple authorship (not to mention the authoring done by hardware engineers in configuring the logic gates that create the bit stream)" (Hayles, *My Mother Was a Computer* 107).

More and different things are also demanded of (human) "readers" than with the quiet reading of a printed text. "Ergodic literature," as Aarseth calls it, requires more than just interpreting what the reader or "user" reads in order to understand a text's meaning. In addition, he needs to perform in an "extranoematic sense"; this means that, as Aarseth puts it, a "nontrivial effort is required to allow the reader to traverse the text" (1). These additional functions are "the explorative function, in which the user must decide which path to take, and the configurative function, in which scriptons are in part chosen or created by the user." The so-called textonic function demands from the user to add textons or traversal functions to the text (64). Aarseth then assumes that users have several functions with specific activity options at their disposal influencing the translations between textons and scriptons—and that they also *have to* use these options in order to make the text appear.

This already leads to highly complex chains of translations when using normal personal computer systems. In spatially defined media even disproportionately more complex steps in translation and interpretational relations develop. Specifically, the *sensorimotor interactions* of the recipients with their social and technical environment—included via sensors and effectors—have to be taken into consideration. It is decisive that the human body is the connecting link of *all* interactions. As Thomas Fuchs has shown in a convincing critique of the reductionist-naturalist neurosciences, the brain contributes to all interactions as an "organ of *transformation* or *translation*, which translates the relations between single elements of a given situation ('stimuli') into wholes or *Gestalt* units" ("Embodied" 227), i.e., it processes the arriving sensorial stimuli and translates them into physiological and motoric reactions. Even though rational processes are controlled by the brain, nevertheless *consciousness* only emerges as a result of complex chains of translations that are mediated by way of sensual perceptions, physical activities and neuronal and physiological processes, as well integrating events in the environment via (also technical) media, especially the activities of other people or events imparted by media:

> Human subjectivity is embedded in the world, with the body acting as its mediator. . . . Miraculously, our body, a solid and material object, is capable of a transformation that turns matter into mind and lets the world appear. By multifarious assimilations, sensorimotor interactions and their further processing, the body becomes transparent to the world we are living in and allows us to act in it. The meaning of this *transparency of the body* should be noted carefully: It implies that consciousness is not the final link of a chain of deanimated physical processes. . . . The mind is not a transmundane asylum of pure subjectivity, but it is the integration of all these living bodily processes, which render themselves transparent to the world. . . . But in perceiv-

> ing the subject embodies or enacts these processes. Their invisibility precisely means their transparency. It is through them that we perceive, and they are implicitly present in our act of perceiving, in a way similar to the single letters through which we read a word without being aware of them. (Fuchs, "Corporealized" 95f.)

The connection of the brain to the human body is also overlooked in literary theories when they mask the multifarious steps of translation in order to directly refer the text and mental processes to each other. However, only the living being *as a whole*—even more so: the living being, eternally "networked" via its senses with its environment[20]—commands a consciousness with which it can perceive or act. In literary communication in principle—even when reading a book quietly, even though to a lesser degree—"transparent" physical activities are necessary. Computer-based media—that via diverse interfaces make the technical control of human-machine interactivity possible and that also extend the human-human interaction via the networking of computers—demand a considerably greater degree of physical activity and thus let us perceive that reading has always been "a whole-body-activity that involves breathing rhythms, kinaesthesia, proprioception, and other conscious and unconscious cognitive activities" (Hayles, "Distributed Cognition" 16). Apart from that, other non-human actors are included whose "antiprograms"[21] (Akrich and Latour 261) disrupt and restrain the actions of the human actors.

6 The Literary in Chains of Translations

Even though these observations are important and expandable for the discussion of literature in computer-based media, strictly speaking they describe *every* form of human transactions with linguistic artifacts. However, one decisive aspect is missing, and that is the question of the specific *literariness* or the specific *aesthetic* experience. This holds true explicitly for ANT: even the studies by Hennion or those by Jean-Paul Fourmentraux on "Net Art"—to say nothing of the few remarks by Latour on aesthetic questions—pursue approaches of a *sociological* kind regarding music or art; they are interested in how human actors communicate artifacts by referring back to cultural practices and by using instruments and technical media to whom different degrees of autonomy are (or have to be) conceded.

Nevertheless—for the most part lacking are considerations which, from a point of view of *literary studies*, deal with the decisive questions: How does the aesthetic, or more concretely the literary, get into these chains of translations at all, or how does the operative process of a translation become a literary one?

How, when, and through what does a specific aesthetic experience develop for the recipient? How does the translation between the agencies of human actors acting in "reality space" and those of literary characters *in* the fictional space of a story or a drama or those of an avatar in a computer game take place?[22] Can moments of lyrical *subjectivity* still be achieved in the communication between human and machine (cf. Gendolla)? And what role does it play that one resorts to the traditional system of literary *genres*? Which *intertextual* references to other literary texts become effective in the chains of translations?

6.1 Non-Translatability: From Reader-Response Theories to Literary Pragmatics

Jens Schröter has made a quite promising suggestion for the use of ANT for aesthetic questions. He is asking for "*konkrete und lokale* Verfahren der Produktion *erstens* der ästhetischen Wahrnehmung . . . und *zweitens* des selbstbezüglichen Erscheinens" ('*concrete* and *local* production methods of, *firstly,* aesthetic perception . . . and, *secondly,* self-referential appearance') (Schröter 68) looking for the answer in the recursiveness of the chains as effect of their *non-translatability:*

> "Kunst" entsteht immer dann, wenn eine Kette aus Übersetzungen dazu führt, dass das spezifische materielle So-Sein eines . . . singulären Artefakts durch nichts übersetzt werden kann. . . . Das selbstbezügliche Erscheinen wird durch die zyklische Struktur der Kette von intransparenten Mediatoren produziert. (76f.)

> "Art" always emerges when a chain of translations results in the specific material *Sosein* ('being thus and not other') of a . . . singular artifact not being translatable. . . . The self-referential appearance is produced by the cyclical chain-structure of non-transparent mediators.

On the one hand, Schröter's ideas can be connected to traditional paradigmata of literary theory identifying aesthetic experience in *disruptions of recursive loops*: The point of departure of Russian Formalism, for example, was that it is one of the functions of literature to perform a deliberate, sensually perceived disruption of automated reactions ("defamiliarization") (Shklovsky). Wolfgang Iser's reader-response theory developed the notion of the "gap" or "blank," that always develops at that point where "there is an abrupt juxtaposition of segments . . ., breaking the expected order of the text" (*The Act of Reading* 195).

On the other hand, however, Schröter's suggestion to examine *local* and *concrete* practices point at a general desideratum of the approaches mentioned

that intensifies in computer-based processes of communication: Literariness cannot be understood as a merely text-controlled phenomenon as this is seen, for instance, by Formalism and in Iser's early approaches,[23] whose "implied reader" expressly is not an empirical reader, but denotes first of all an aesthetic effect that emerges between readers and texts. Therefore, the "implied reader" as a kind of readerly role model within the text does not primarily establish an agency of the reader but rather one of the *text*. But neither can it be explained as a result of a process merely controlled by knowledge privileging each reader's subjective experience in which the socio-cultural normalizations by "interpretive communities" (Fish) show up.

Below I can only indicate with one specific example how, to my mind, the traditional methods of literary studies have to be updated in order to be able to use them for the analysis of literary reception in computer-based media. To do this I will go back to existing reader-response theories, especially those by Wolfgang Iser and Hans Robert Jauß. Both of them already have developed a concept of literary studies taking into consideration action- and communication-theory so as to (re-)construct the processes of literary production and reception—and thus the *different* creations of meaning for *one* text by readers with different reception-tendencies.[24]

But also these approaches cannot fully describe the exchange between the textual structures and the recipients' subjective level of knowledge as a dynamic, interactive control loop. Rather—this is the justified objection by Sven Strasen—all theories of aesthetic reception attempted to analyze the complex interdependencies of the agencies involved in this process—one could also call it the tracing of the chains of translations—"indem sie jeweils einer dieser Instanzen ihre Dynamik austreiben, um sie dann zum stabilen Ausgangspunkt einer linearen Ursache-Wirkungs-Kette zu machen, die den Prozeß der Bedeutungszuweisung beschreiben soll" ('by muting the dynamics of one of these agencies in order to make it into a stable starting point of a linear chain of cause and effect that is supposed to describe the process of establishing meaning') (22).

Already in Iser's *The Act of Reading* the constitution of meaning was attributed to the "interaction between the textual signals and the reader's acts of comprehension" (9); i.e., semantic attribution in the production of meaning had already then been conceived of as an interactive process of mediation between textually and knowledge-controlled processes. According to Iser, an entire process is manifested in the text—from the author's world-view to its becoming noticeable by the reader—that is, a process in which, however, the processes of establishing meaning are only just selective realizations of the text. Against the backdrop of the "sense of possibility," the fundamental plurality of the text is selectively disambiguated.

Central building blocks of Iser's theory are the so-called "blanks" or "gaps": They are hinges between different schematized perspectives of representation of a text and the (mental) activities of the reader. They introduce a disruption into the act of reading that causes an "impeded process of ideation" (188). Thus, we are dealing with "potential connections" (182) in which the earlier attributions of meaning by the reader are disrupted; he therefore has to test and possibly revise them in order to make the text coherent again. For this, Iser saw two possibilities: the range of semantic horizons either can be "narrowed down" or "modified" (111) so that they establish on the temporal axis of reading a "dialectic . . . between illusion-forming and illusion-breaking" (127).[25] The specific oscillation between involvement and distance, i.e., that which Jauß calls "Selbstgenuss im Fremdgenuss" ('self-enjoyment in the enjoyment of something other') (*Ästhetische Erfahrung und literarische Hermeneutik* 84) in the recipient calls up the specific *aesthetic* experience.

Iser describes these interactions of the reader with the literary text and its blanks as a cybernetic mechanism:

> If we view the relation between text and reader as a kind of self-regulating system, we can define the text itself as an array of sign impulses (signifiers) which are received by the reader. As he reads, there is a constant "feedback" of "information" already received, so that he himself is bound to insert his own ideas into the process of communication. . . . The dynamic interaction between text and reader has the character of an event, which helps to create the impression that we are involved in something real. . . . In literature, where the reader is constantly feeding back reactions as he obtains new information, there is just such a continual process of realization, and so reading itself "happens" like an event, in the sense that what we read takes on the character of an open-ended situation, at one and the same time concrete and yet fluid. . . . The text can never be grasped as a whole—only as a series of changing viewpoints, each one restricted in itself and so necessitating further perspectives. This is the process by which the reader "realizes" an overall situation. (*The Act of Reading* 67f.)

This long quote is illuminating because with the example of the reading of a printed text Iser designs a scenario that—because of its emphasis on feedbacks between the text and the reading process—also provides some theoretical building blocks for the literary processes in computer-based media. In changed media dispositives the mediation and the change of different horizons as fundamental conditions of aesthetic experience will have to be proven, e.g., the initial horizon of expectations "als paradigmatische Isotopie, die sich in dem

Maße, wie die Aussage anwächst, in einen immanenten, syntagmatischen Erwartungshorizont umsetzt" ('as paradigmatic isotopy, which is transposed into an immanent syntagmatic horizon of expectations to the extent that the utterance grows') (Jauß, *Literaturgeschichte als Provokation* 175) will eventually have to be mediated with the reader's horizon of experience.

Nonetheless, at least two problems remain: Firstly, the dynamics of the text leaves quite a bit more to be desired than becomes visible at first glance. Iser's text is an object that is fixated on the medium book whose materiality as a printed "immutable mobile"—even though it is "dynamized" in the act of reading—nevertheless cannot be questioned. Secondly, this concept seemingly is aimed at the actions of the reader, while the elements *controlling* the reading process in reality are hidden in the text.[26] This is also true for the famous "implied reader," a *textual figuration* to which the empirical reader *has to* adapt:

> The constituting of meaning and the constituting of the reading subject are therefore interacting operations that are both structured by the aspects of the text. However, the reader's viewpoint has to be prearranged in such a way that he is not only able to assemble the meaning but also to apprehend what he has assembled. (152)

However, physical, cognitive, psychological, social, cultural and media-technological factors of the *empirical situation* during the act of reading remain unheeded. In computer-based media, however, the "blank" between expectation and aesthetic realization sets in just as much as in the reading of a book; only the outline of a different semantic horizon triggered off in the process does not remain only in the imagination of the reader. Rather, the recipients are invited to *physically* interact directly with the sign processes, to promptly "continue writing" or to fill "gaps" which they themselves continue to create. If we speak of *aesthetic* reception as a frame of reference for expectations that can be objectified in texts and that then are varied, corrected and changed, thereby disrupting the horizon of expectation, then the here announced scope of change and reproduction definitely remains observable. However, it has emigrated from the relation between texts (e.g., courtly romances and their parodies in Cervantes' *Don Quijote*) into a connection between texts, their dynamic projection onto diverse displays and the activities of their readers, including bodily activities.

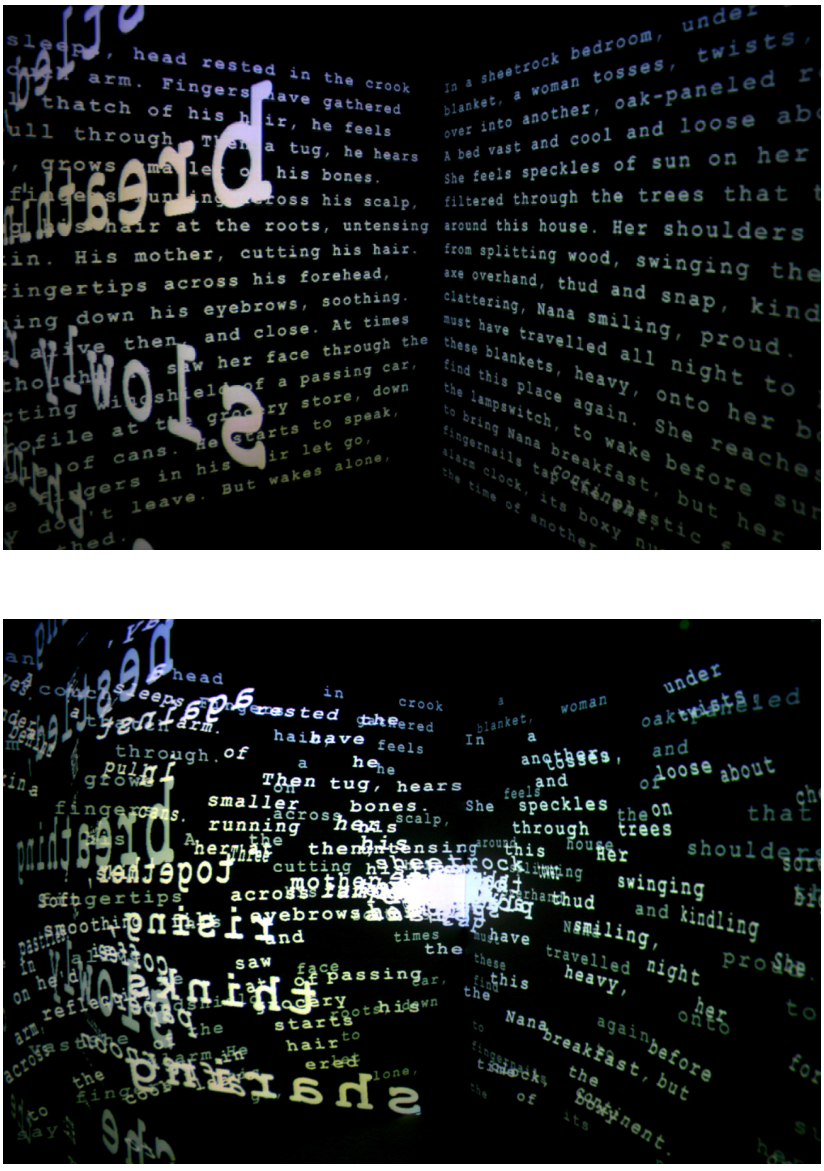
This can be illustrated using the example of Wardrip-Fruin et al.'s Cave installation *Screen*. At first, this installation surprisingly does not require anything more than reading three introductory texts, which are projected onto the three walls of the Cave, accompanied by a reading from the off. The texts talks of the virtuality and (in)stability of memories that "seem at times more there than

the there we daily inhabit, fixed and meaningful texts in the indecipherable flux of the world's words, so vivid at times that we feel we can almost reach out and touch them" (Coover 13). Continuing, we read:

> But memories have a way of coming apart on us, losing their certainty, and when they start to peel away, we do what we can to push them, bit by bit, back in place, fearful of losing our very selves if we lose the stories of ourselves.
> But these are only minds that hold them, fragile data, softly banked. Increasingly, they rip apart, blur and tangle with one another, and swarm mockingly about us, threatening us with absence. (14)

It is precisely this experience of peeling away or losing memories that is the subject of the installation. The introductory texts are followed by three narrated memories, which are short poetic descriptions of the moment of awakening, of the transition between a state of dreaming and being awake. In the meantime, the words separate in increasing speed from the projection walls, whirling around the recipient in the three-dimensional space; they remain legible but, as graphic and voluminous objects, they are also situated in space or, as Cayley notes, paradoxically "inscribed *on* the background that *surrounds* us" ("The Gravity of the Leaf" 213). By "batting" with the data glove, i.e., with playful movements of the body, words can be manipulated and moved to different positions on the walls: They literally fill the gaps in the text, thereby filling (and eliminating) the "memory gaps" that the text makes into a subject.[27] Unlike the printed text, this filling of the blanks happens in a peculiar way: on the one hand, as a result of a sensually perceptible *and* machine-based activity, as closings of spatial gaps on the surfaces of the projection walls by which the recipients are "starkly, literally, confronted with the diegetic break on which language depends and by means of which we make it and it makes us as we write and read" (216). On the other hand, these gaps also mark blanks in Iser's sense, i.e., those enclaves in the text that are offering themselves to the imaginary fillings by the recipients' prompting them "to supply what is meant from what is not said" (*The Act of Reading* 168):

> Communication in literature . . . is a process set in motion and regulated . . . by a mutually restrictive and magnifying interaction between the explicit and the implicit, between revelation and concealment. What is concealed spurs the reader into action, but this action is also controlled by what is revealed; the explicit in its turn is transformed when the implicit has been brought to light. (168f.)



Figs. 3-4. The texts of *Screen* are projected onto three walls (top). In increasing speed, words are separating from the walls (bottom). Courtesy of Noah Wardrip-Fruin.

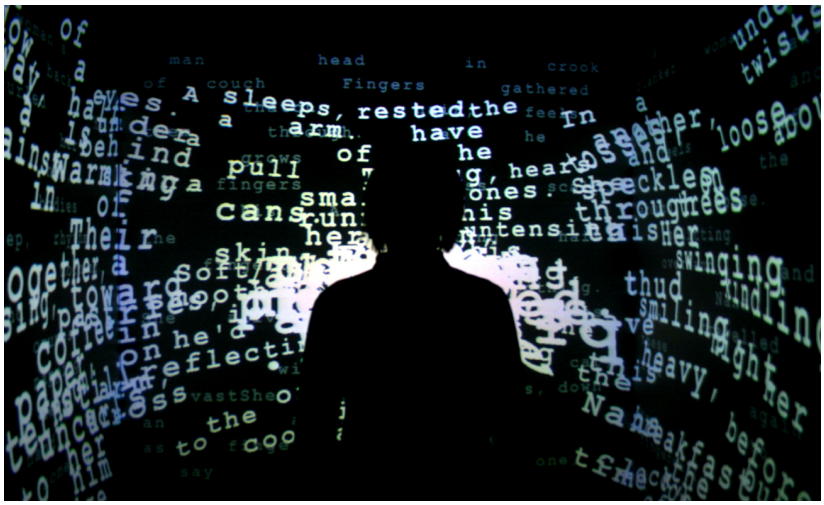


Fig. 5. Finally, the words are collapsing into the center of the Cave. Courtesy of Noah Wardrip-Fruin.

In a media-technologically quite specific way this oscillation between what is said—that itself is changing (and indeed depending on the interactivity made possible by the media dispositive)—and that which is made to appear in the imagination of the recipient is only stopped when the texts in the Cave finally collapse, i.e., when the basically unlimited semioses are broken off. On the basis of the actions of the recipients, a *changed* text is building up on the projection walls and with this also a changed memory is retained. Finally, the following text is read aloud:

> We stare into the white void of lost memories, a loose scatter about us of what fragments remain: no sense but nonsense to be found there. If memories define us, what defines us when they're gone? An unbearable prospect. We retrieve what we can and try again. (14)

In comparison to the reading of the identical text from a printed page, the experience in the Cave is fundamentally different: In the interplay of physical activities, computer-controlled processes, voices from the off reading parts of the text, and the continued reading by oneself, the recipient's expectation is disrupted in a double sense: On the one hand, *Screen* does not attempt to create a virtual reality environment but instead confronts the recipient with a literary text. Thus, the—admittedly not yet widely spread—expectations in the medium Cave are jarred. However, a new text, a new environment, a new reading-experience are simultaneously also interactively *delineated* which are made possible only by way of the multiple recursive co-operations of human intentions

and mechanical processes. It is a mode of reception that Wardrip-Fruin calls "peripheral reading" ("An Interview and New Work") of a variable text, that in all probability cannot be generated in identical form, not even after training for months.

In order to describe these literary processes the traditional reader-response approaches do not suffice. Therefore their approaches must be supplemented in terms of an empirically verifiable *literary pragmatics* that focuses on the description of *concrete* literary chains of translations between human writers and readers (as well as additional actors such as programmers, interface designers, etc.), medialized texts and literary conventions. Such a pragmatic approach then has to conceptionally and methodically measure up to the agency distributed between human and non-human actors, also taking the physical activities of the recipients into consideration.

The strength of pragmatic approaches lies in the fact that they are aiming at mediating between textually controlled processes and those that are controlled by knowledge when creating textual meaning in *concrete,* spatially and temporally situated relationships of communication. Notably in computer-based media, in which posits of an endless semiosis seem particularly convincing and thereby complicate the engagement of literary studies with the objects, Roger D. Sell's assumption that in practice semiosis "probably never continues without interruption" but inevitably leads to a point "at which we momentarily freeze semiosis in its tracks" (38) can possibly open up new paths for exploring the potentially endless and subjective attributions of meaning or the contextualizations of the empirical recipients *in the moment* of reading. Hans-Jörg Schmid has pointed out that the generation of a mental representation prompted by a literary text depends on a range of contextual factors encompassing six types of "activated knowledge"[28] as well as the recipient's specific emotional state in the given situation:

> The interaction between text and context is characterized by a constant reciprocal updating of the mental representation of the text under construction on the one hand, and the context on the other. . . . The only limit to the amount or kind of knowledge that can have some bearing on the mental representation a person construes in response to a given utterance is his or her total cognitive environment, which is potentially infinite. (Schmid 442f.)

In order to expand these approaches that locate the openness of literary texts mainly in the indeterminacy of the contexts constituting meaning and that therefore include the material and social dimensions of these contexts, the existing approaches of literary pragmatics have to be expanded including the ear-

lier ideas on the agency of non-human actors. If, for example, Sell defines the writing of a literary text as "a deed with an interpersonal valency across time and space, which can only be realized, furthermore, by a second kind of human act, an act of reading" (107), then he focuses only on the interpersonal relationship between a (human) author and a (human) reader. By contrast, he refrains from opening up the black boxes in which the various media and bodily steps of translation are enclosed that for example in the case of *slipping-glimpse* or *Screen* have to be considered. But this is necessary if one wants to widen these approaches into a pragmatic theory of literary communication between human and machine (cf. par. 7 in this text).

6.2 Literary Knowledge: The Persistence of Genre Conventions

Before concluding with a methodical suggestion how this broadening of the reception theory could be realized, I would like to bring up an important factor that organizes the restriction of the fundamentally open contexts of meaning mentioned above: Literary communication is not possible without the internalized literary knowledge and the previous experiences of the recipients. This means that in the (individual and collective) history of literary reception, readers inevitably create horizons of expectation developing *between* work and work, in which basic generic patterns are both taken up and at the same time modified. These patterns have been expanded today anyhow through experiences with other non-biblionomic media like film, video, computer games, etc., the knowledge of which will be taken for granted. With this in mind, contextual presuppositions as bodies of "extratextual information, which is encoded in the text as literary convention" (Randall 420), necessitate certain historically developed possibilities of action between author, text, and reader that also continue influencing literary communication in computer-based media.

Literary knowledge is integrated within chains of translations in the works of electronic literature as well, thus becoming elements of an actor-network. But the agencies of the human actors are thereby transferred to machines integrating the users into technically controlled inter-actions. Here, three forms become apparent which I believe can still be correlated with the traditional literary genres, insofar as I do not understand genres as ontologically fixed, but as historically changing, dynamic systems of classification for communications.[29] A possible solution to the dilemma of applying genre definitions to digital pieces has recently been foreshadowed by Joseph Tabbi who argues that more generic and more qualitative terms are needed in a time of transition: "*narrativity* or *fiction* more generally than *novel, poesis* more generally than *poem,*

conceptual writing more generally than *essay*"—we could add "*dramaticity*" or "*dramaticness*" more generally than "drama."

Current media systems, however, isolate, assess or confront these forms in another way which we have to analyze carefully, especially regarding aspects of space and time:

- *Narrativity*: We experience narrative lines notably in the already mentioned *locative narratives,* i.e., in environmental, neighborhood and city projects with GPS-based media following literary patterns. Included are projects such as Jean-Pierre Balpe's *Fictions d'Issy* or *34 North, 118 West* by Jeff Knowlton, Naomi Spellman, Brandon Stow, and Jeremy Hight. *Worldwatchers* by Susanne Berkenheger and Gisela Müller is an example for projects on the Internet that locate the increasingly massive social control through video-monitoring (or other sensor systems) in the long literary discussion from perspectivism to dystopian concepts, updating them critically.

- *Poeticity*: If we do not understand the poetical only as an effect of literary procedures—in Roman Jakobson's sense of "poetic function" (358)—but as a re-projection of socio-historical and technical conditionings of the body to its sensual self-perceptions, then it is materialized in *mixed reality environments* such as the Cave or interactive camera-projection systems. This means that it is transferred from the imaginary realm into the immediate haptic, acoustic and visual realm of perception. Apart from Cave projects like Noah Wardrip-Fruin et al.'s *Screen* or John Cayley's *lens*, literary installations such as *Text Rain* by Camille Utterback and Romy Achituv, Daniel Howe's *text.curtain* (2005) or Simon Biggs' *reWrite* (2007) and *reRead* (2009) also belong here.

- *Dramatic art*: In *stagings* of inner realms and environments, real characters (from simple users to trained actors) and artificial ones (from avatars, software agents, etc., to complex AI-programs), following quite classical dramatic patterns of activity, are involved in dialogues (cf. Schäfer, "Looking Behind the *Façade*"). Among these belongs for example the interactive drama *Façade* by Michael Mateas and Andrew Stern for which an augmented-reality version has been developed (Dow et al.).

7 Opening the Ethnographer's Toolbox: Interactivity Experiments and Participant Observation

The findings described above demand drawing methodological consequences. I believe that in order to be able to describe quite concrete, distributed aes-

thetical processes with computer-based and networked media, particularly those using site-specific media in physical space or in computer-aided mixed reality environments, instruments have to be developed that also include methods from media ethnography, "workplace studies" and qualitative social research.

Therefore my own thoughts regarding future work are aimed at directing the results of the above-mentioned theoretical and methodological considerations into concrete pragmatic activities, combined in a further step with questions of literary studies. One could, for example, on the one hand think about conducting media ethnographic observations of locative narratives as systematic combinations of participant observation, recording and surveying computer logs—thereby identifying patterns of interaction in concrete contexts of action and communication.

Media ethnography—especially "Technography" (Rammert and Schubert) and "Virtual Ethnography" (Hine)—has developed methods that can also be used for the analysis of literary activities of human and non-human actors with symbolic artifacts. Empirically detailed studies for all components have to be pursued recognizing concrete literary actor-networks—and in computer-based and spatially determined mixed environments this includes the physical movements of human actors, their literary knowledge, the media-technological and spatial conditions, and the institutional parameters, etc.

In contrast to the fieldwork of classic ethnography, the approaches of a "focused ethnography" are well suited for the integration of questions of literary studies since they are based on short-term but data-intensive field trips in areas known to the scholars. Therefore, they can concentrate on the specifically *literary* frames of activity and communication and present the knowledge of their discipline in a targeted manner. In participant observation both the activity of other actors can be observed and recorded while one's own experience of the analyzed practices can be described. The meanings and subjective perspectives of other human actors can be determined through interviews. And since we are dealing with a spatially and temporally assessable field, the intersubjective observation of data (specifically in transdisciplinary research groups, cf. Knoblauch) can be enabled through the use of the currently available technical methods of recording.

On the other hand, working with the Cave could allow for conceptualizations and realizations of experiments of structured interactions in which *concrete* human-machine interactions can be recorded and documented. In this sense, the Cave can be utilized as an "experimental system" (Rheinberger), i.e., as a hybrid configuration in which aesthetic experiences of the interaction between literary factors such as genre traditions, roles of literary plots, etc., and technical conditions such as computers, networks and displays are all made possible.

This would demand active participation putting the recipient—and especially the literary scholar—into a situation in which he has to introduce his historical and systematic knowledge just as much as his pragmatic competence in the interaction with media interfaces. At the same time he has to continually revise his own horizon of expectation, adjusting it to technically determined constellations the combinatorial possibilities of which as a rule he cannot grasp. In exemplary studies it could be examined in what way literary knowledge, physical action and technical systems are related to each other and how they reciprocally shape each other.

Besides, in such experimental settings individual factors within different experimental sequences can be varied in a controlled way. Additionally, the micro-level of concrete human-machine interaction can be made accessible for description by analyzing computer-protocols (cf. Hahne et al. 279). This means that by observing all human and non-human actors, recurring or typical patterns of action of the actors—e.g., *spatial* patterns of distribution, *temporal* routines and *patterns in the sequences of interaction*, i.e., in the sequence and distribution of acts of activity—can be identified.[30]

For example, an analysis of *Screen* would initially attempt to register how the bodily movements of different recipients and the movements of the letters are related to each other and which textual variations emerge from this interplay. Added to this with video recordings, the physical activities of the recipients can be recorded and documented by analyzing the computer protocols of the VR system's performance. In this way possibly intersubjective patterns can be determined. In a further step, it could then be established which different semantic representations in the episodic memory were created in these concrete acts of reception. In structured interviews, the attributions of meaning that the different recipients create would have to be approximately determined, taking their contextual literary knowledge into consideration.

8 Conclusion

I have attempted to sketch a theoretical framework that allows integrating the specificities of literary communication in computer-based and networked media—in particular in spatially determined media dispositives—in such a way that it relates the distributed agency between human and non-human actors, the transcriptivity of language and the "artificial intelligence" of computers, the bodily experience of recipients and the mental representations and, last but not least, the literariness of these processes to each other.

This framework is understood as an attempt to open up a pathway upon which research can possibly live up to the demand that N. Katherine Hayles has rightfully made:

> Nothing works well when the focus narrows to the solitary individual considered in isolation; everything works when things are situated in relation to one another. ("Distributed Cognition" 27)

Translated by Brigitte Pichon and Dorian Rudnytsky

Notes

1 The important differentiation between *actants* and *actors* in ANT is undecided. Therefore I have decided on a use that is based on different states of figuration. An actant is the smallest prefigurative unit that becomes an actor when it is networked and therefore obtains action potential of its own within this network: "*any thing* that does modify a state of affairs by making a difference is an actor—or, if it has no figuration yet, an actant" (Latour, *Reassembling the Social* 71).

2 The Actor-Network Theory is in no way a systematic, closed theoretical construct. Between its main representatives Bruno Latour, Michel Callon, John Law, or Antoine Hennion the important points can indeed emerge with differences and disagreements, even in the definition of the key terms. In my references to ANT below, I will proceed at first heuristically analyzing different aspects separated from each other that in reality are connected to each other by the logic of translation.

3 Of course Latour does not talk of "the literary" but of "the social."

4 Latour here says "social" and not "literary."

5 The etymological origin of "literature" can be traced back to the Latin "littera" ('letter') which initially denoted all kinds of written texts (cf. Schäfer, "Sprachzeichenprozesse").

6 To be exact, ANT differentiates between "intermediaries" and "mediators": "An *intermediary* . . . is what transports meaning or force without transformation: defining its inputs is enough to define its outputs. For all practical purposes, an intermediary can be taken not only as a black box, but also as a black box counting for one, even if it is internally made of many parts. *Mediators* . . . transform, translate, distort, and modify the meaning or the elements they are supposed to carry" (Latour, *Reassembling the Social* 39).

7 Clearly, ANT to a large extent is based on semiotic theories, especially on the works of Algirdas J. Greimas, e.g., on his *Structural Semantics*. Cf. Latour: "It would be fairly accurate to describe ANT as being half Garfinkel and half Greimas: it . . . has found ways to tap the inner reflexivity of both actor's accounts and of texts" (*Reassembling the Social* 54n54).

8 The idea of the circulating reference was described by Latour quite concisely in his famous ethnography of geological studies from the Brazilian jungle. According to Latour, the sciences are dealing with reality always only "in the form of two-dimensional, superposable, combinable inscriptions" (*Pandora's Hope* 29), i.e., with "representations, that seem always to push it [the world] away, but also to bring it closer" (30). These representations (diagrams, texts, etc.) are connected to their original context only by way of chains of translations; here, tools like the pedocomparator represent in a manner of speaking hybrids of thing and signs allowing the creation of these chains of translations, i.e., to substitute thing and sign. This, according to Latour, is an expansion of the semiotic models or rather a generalization and a transfer to things/objects, as a "study of order building or path building and may be applied to settings, machines, bodies, and programming languages as well as texts; . . . the key aspect of the semiotics of machines is its ability to move from signs to things and back" (Akrich and Latour 259).

9 Thus, regarding Latour's assumption of the hybridity of thing and sign, Georg Kneer criticizes that the links of the chain of signs do not appear as hybrids. According to him, it is not an ontological differentiation, but one that is always done by *observers*. Therefore signs function only *as signs* and specifically the fulfillment of its functioning as sign presupposes an abstraction from all material characteristics (295).

10 Since all speech creates such a surplus, it still has to be cleared up more specifically where the *specifics* of literary language use can be located. First ideas regarding this will be reflected upon in paragraph 6.1.

11 Bernard Robben calls "notation" the relationship between the code and the perceivable representation, i.e., "die Form der Über-Setzungen des Mediums Computer, eine prozessierende Relation zwischen Kode und Darstellung" ('the form of the translations by the medium computer, a processing relation between code and representation') (12f.).

12 An interesting variant of this conception has been pursued by Adam Parrish, who creates so-called "New Interfaces for Textual Expression," i.e., textual instruments as *hardware* devices.

13 For an in-depth discussion of Schemat's project cf. Kwastek, "Geo-poetics."

14 Renate Grau has coined this term for the appearance of belletristic (print-) works as aesthetic artifacts that emerge in literary publishing houses via the "translations" between the different human actors of the "literary business" (like authors, lectors, literary agents, distributors, book sellers, etc.), different technologies of communication and production (paper, computer, software, printing machines, etc.), sales channels, institutions and competences (book stores, interim storage facilities, etc.) and aesthetic contextual knowledge (98). Here, she is following John Law's "heterogeneous engineering" who argues "that the stability and form of artifacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network" ("Technology and Heterogeneous Engineering" 113).

15 In my opinion the most important points of criticism are that on the one hand it does not always become clear why different actors should be included in a network with the same intensity and with the same degrees of freedom, while on the other the two principles are defined so broadly that one cannot always differentiate enough whether an agency of their own is implied to technical systems, or whether an effect of agency is *attributed* to an entity from the perspective of an observer (Schulz-Schaeffer 21).

16 In the early poetry and story generators, the programmable, combinatorial procedures were delegated to the (mainframe) computers that processed the programs in batch mode. Only with interactive computing have the possibilities of distributed agency decisively widened.

17 The following overview does not intend to furnish a complete list of the actors involved; I simply want to point out the heterogeneity of the agencies.

18 Hayles notes: "An electronic text does not have this kind of prior existence. It does not exist anywhere in the computer, or in the networked system, in the same form it acquires when displayed on screen. After it is displayed, of course, the same kind of readerly processing may occur as with print. . . . In this sense electronic text is more processual than print, it is performative by its very nature, independent of whatever imaginations and processes the user brings to it, and regardless of variations between editions and copies" (*My Mother Was a Computer* 101).

19 Latour once has made use of the terms "worknet" or "action net" in order to underline this processuality: "If I believed in jargon and if *worknet* or *action net* had any chance to hold, I would offer it as a substitute so as to

make the contrast between technical networks and worknets, the latter remaining a way for social scientists to make sense of the former. *Work*-nets could allow one to see the labor that goes on in laying down net-works: the first as an active mediator, the second as a stabilized set of intermediaries" (*Reassembling the Social* 132).

20 It is just this "networking" of the body via the senses that is currently technologically enhanced with the help of sensors and effectors, i.e., the natural limitations of the physical interior are made permeable in a new way.

21 Akrich and Latour define "antiprograms" as "all the programs of actions of actants that are in conflicts with the programs chosen as the point of departure of the analysis" (261).

22 I cannot here deal with this aspect for reasons of space. In my analyses of the interactive drama *Façade* I have considered this question ("Looking Behind the *Façade*"). On the question of "agency in relation to the fictional worlds of games and other playable media" cf. Wardrip-Fruin, Mateas, Dow and Sali.

23 This holds for the reader-response approach of Iser's early books *The Act of Reading* and *The Implied Reader,* which he extended toward literary anthropology in his later seminal studies *Prospecting: From Reader Response to Literary Anthropology* and *The Fictive and the Imaginary*.

24 Other established theories of literature such as hermeneutics, formalism, systems or discourse theories or other versions of reader-response theory should also be critically reviewed: How do they conceptualize literariness? What do they regard as specific aesthetic qualities of texts? Are any of their key terms and conceptions such as "defamiliarization" (Shklovsky), "interdiscourse" (Jürgen Link), "autopoiesis" and "communication" (Luhmann), and so on relevant for analyzing literature in computer-based media?

25 Iser argues that "every moment of reading is a dialectic of protention and retention, conveying a future horizon yet to be occupied, along with a past (and continually fading) horizon already filled; the wandering viewpoint carves its passage through both at the same time and leave them to merge together in its wake" (*The Act of Reading* 112).

26 Here Iser's theory regains a certain precision: Strasen's main criticism is that Iser's theory privileges the control of the reader by textual structures. In computer-based media, however, this question of control has to be asked on quite a different technical foundation and in an expanded version: namely, the additional question has to be asked in what way the text

and therefore also the activities of the reader are controlled by running programs and by interfaces that demand not only interpretative but quite concrete physical additional activities.

27 Apart from this some "struck" words dissolve into their syllables and can afterwards converge in neologisms.

28 These types of activated knowledge encompass "mental representations in the immediate past" that have been kept in an activated state; knowledge about other discourse participants; individual goals and expectations in the given situation; knowledge of the situation; "knowledge about the speech act in which one participates"; and, last but not least, "general world knowledge" (Schmid 437ff.).

29 Iser notes: "Literary texts contain a range of signals to denote that they are fictive. . . . More important than the repertoire [of these signals] is the fact that these signals are not to be equated exclusively with linguistic signs in the text. . . . For these signals can become significant only through particular, historically varying conventions shared by author and public. Thus the signals do not invoke fictionality as such but conventions, which form the basis of a kind of contract between author and reader, the terms of which identify the text not as discourse but as 'enacted discourse.' Among the most obvious and most durable of such signals are literary genres, which have permitted a wide variety of contractual terms between author and reader. Even such recent inventions as the nonfiction novel reveal the same contractual function, since they must invoke the convention before renouncing it" (*The Fictive and the Imaginary* 11f.).

30 An interesting co-operation of literary scholars and cognitive scientists is conducted by the British research project *Poetry Beyond Text: Vision, Text and Cognition* located at the universities of Dundee and Kent. Research teams try to find out how readers respond to the visual aspects of poetry by combining reader-response theories with psychological methods such as eye-tracking and pupil dilation: "We will assess how reading strategies affect memory, interpretation and perceived aesthetic value, using both quantitative measures and reader-response theories. We have developed, on the basis of previous work in this area, a strategy of a 'reflective feedback loop,' in which participants in experiments are regarded as co-researchers. Their cognitive processes will be assessed, using various experimental methods, while they are reading the various types of poetry. . . . Crucially, these results will also be presented to participants, who will be asked to write their own responses, allowing us to explore their aesthetic experience and interpretation of the poems, before and after receiving

such feedback. Furthermore, participants on appropriate degree programmes, together with poets and artists will be invited to create works in response to the investigations" (Roberts et al.).

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