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Six Problems in Search of a Solution: The challenge of cybertext theory and ludology to literary theory

By Markku Eskelinen

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Abstract

As its title should tell the paper tries to solve or at least complicate six specific problems. First, as narratives are supposed to be transmedial how should we extend literary narratology beyond its print heritage? Second and thirdly, in addition to various narrative and would-be-narrative constellations and devices also the relations between texts and the text's relation to itself have changed. Fourthly, all these changes have their bearing on the role of the reader in the situation where the lack of conventions is well matched with the outdated expectations concerning narratives, texts and transtextuality. Fifthly, enter playability and the fear of variety when readers and scholars should perhaps be willing to give up the idea of literary wholes and try to pursue happiness in the form of parts, phases and playthings. Sixthly, we'll try to shed some ludological light into the recent trend of building textual instruments and instrumental texts.

The power of cybertext theory in this context stems from the fact that even the state-of-the-art literary theories of today are ultimately based on literary objects that are static, determinate, intransient and random access with impersonal perspective, no links and utilising only the interpretative user function. To this one special type of object cybertext theory adds 575 rather fresh alternatives capable of undermining and shaking many basic assumptions and presuppositions derived from the print era.²

Ludology gives us a perspective and a paradigm from which to approach the interactivity or ergodicity of literary works without any hype of the new versus the old, as interactivity has always been dominant in games. In short, in literature we may have to configure in order to be able to interpret, but in games we have to interpret in order to be able to configure and proceed from the beginning to the winning or some other situation (Eskelinen 2001a). This ludological double vision is

all we need to situate the continuously expanding field of ergodic literature between linear literature and computer games.

It's time to formulate the first of my six challenges; let's call it the logic of expansion. There are many other fields where the current media plurality seems to pose problems, but the easiest way to show what I mean is by and through narratology. Narratives are supposed to be transmedial, or to put it in Seymour Chatman's terms: "The transposability of the story is the strongest reason for arguing that narratives are indeed structures independent of any medium." (Chatman 1978, 20) So, let's see what happens if we try to expand formal literary narratology from its traditional one media position to those few hundreds offered by cybertext theory.

1. From expanded narratology to the lack of conventions

Aarseth contrasts ergodic mode with narrative mode for various good reasons I fully agree with. Still, from the outset Aarseth's concept of ergodic literature seems to concern differences only within one of the seven dimensions, the main dividing line separating the interpretative user function from the three other user functions. Therefore we could begin our investigation by focusing on the other six parameters of his typology of textual communication, as in principle they could all be combined to the interpretative user function within the realm of non-ergodic narrative literature. We'll have eight major shifts to deal with: from static to intratextual and textual dynamics, from determinate to indeterminate texts, from intransient to transient time, from random to controlled access, from impersonal to personal perspective, and from no links to links and conditional links.

To warm you up, let's take two stock examples of narrative power: the concepts of unreliable narration and dramatic irony. The former makes sense only if there's a completely accessible and static textual whole against which background the reader can finally understand and verify how the narrator was positioned in relation to possible other narrators and the narrated events and existents in general and how reliable he actually was. The case is pretty much the same with dramatic irony. The reader can by all means believe she knows more than certain characters and narrators do, but in the end this can be verified only in the context of the whole text and nothing but the whole text. Of course these things are always already actively interpreted and hypothesized on a more local level one way or the other, but the possibility that one is being misled remains until the whole text is read. Both in print fiction and classic hypertexts the whole text, that is, every single texton, is there to

be read, but in more dynamic works that doesn't have to be the case. To misquote Radiohead, just because you read it doesn't mean it is there.

Genette's formal narratology (1980; 1988) will serve as my point of departure, as it gives us access to a wide variety of already well-recognised, thoroughly studied and therefore quite uncontroversial and conventional narrative devices.³ Genette's model is a fairly simple and reliable system of narrating, narrative, and story. The first of these terms is used for the producing narrative action, the second for the signifier, statement, discourse or narrative text itself, and the third for the signified or narrative content. Genette divides his basic parameters into three groups: tense, mood, and voice.

Tense concerns temporal relations and possible distortions between story time and narrative time. They are studied in three registers: order, frequency, and duration. It's now time to add some cybertextual ingredients to this simplicity. As we all know textonically dynamic texts like William Gibson's *Agrippa* or Noah Wardrip-Fruin's *The Impermanence Agent* are capable of reducing the number of their original textons and scriptons to zero and thus either disappearing or replacing themselves completely within a limited period of time. Transient texts set temporal limitations to their reading; in Stuart Moulthrop's *Hegirascope* it is 30 seconds max per node per visit. This means we may have to add two new temporal categories to the classic two: system time to account for the varying degrees of the text's permanence, in short the appearances, disappearances and possible reappearances of its parts and phases, and reading time for the text's potentially limited temporal availability to the reader.

For the sake of simplicity and time we browse through these two new temporal layers without inventing too many new categories, as those of frequency, order, duration and speed will do for our limited purposes. Accordingly, reading time could be conceptualised to be either unlimited or limited in all these categories, as in principle reading constitutes an event like any other. These limitations could be applied both locally and globally. *Hegirascope*, for example, limits only the duration of its reading on the local level of its nodes. There are countless other alternatives. Imagine your favourite classic that could be read only once or only for two hours, or in night time or outside office hours only, or of which you are allowed to read only two chapters in a decade or in a lifetime, tempting you to collaborate with other readers or leave it and your vague memories of it as an inheritance to the next generation of readers.

If the text disappears gradually and not at once, we will have to be prepared to attach different temporal values to each of its dynamic parts. In principle, the text is permanent, partially permanent or ephemeral. And if the text or some parts of it are of the vanishing kind then we could study this process in the aforementioned temporal registers. As I think it is trivially easy to invent or discover useful examples,

I won't bother you with them now. To sum up these extra dimensions, suffice it to say that if we combine the possible limitations regarding levels (global and local) and the four temporal registers (order, speed, frequency and duration) we'll have at our disposal a system of 256 basic ways of constraining reading time only one of which, the one containing no restrictions whatsoever, is compatible with classic narratology (see figure 1 below).

Level	Local		Global	
	unlimited	limited	unlimited	limited
Frequency (How many times the work can be visited?)	<i>Reagan Library</i> ⁴	<i>Reagan Library</i>		<i>Agrippa</i>
Duration (For how long can be visited?)		<i>Hegirascope</i>		<i>Agrippa</i>
Speed (Possible limitations of the reading speed such as mandatory pauses)		<i>The Impermanence Agent</i>		
Order ⁵ (Freedom of movement within a part between parts)				Hypertext Fiction

Figure 1. Reading time

All these limitations complicating reading and rereading may seem to run counter to our cultural conventions and therefore to be an exercise in futility. Still, if one of the main attractions of narratives is the challenge to construct and reconstruct a set of temporal relations on one level from various explicit and implicit cues and hints embedded in another temporal level, then it may not be totally out of question to add more temporal levels to that challenge. Reading time and system time can equally well be used in non-narrative texts and for non-narrative purposes, which means they are not narrative categories in themselves.

Mood, Genette's second group, with its categories of distance and focalisation, deals with various techniques of regulating the quantity and quality of narrative information. The effects of this regulation constitute another standard attraction of narratives, as it challenges the reader to work his way through these limitations and hypothesize the bigger picture so to speak. Focalisation is not about who narrates, but who perceives or where the perceptual focus of the narrative is situated. In other words, it is a delivery channel for narrative information, and its functioning as a narrative device is ultimately based on uneven distribution of knowledge. It seems that many kinds of bots, non-playing characters, avatars and voices have already expanded the notion of the channel and its behavioural variety, as we can sometimes discuss with these entities, or even operate them to a certain degree,

which is all very different from what we can do with characters and focalisations in print literature. Confusingly, the current careless and indiscriminate use of the word character doesn't tell us whether characters are used as delivery channels for narrative purposes or as strategic tokens for interaction (see figure 2 for basic distinctions).

Control		Not controlled by the player/reader/viewer		Controlled	
Communication	Subject (2-way)	Object (1-way)	Subject	Object	
Behavior					
Static	NPC	Characters			
Dynamic	Bots like Eliza	Possible digital characters			

*Figure 2. Existents and "characters"*⁶

It is also clear that the amount of possible additional filters will know no limit once we move from random to controlled access. All these shifts point out to new textual communication structures and it is a mystery to me why they should be reduced to or labelled as narratives (see also Aarseth 1997, chapter 5). Therefore, and before getting into the heart of our first challenge, we'll try yet another strategy to expand narratology with the help of cybertext theory.

Because in cybertexts narrators and characters and other traditional narrative elements and devices we are familiar with are just potentially alterable strings of signs, we should make a fundamental distinction between textonic and scriptonic entities. On a slightly more practical level this means that there might be a pool or an archive of possible narrators, and every time the (cyber)text reorganizes itself a certain number of these narrators are first selected and then distributed to their temporary positions inside the narrative text that is presented to the reader. It's easy to imagine possible operations of these dynamic fictive entities: they can turn more covert or overt, trade places with each other, split up or unite, extend or reduce their territories, move between narrative levels and homodiegetic, heterodiegetic, and mere character positions, alter the degrees of their intrusiveness, self-consciousness, reliability and distance, and so on (see figure 3 below).

Object/	Narrator/		Character/		Narratee/	
Level/	textonic	scriptonic	textonic	scriptonic	textonic	scriptonic
Operation:						
Addition:						
Substitution:						
Substraction:						
Multiplication:						
Division:						
Increased presence:						
Decreased presence:						
Increased territory:						
Decreased territory:						
etc. (changes in intrusiveness, self-consciousness, reliability and distance						

Figure 3. Rotation scheme for narrative entities.

The same idea could be applied to more abstract narrative devices as well. If we choose to do it to narrative levels, in some fictional world the story of Shahrazad may very well turn out to be framed by the story of Sindbad the Sailor. In addition to the traditional options of either hierarchic (A embeds B) or heterarchic (A embeds B and B embeds A) arrangement of narrative levels, there are two novelties (see figure 4 below): dynamic relations between narrative levels based on how the text is being read, and rotating levels (let's say only five out of seven narrative levels are available during any one reading session).

- Number of levels in the text: n
- Number of levels available for the reader during any one reading: $n / < n$
- Mutual relations of available levels: static/dynamic
- Type of framing: hierarchic/ heterarchic

Figure 4. Logic of narrative levels

It might be helpful to make at least one more distinction: the one between three different sides or dimensions of narrators, that is, their position or positioning, their identities, and their qualities or characteristics. In print fiction these three dimensions are glued together but in cybertext fiction that no longer needs to be the

case. We can separate them, not without consequences of course. Once again, on a more practical level, this may lead to narrators exchanging posts, or competing with each other for the key positions (in terms of time, space and credibility) inside cybertext fiction, and also, as a result of these transformations or for other reasons, changing the number and identity of possible narrators in the following phase or version of the narrative on the run. Working out the ways to rewrite narratology with these possibilities of playing with yet another attraction of narratives, the promised discovery of narrators' relations to and positions in the narrative text, will definitely offer lots of fun, but as I have already done it elsewhere (Eskelinen 2001b) I will not dwell on that here.

Whichever way we choose, adding strange new behaviours to easily recognizable narrative devices or new categories barely justified by loosely defined attractions, we'll end up in trouble sooner or later. Firstly, every well-established and sophisticated narratological theory, regardless of whether it puts its emphasis on communicative (Chatman, Genette, Prince) or cognitive models (Bordwell, Branigan, Sternberg), is ultimately a theory of interpretative reconstruction based on the narrative text that is presented to its readers or viewers. In other words, reading a narrative is a construction process where based on what's presented to us we are supposed to figure out what really happened and what the relations between events and existents were. It seems to me there's no justification to expand the definitions of narrative beyond this economy of presentation and interpretation. Secondly, many of these new and hypothetical narrative devices and techniques will exceed the cognitive capabilities of the readers and in some cases humanly possible attention spans as well. Thirdly, there are no broad cultural agreements, shared conventions or readymade expectations to help readers in their encounters with these would-be-narrative oddities, such as rotating narrators and characters and playing with time and temporal change in four registers instead of the standard two.

Consequently, our second problem or challenge has to do with conventions, but before getting there let me conclude with four possible solutions to our first challenge of how to expand narratology to meet the multiple media positions offered by cybertext theory:

- 1) Not to do it at all beyond its one media position, and believe it is too intimately tied to it, just like film narratology is tied to its one position, the difference between these two well-established narratologies residing in the transient time and temporally controlled access of the film medium.
- 2) Try to expand it to accommodate all the 144 non-ergodic positions and find out there's a lack of conventions for producing and consuming such artefacts even if the role of the reader as an interpreter has not changed.

3) Try to expand it to accommodate the 432 ergodic positions as well if certain other conditions are met, most importantly that the ergodic mode will be in the service of the narrative mode.

4) Try to expand it to absolutely anything the way the pan-narrativists do in the context of games.

While you can take your chances and try to fill the blank spots in the charts, my choice is to focus next on conventions, the supposed lack of which will form the second challenge.

2. At the reception: you can't always get what you want

As we move from narratological problems to those of reception, we need to clarify something, and in order to that we have to adapt a standard deconstructive position for a moment or two. It could be shown that there always already exist both thematic and formal overflow capable of overturning and shaking whatever our structural constellations or thematic interpretations our reading tries to posit. In the context of narratology, expanded or not, this means first of all that we should acknowledge the endless interplay between narrative and other textual designs. There's nothing extraordinary in this; we can take any decent half-experimental 20th century fiction and show a recognizable narrative organisation to exist side by side or intermingled with other, anti-, non-, or counter-narrative organisations. From this perspective also the ergodic and narrative modes could easily co-exist in the same cybertext and either serve or undermine each other, and it's up to the reader-user to figure out which is the case.

The more or less hypothetical narrative devices we drafted earlier could easily be used to complicate and defamiliarize the text to every extreme, but that's not the only and probably not the best use of these relative novelties. While it is true that these techniques set new demands and challenges for the reader, it is also true that just like in an ordinary work of print fiction they must be motivated to the reader at least to a minimal degree. To reach that noble goal we can thematize, conventionalize or trivialize the functioning of the cybertext or try to shape its ergodic side more playable.

Probably the easiest way to do it is to ground the behaviour of the textual machinery in themes. If the protagonist is under a lot of stress and has to make more or less difficult and fatal decisions in a hurry then why not boost this theme by extending it to the reader's experience as well by setting limits for the time the text stays

available without changing itself. Likewise, the text that changes itself could be described as hiding or destroying the evidence it contains making it therefore very likely to suit the well-known formats and clichés of thrillers and detective stories. If the text, or more likely certain key parts of it, is materially different in every rereading, it would be very easy to connect this quality to themes of memory and remembrance, as well as to countless others, from Alzheimer's disease and traumatic experiences to resistances and defences in psychoanalytic sessions.

We could say that the three classic hypertexts, Michael Joyce's *Afternoon*, Stuart Moulthrop's *Victory Garden*, and Shelley Jackson's *Patchwork Girl* all did what they could to make the reader more receptive to the marvels of their labyrinths: by using hidden and conditional links to highlight and parallel the defences and self-denials of the protagonist in *Afternoon*, his general unwillingness to know; evoking and concretising the familiar literary tradition of forking paths of Borges, Coover and Pynchon in *Victory Garden*, and foregrounding Frankensteinian bodily metaphors to ease the postmodernist butchery work of connecting parts and wholes in *Patchwork Girl*.

Secondly, we could banalize. It's important to bear in mind that every cybertextual media position seems to have its trivial counterpart in everyday life. Textonic dynamics can be found in discontinuous textual flows in blogs and online discussions, and variable responses characteristic of intratextonic dynamics can be found in our everyday experiences with so-called intelligent machines. Humans are not (always) predictable hence indeterminability is at the core of our social life. Film subtitles are transient; even the simplest board games make you assume strategic responsibility for something, footnotes and encyclopaedias fork the text and turn it to a system of fragments and connections, passwords control your access, etc. These familiar experiences offer countless possibilities for taming the cybertextual machinery.

The third way to make the functioning of a cybertext familiar or at least more familiar to its user is to borrow conventions, but not necessarily from literature or even art in general. In *Cybertext* Aarseth devotes separate chapters to four different specimen of ergodic literature: hypertext fiction, story generators, textual adventure games, and MUDs. The latter two use ordinary game and quest elements along with common communication structures like dialogue and polylogue to make it easier and more meaningful for the reader-user to deal with the textual constructs and constellations she encounters. Story generators will probably remain fundable because of their tight connections to AI research, and need neither familiarizing nor defamiliarizing touches.

This leaves us with hypertext fiction and its somewhat twilightish status as a relatively recent branch in the networked traditions of experimental literature. To condense what was said earlier about classic hypertext fiction, we could wonder

whether it was quite enough after all to borrow the convention of the jig-saw puzzle and force or challenge the reader to complete it. A puzzle is a puzzle is a puzzle, a monologic experience if any.

Cybertext theory has already shown experimentalists a fresh way out in the form of new targets, those shared strongholds of both print and hypertext fiction: static scriptons and intransient time. Still, cognitively speaking I can't be optimistic: if the simple hypertextual distortions of the presentation order were able to generate such a commotion and conceptual mess, it is unlikely that the much more dynamic distortions will be recognised, understood and conventionalised in any time soon.

Conventions don't appear or disappear overnight or in a decade. The big question then is whether to wait for their emergence without knowing if they'll ever arrive or to apply the already well-known conventions, not from literature, but elsewhere: from games and computer games especially. The justification would be that the minute there's a recognizable cultural divide between interpretative and operational sides of literature, the latter will be measured against the already existing and well-formed activities and operational practices and if no matches are found then the case is what it still is today: the bits and pieces of ergodic literature without explicit play- or game-like attractions are viewed as elitist and experimental oddities (which is fine by me). This last possibility refers to concrete relations and borrowings between sign-producing machines, which is a fairly decent way to introduce our third challenge: what happens when transtextual relations cease to be merely interpretative?

3. Transtextuality meets cybertextuality

Before taking a quick tour through Genette's five forms of transtextuality (1997b, 1-8), it should be clear that from the cybertextual perspective there's a basic distinction to be made between interpretative and ergodic relations between texts. The latter are concrete and programmable, the former are those of traditional print transtextuality, expanded or not by the variety of new possibilities opened up by the digital media. The material basis of interpretative relations between texts can be (at least potentially) altered in ergodically dynamic cybertexts (by adding, removing or otherwise manipulating scriptons) in contrast to print texts and ergodically static hypertexts. Within the latter group there's a crucial difference between web and stand alone hypertexts. In the former environment some links and transclusions could be said to function as explorative forms of transtextual relations (that is, we can concretely and seamlessly move from one text to another). Similarly, nothing, except maybe deep-seated conventions, prevents authors from designing configurative and textonic relations between and among texts. This may sound

familiar and it is intended to sound that way since it might be tempting to find an analogue between the ways scriptons are revealed and generated from textons, and the ways these textons could be generated from other textons. However, the analogue is far from complete, and we shall postpone discussing it until much later. For now it may be useful to keep an open mind to the possibility that in addition to interpretative relations there also are explorative connections, configurative affects and textonic impacts between texts.

In order to see the bigger picture of changed relationships between and within texts we should free ourselves from the metaphysics of links, that is, from the famous convergence or embodiment hypothesis. Obviously, links can be used to make explicit references and transclusions will work as direct quotations, if for some obscure reason we wish merely to foreground, emphasize or boost the traditional notions of intertextuality. However, it should be equally obvious that although links have been too often confused with intertextuality, there are both intertextual relations that cannot be shown by links, and various uses of links that have nothing whatsoever to do with traditional intertextuality. Every traditional notion of intertextuality is ultimately dependent on the unpredictably varying interpretative and transpositional skills of the readers and this dimension can neither be reduced to links nor fully expressed in them. On the other hand, already the links forming concrete connections (instead of mere references) between online hypertexts are potentially very different from their distant print relatives, as unlike the latter they are not merely interpretative and they could also be timed, changed, conditioned, chained, concealed, randomized and layered for complex effects the tradition knows nothing about.

Architextuality. Genette means by architextuality "the entire set of general or transcendental categories - types of discourse, modes of enunciation, literary genres - from which emerges a singular text." (1997b, 1) Here cybertext theory adds another dimension and taxonomy to the already muddled project of Western poetics and aesthetics: the 576 textonomical genres or media positions describing the functional or behavioural side of any literary work. At stake here is the whole necessary and unmanageable project of Western poetics, a cluster of modal, generic, formal and thematic categories, combinations and considerations. It is safe to say dynamically ergodic texts will have long lasting uneasy relations with them. One needs only to imagine fictions the genre or the mode of which will change based on how the text is being read - let's say the faster you read a detective story the faster it becomes a horror story to slow you down with gruesome details or that only the dialogue will remain to be reread while the rest of the text once read, hopefully, stays in someone's memory.

Paratextuality. Paratexts are heterogeneous elements that lie on the threshold of the text and which help to direct and guide the reception of a text by its readers (Genette 1997a). In digital cybertexts this dimension should be discussed in relation

to various interface issues as well as to user's manuals, help-files, web sites and etiquette given to users and readers to consult while approaching, interpreting and learning how to operate ergodic works. In some cases, the text may explicitly comment upon the way it has been read and offer genuine or mocking assistance, which nicely blurs the traditional difference between guiding paratexts and self-referential commentaries – yet another distinction inherited from the golden age when literary works didn't react to their reading.

Metatextuality is "the relationship most often labelled commentary" (Genette 1997b, 4). In certain encounters with indeterminate cybertexts, commentaries may turn out to be commentaries on one's own singular experience of ephemeral constellations of signs never to be repeated again or to be seen by any other user. There are at least three types of new challenges. Firstly, in addition to the usual interpretative skills the critic needs ergodic skills to use the textual system in an appropriate way. Secondly, the continuous and potentially never-ending variation and supplementation may well exceed any humanly possible attention span. Thirdly, an ergodic work may be very sensitive to how it is used and this may result in unique textual responses to the critic's efforts. I can almost hear the boring me-my-mine rhetoric this may well lead to, so it's better to move on to the next transtextual relation.

Intertextuality. According to Genette's rather restricted definition intertextuality is "a relationship of co-presence between two texts or among several texts." (1997b, 1) This includes the practices of quotation, allusion and plagiarism. In principle, it is just a matter of recognition. But in these days just because you read it doesn't mean it is there and vice versa. The invisible, hidden, and inaccessible parts of the text will deny the reader the comfort of knowing for certain what exactly is there in the text. To make matters more complicated it's not only the dialectic between visible and invisible parts of the text that counts, but also the relations between what's visible now and what, if anything, will be visible later. Also the threshold between what's inside and what's outside the text is getting blurrier, as it's so easy to supplement and replace the original text from the outside (as certain famous software agents have already shown). In some ways, all this may lead to the decreasing importance of intertextuality in dynamically ergodic works, or at least to more drastic ways of foregrounding intertextuality. In any case we'd be better prepared to understand the widely varying degrees of co-presence at work.

We could perhaps take one step further in order to follow the concept of co-presence to its logical end, and add yet another category of relations, the one between textual wholes (or entities) potentially capable of annihilating and incorporating other textual wholes, or arresting and releasing them, in short making other texts (and parts of other texts) appear, disappear, and reappear. In other words, I suggest we distinguish between independent, dependent, dominant and co-

dependent works of art. This may very well be the end of intertextuality as we know it, but I feel fine.

Hypertextuality in the Genettean sense deals with systematic grafting of a text (a hypertext) upon an earlier text (a hypotext) in a way that is not commentary (1997b, 5). These imitations and transformations are formal and thematic, and it is safe to say that cybertexts add a third option, the functional one, as well as transform the previous two. There are at least three separate aspects to that situation. Firstly, there's a new possibility of gradual and serial transformation where the text goes through several different phases and quite possibly loses contact with its first or previous hypotext in the process; just imagine some banal desert island story that first models itself after Ibn Tufayl and then after Grimmshausen, Saikaku, Defoe, Tournier, and Eco. To get to know the serialized nature of these hypotexts you just have to keep on rereading. Secondly, this transformation may be purely functional; let's say we first turn a detective story into a hypertext and boost its epistemological structures with conditional links, hiding the evidence so to speak, and then turn this ergodically static hypertext into an ergodically dynamic cybertext that after certain time starts playing with both its own and its users' time and begins to destroy its static scripts, that is, its very evidence.

Virtually every text generator can show us the transformation of texts into changing script combinations in a way that is challenging enough to every traditional notion of inter- and hyper-textuality. The words waste and land may or may not be combined to constitute a reference to Eliot. You'll never know until it happens, and when it does you might not be there to witness this intratextonic nihilogue. Another case that comes to mind is the emergent growth of textual systems. Let's say there are two such systems connected to each other over the net continuously affecting the organization and reorganization processes of each other. The host and the parasite, the hypotext and the hypertext reprogrammed n times, until the one completely consumes or deadly inflicts the other. Scholars are very welcome to attach their favourite meanings to every morph, or forced to change their approach as there's no way to slow down the rotational speed (rpm) of the hermeneutic circle under such circumstances.

Users are an obvious source for altering inter- and hypertextual relations, but what happens or should happen when a Shakespeare snob meets a Shakespeare bot in some programmable textual environment? Is there any reason we should trace the connections whatever they are, or should we finally let the sleeping traditions lay and concentrate on more interesting issues if there are any? When users bring their transtextual fields and priorities into conversation and consumption, they may have a carefully calculated chance to convert the process to certain inter- or hypertextual directions (as in John Cayley's *Book Unbound*). There's also room for an interesting inversion: the cybertextual machine may turn critical or even allergic to such civilizing processes and may begin to defend its own priorities against the invading

flow of the user's cultural capital. Imagine a text that needs to be regularly fed by other texts from the outside: a textual tamagotchi, a vicious little cybertext using, say, Kafka as a catalyst to induce series of transformations in its incorporated textual nourishments and their relations to each other thereby producing the next generation of minor literature.

To conclude, any notion of digital transtextuality has to take into account at least three basic things or changes. Firstly, the relations between texts have ceased to be a mere matter of interpretation; dynamically ergodic cybertexts may concretely affect each other's form, content, behaviour and very existence. Secondly, the relations of such texts to themselves has to be taken into account, as they may now consist of several more or less autonomous parts and phases imitating and transforming each other and having their own transtextual specifications in all five dimensions. Let's call this new opening a field of dynamic autotextuality. Thirdly, the reader-users armed with configurative and textonic user functions can have fundamental impact on the text, a possibility not even on the horizon of Genette's work in the early 1980's. To take one concrete example, how should we conceptualize the personalized differences in ergodic works like *Book Unbound* or *The Impermanence Agent*, as the different ways their readers use them will make the versions of them very different from each other.

After this brief exercise in the fluidity of textual relationships, we might want to stop for a while to find out whether we need the traditional notion of the textual whole any more, and if not, how to get rid of it and what to replace it with? Enter the fourth challenge, dynamic intratextual relations.

4. The whole and nothing but the whole

I will be following Brian Eno's maxim about going first into an extreme position in order to be able to shift into a more useful position. So let's take the seven cybertextual dimensions as far as possible from the behaviour of the print works of our shared cultural heritage. This may sound like an exercise in futility, and maybe it is if futility is just another name for our unrecognized presuppositions. So; imagine a textual process continuously supplementing itself by outside sources, unpredictably varying its response to the activities of the reader which it also constraints temporally and by denying complete and random access to its parts and phases, using conditional linking and demanding not only explorative but also configurative and textonic activity from the reader in order to overcome the obstacles she's bound to through her personal perspective on the consequences of her very own strategic choices.

After this condensed glimpse at the almost non-existent extremities we could perhaps finally ask what will happen when there simply are no more expectations left to be manipulated or crashed. The seven parameters of cybertext theory will serve to illustrate the ways the textual whole may vanish or disappear from the reader's grasp if not from his aspirations or work ethics.

Before going into that it is important to remember that this assumed literary whole or totality can be described at least in interplaying perceptual, behavioural, structural (or intratextual), cultural (or transtextual), temporal, spatial, causal, and functional terms. Needless to say it is not reducible to any of these dimensions.

Dynamics. Our traditional concept of the textual whole is tied to the unchanging amount and material content of signifiers, and it is not well suited to deal with potentially endless variation or supplementation. There are two rather effective ways to naturalize variation: dialogue structure as in Joseph Weizenbaum's *Eliza*, a granddad of many if not all subsequent bots and artificial characters, and anamorphic game or puzzle schemes where the variation is crafted as a challenge which promises a solution thus putting end to variation (at least until next time if there'll ever be one). This is common to textual adventure games and interactive fiction in general. In these cases variation is tied to its rather immediate use value and it is not given the high status as literary expression to be contemplated; in other words the user is given a prior permission to actively ignore and dismiss certain variations.

With textonic dynamics the challenges to traditional notions of the whole get even more complicated. In principle, the source of supplements, changes and additions can be either the user himself, other users, or the text can supplement itself from the outside as in *The Impermanence Agent* or John Cayley's idea of using a Reuter's news-feed as a real-time material for one of his *Speaking Clocks*. All these open up a potential for never-ending metamorphoses that don't have to be balanced by personalization, social interaction or conceptual clarity, although these three are the best candidates for achieving that goal.

Determinability. Indeterminability is usually associated with randomness or chance, but that's only one side to it, and perhaps not the most interesting one. In Aarseth's model it's about the stability of the traversal function. In practical terms indeterminability means that if I react or act the same way in the same situation the system doesn't respond the way it did the last time. The crucial question is then how do I know it is the same situation after all; is it even possible to be in the same situation twice? Here too, the traditional wisdom related to the textual whole doesn't get us very far, as it is bound to the notions of repeatability (controlled by the user).

Transience. Transient texts don't allow the reader to control the time of their reading. Texts are available for limited periods of time, sometimes only once as was the case with William Gibson's *Agrippa*, or more precisely with its unhacked copies.

Here we are dealing with cycles of appearances, disappearances and potential reappearances in the context where the text, and not the reader, controls the pace. We are asked to prioritize our fleeting perceptions and to decide what to read and see when it is impossible to read and see it all. According to Janez Strehovec (2001, 104), in the context of digital web poetry this easily leads to foregrounding kinetic and visual affects, effects and constellations at the expense of the usual syntactic and semantic complexities.

Access. If we don't have random and complete access to every part of the text, our potential mastery is once again denied by constraining our traditional right to traverse and to skip the text any way we please. Controlled access contains the very real possibility that some parts of the text will remain hidden and out of reach despite the best efforts of the reader.

Links have potential to undermine the relation between parts and wholes allowing different degrees of local and global wholeness, but that potential should not be overestimated, as the average hypertext fiction shares many stabilising qualities with its print predecessors (from static dynamics and determinability to intransient time and impersonal perspective).

Personal perspective forces the reader to assume strategic responsibility and then face the consequences of her actions. This is a very game-like feature, but it is also possible that the required strategic choices have to be made in the absence of explicit rules, goals and manipulative procedures.

Finally, the user functions. While I save studying their mutual relations until a little later, it is safe to say that whereas the explorative user function brings in the rhetoric of choice, navigation and labyrinth, the configurative and textonic user functions give us the chance and necessity to affect the text and therefore to use or conceive it as a playground, an obstacle, or more or less malleable raw material to build upon. These latter two user functions clearly foreground the user's own extranoematic activity without which there would be no experience of wholeness whatsoever.

All these shifts away from the traditional media position (static, determinate, intransient, impersonal perspective, random access, no links and interpretative user function) seem to suggest a certain reversal and exhaustion in the reader's role. The "new" cybertextual media positions may constrain and limit the reader's freedom of movement and his control over reading time, undermine and even deny such traditional luxuries of reading as guaranteed repeatability, possibility to re-read, complete access and strategic passivity, and open up the finality of the literary work to potentially endless metamorphic processes⁷ setting new demands for the reader's attention span⁸ while requiring much more than interpretative involvement from her. As the text sets conditions for its reading, it doesn't make much sense to keep clinging on to traditional values and habits of reading for much longer.

Traditionally, the work of art or literature can exhaust even the best attempts of its reader by using extensive duration or variation. Computers can be of great help in this, but they are not necessary in creating such effects as Queneau's *100 000 billion* poems have already shown. To counter this we could say that Queneau's work is easily exhaustible, because all its textons are readily available and the sonnet form is already automated to boredom and beyond. In any case, these examples have been rather marginal and have left no traces on ordinary horizons of expectations, which still take it for granted that a work is (and should be) materially exhaustible.

In hypertext theory, Jim Rosenberg (1996) did propose a concept of session as a new unit of reception (and attention) to account for the difficulties in traversing the text and variations in the reading order the hypertext reader is or was supposed to struggle with. Despite that common sense effort, the paradigm of reading it all still reigns, probably because at least the well-informed readers know that it is possible to read every single unchanging lexia of *Afternoon*, *Victory Garden* and *Patchwork Girl*. The case is a bit different in the later works of Stuart Moulthrop, especially in *Reagan Library* and *Pax*. The paratextual intro to the latter even tries to convince the reader-user of the impossibility of reading and experiencing it all (Moulthrop 2003b).

More than two decades before Rosenberg Roland Barthes drafted four pleasurable ways of how the readers combine their reading neurosis with the hallucinated form of the text. Let me quote: "The fetishist would be matched with the divided-up text, the singling out of quotations, formulae, turns of phrase, with the pleasure of the word. The obsessive would experience the voluptuous release of the letter, of secondary, disconnected languages; of metalanguages (...) A paranoiac would consume or produce complicated texts, stories developed like arguments, constructions posited like games, like secret constraints. As for the hysteric (...) he would be the one who takes the text for ready money, who joins in the bottomless, truthless comedy of language, who is no longer the subject of any critical scrutiny and throws himself across the text (which is quite different from projecting himself into it)." (1975, 63) In short, if you read for your pleasure, you don't have to read it all.

To sum up: it is trivially easy to use cybertextual machinery to undermine traditional notions of the textual whole. We simply can't read it all in *Book Unbound* or *The Speaking Clock*, and our own activity is always already there in the beginning to replace and contaminate the original text in *The Impermanence Agent*. Still, these three works are far from chaotic or strenuously difficult; in *Book Unbound* the process and chance of inevitable personalization gives a firm enough teleology to the work's potentially endless mutability, and if we adjust our attention spans and kick our reception habits we can now and then take a relaxed look at the workings of the Agent and the Clock.

Even if the textual whole might have vanished or be under erasure, the expectations may remain the same. Cybertexts are machines for producing variety of expression,

and at the moment we can discern at least four degrees in the deep rooted humanistic fear of variety: You can read for the plot and look for exaggerated rather than moderate or minimal forms of coherence and closure. The typical result is hypertext whining, the contradictory and hype-ridden practice where critics keep disappointing themselves by projecting their mainstream expectations onto works that continue the long and winding tradition of experimental literature.

Secondly, you can read for pleasure and stay happy within your very own hallucinated form. It's more than likely that Barthes' ideas about the reading neurosis could be extended to psychoses, borderline cases, and perversions, and not only in literature, but in games as well.

Thirdly, one can read for metareading as the connoisseurs of experimental literature do and cherish intertwining epistemological, ontological and ergodic challenges to the doxa of the day or the literature as we used to know it. Sometimes it may even be advisable to read literature the way the OuLiPo used to write it - as combinations of objects and operations.

And fourthly, one might consider balancing reading with playing. There's a long and binding aesthetic and trans-aesthetic convention that you are not supposed to exhaust the potentials of an instrument of any kind. Or if you do, it is not much of an instrument. Or much of a game either.

Generally speaking, it would be good to give up the idea that interpretative user function will and should always be on top, and the most important one. When the textual whole has gone, interpretative mastery should follow its master as well, especially when we are entering our final challenge that situates itself firmly on the no-man's land between the last two stages in the following chart:

User function(s)	Aesthetic realm
Interpretative	Linear literature
Interpretative served by other user functions	Mainstream ergodic literature
Intrepretative undermined by other user functions	Experimental ergodic literature
Interpretative serving other functions	Play, games, toys, instrument

It's time to move on to our two final challenges, which are implicitly tied to two almost mutually exclusive attitudes and approaches to play, games and literature(s).

5. Against the fear of variety

When the safe and somehow manageable totality, be it coherent or not, vanishes from sight, the spectators and readers have to try different strategies of comprehension, which may seem complicated if and when the users do not know the limits and the functional principles of whatever they are encountering in the disguise of an artwork. There's no guarantee that the work works as it seems to work, or continues to work as it has worked so far, not to mention that it'd work as its manual or other paratext claims it works.

From this perspective computer games are interesting, as they domesticate the excess looming large in both ordinary and avant-garde products and processes, and the fundamental potential for change and unreliability inherent in new media objects. It would be tempting to generalise and argue that for as long as we have systems where there are either one material level or several material levels with trivial mutual relations, narrative is the most powerful (and certainly the most popular) arrangement that can be used in them – but whenever the relation of levels turns out to be arbitrary the concepts of gaming and simulation will be more and more attractive and popular. Despite the fact that computers can support, emulate and modify whatever aesthetic tradition and convention there is, the most satisfying way of pacifying consumers facing potential insecurity and lack of motivation caused by endless variation will be computer games. They promise fun and pleasure in exchange for following and applying the rules in order to reach the (given, chosen or created) goal.

A few words about ludology might be in order before I take my favourite pick of the challenges it provides. The very idea of ludology is to study games and especially computer games as games, and not as a derivative of something else like narratives, drama or film or their interactive and/or remediated offshoots. In short, games should be studied as their own transmedial discursive mode. It is important to understand what this doesn't mean. It does not mean there can't be hybrids, as no-one in his right mind working with computers, these famous universal machines, could deny the possibility of hybrids. It sounds trivial, but it isn't.

In a poorly defined opposition to ludologists there have been three major camps of narrativists: firstly, those who do not even define the contested concepts they try to compare (stories, narratives, games); secondly, pan-narrativists who try to stretch

their definitions of stories and narratives to the extreme where everything we cognitively construct from whatever is presented to us will result in a story; and thirdly those who care to define their concepts, but focus on just hoping and predicting that some day, maybe, a useful definition will arrive to combine games and stories, but don't seem to have the brains to do the conceptual work themselves. No wonder the ludologists won that debate, the particularities of which don't need to concern us here, as we are talking about our six more or less literary challenges.

It'd be trivially easy to point out the differences between games and narratives: the former an economy of means and ends with rules, goals and necessary manipulation of an equipment; the latter an economy of presentation and interpretation with story and discourse. Of course one could still try to rewrite narratologies to extend to the realm of games, but as we speak, such theories have not emerged and the burden of proof lies with those who continue to make narrativist claims. It'd be much easier to do the opposite and redefine narratives as games of interpretation if one really wants to have a unified field, where literary knowledge will still be of some use.

However, our real issue is elsewhere. If we wish to build hybrids called instrumental texts or textual instruments,⁹ we need to get rid of silly and worn-out prescriptive ideas of how to do it, one variation of which can be read from countless futile proposals for civilizing games by adding narrative must-haves such as plot, themes, coherence or fictional worlds. Here's a schematic chart of dominant features and differences between interpretative and configurative practices:

Interpretative practice	Configurative practice
Interpretation	Action
Economy of representation	Economy of means and ends
Conventions	Rules
Meaning guaranteed by minimal coherence	Variation pacified by rules and goals
Reception	Play
Fiction	Simulation
Work and text	Model and system
Spatiotemporal	Causal and functional

The above list is not meant to cause blindness and irritation in purist anti-binarists; the right hand side merely highlights game-related characteristics that are perhaps more important to take into account in the process of building textual instruments than their traditional and thoroughly studied counterparts on the left. In short, I propose we focus on the expressive potential of the former terms instead of constraining playability by the latter. Before viewing this challenge from the perspective of game studies in the next section, I'll try to figure out what literary theories and traditions could offer.

As we saw in the previous section, the "new" cybertextual media positions are typically used to diminish the reader's autonomy over his reading time and habits. The idea of building instrumental texts and textual instruments could be seen as a countermeasure giving the reader the chance to exercise his precious freedom in the form of play. It is still too early to say whether this recent shift of focus from the functioning of the cybertext to the actions and activities of its user-player is more than a minor trend caused by the accumulating pressure and attraction of computer game studies. From the perspective of David Rokeby's decade-old insights it's not very odd that also in literature navigable structures exist side by side with transforming mirrors and automatons.

In any case an instrument is supposed to shape and frame the player's action and to produce interesting variation. This is a challenge that goes far beyond the overly hyped problems of non-linear presentation. As in any economy of means and ends, it is important to find suitable goals and patterns of change and variation in the functional and causal framework. The questions of how to use one's resources and for what purpose haven't been the bread and butter of literary theorists except maybe in the author-centric context, most explicitly so in the Oulipian tables of operations changing the order, length, number or nature of linguistic objects from phonemes and letters to paragraphs and beyond.¹⁰ Only if we remove a major implicit constraint from these schemes, the idea that these operations should be used by an author in order to produce a final and fixed literary object, could we get something to play and build an instrument with.

Literary tradition contains at least five easy dialectics that could be adapted as flexible frames for the necessary variation: the text as an object and a process, the work and the oeuvre, the text and the intertext, the reader's and the text's control over reading, and the maintenance and destruction of the text. The task and the pleasure of the reader-player-instrumentalist would be to maintain, break or (re)create the balance between these oppositional poles.

The instruments could be tuned by theories that are precise enough; in addition to the Oulipian corpus there are many other almost ready-made candidates ranging from Freud's analysis of Schreber¹¹ to the particularities of the traversal function in cybertext theory. All these theories are more useful or instrumental in building

textual instruments than instrumental texts, as the former should in principle be able to handle any given text and not just the one particular text that comes with the system.

Wardrip-Fruin's attempt to build a 3-gram instrument (2003) relies on syntagmatic substitution. It would be interesting to see it complemented by similar but somewhat fuzzier paradigmatic capabilities (maybe by using self-organising maps).

In many cases an instrument gives us information we couldn't otherwise have. It'd be rather unproblematic to build instruments that detect constellations and statistical features that the readers can't or won't. The way people use instruments is also unpredictable to a certain degree. These emergent patterns could be boosted, paralleled or countered if the text and its behaviour were at least partly organised by a-life applications.

The already existing multitude of instruments is just waiting to be exploited, especially those cheap everyday ones already capable of communicating with other smart objects. We are just one step away from the texts for the alcometer or other such devices detecting meaningful fluctuations in the physical condition of the player (allowing the player to play also with herself).

6. Games and textual instruments

We could perhaps begin to see the rise of concretely (and not metaphorically) playable literature if we imagine works that shape their ergodic side by taking their cues from Aarseth's recent game typology (Aarseth, Smedstad and Sunnanå 2003). This system has 15 dimensions resulting in more than 220000 functional game genres, circumscribing yet another neglected area of research. The reasons for choosing this typology for closer inspection are rather self-evident: if this model is any good it gives us an overview of the most important features of game structures and their basic variations. It is also clear that game structures affect and shape gameplay. So; if we were to follow John Cayley, Stuart Moulthrop (2003b) and Noah Wardrip-Fruin's (2003) recent suggestions and build literary instruments we could do a lot worse than see what Aarseth's typology has to offer.

Let's begin with the categories of space. "The perspective of the player can be either omnipresent allowing the player to examine the entire arena or field at will or vagrant where the perspective follows a main player-token or avatar." At first glance this is reminiscent of the category of access in cybertext typology. Still, this game category is more directly connected to the user's perception, and that allows us to imagine literary practices playing with access and perspective, examples ranging from Eduardo Kac's holopoetry (1996) where the user's physical movement changes her

perspective on the work as well as the work's visible content to hypothetical hypertexts where the node starts to destroy itself from the invisible end at the very second the reader begins to read it from the other end. As noted before the more fundamental question is whether it makes any sense to build instruments that could detect and analyse textual features, constellations and statistical frequencies humans either can't or won't - or could but only with great difficulty (like chart the field of possible multilingual anagrams in *Hexentexte* or *Finnegans Wake*) and reorganize either themselves or the playtexts using this non-human information.

The second category is topography: "a game's topography can be either geometrical with continuous freedom of movement, or topological, giving the player only discrete, non-overlapping positions to move between." In this respect classic hypertexts seem like badly designed board games allowing the reader to navigate between discrete reading positions (in contrast to such kinetic texts as David Knoebel's *The Wheels*). This could be made more obvious and challenging by adding a chess-like interface to a 64-node hypertext and allowing the reader to traverse it from the positions of different pieces and according to their possible moves. In a turn-based two-player mode, you could lose your piece if your fellow reader's piece enters the same node, making it harder or impossible to traverse the whole text. This game could be made more challenging if the players didn't see each others' positions until it was too late and they overlapped with fatal consequences. In this arrangement the game and the literary text would be each other's by-products.

Thirdly, the game environment is either static remaining unchanged for the duration of the game or dynamic letting itself to be modified by the player. Obviously, MUDs are often dynamic in that sense, but there are other environments, including our physical surroundings, which we can now or soon tag and populate with miniature literary devices producing variety of expression.

Aarseth's game typology contains three parameters of time: pace, representation, and teleology. The category of pace divides games into real-time and turn-based ones, which is almost but not quite the same as the category of transience in cybertext theory. We already have boring turn-based collaborative writing practices, but since we seek to build instruments they won't do. *Hegirascope* comes close to being a real-time instrument, as its 30 second constraint feels like a challenge or an obstacle, which is the first step away from passive "timeless" hypertexts towards more complex real-time adversary structures.

The representation of time is either mimetic or arbitrary depending on whether the time of the actions in the game mimics the time of corresponding actions in the real world. It'd be rather easy to build adaptations of literary classics and instruments for playing them that use strictly mimetic reading time freezing the reader's movement or progress. In a more competitive setting the reader-players could block

each other's ways and navigation options inside an online hypertext using mimetic time.

The third temporal category relates to the final goal of the game. The games with clearly defined successful outcomes for one or more players are teleologically finite, and those without such outcomes are teleologically infinite, and could in principle go on endlessly. *Book Unbound* is clearly infinite while hypertext fictions as we know them are all teleologically finite, successful conventional outcome requiring that every node has been read at least once. More complicated goals could be crafted after Brian McHale's studies of postmodernism (1987; 1992): the reader should maintain, restore or destroy the delicate balance between ontological and epistemological problems.

The next provisional subcategory, player structure, reminds us once more about certain fundamental differences between literature and games. We are given six options: singleplayer, twoplayer, multiplayer, singleteam, twoteam and multiteam games. It's a combination of adversary-structure (none, one or multiple) and team-structure (individual or team-based). In a quick comparison it's obvious that contemporary literature is single-reader, that is, the combination of individual interpretative effort and no adversaries. Superficial imitations would give rise to literary texts that could be read only as a team effort, and to readers interfering with each other's reading positions and possibilities, obstructing them to the best they can. On the more positive side, these kinds of practices would counterbalance the fuss about collaborative writing, which is such a banality.

The category of player structure contains also two categories currently best suited to mobile games, the question being whether the proximity of the players to each other and the physical location of the players matter. Probably, these possibilities will multiply with various wlan technologies and cheap Bluetooth chips added to appliances of every kind, shape and size. Literary fictions tracking down your everyday routines, habits and movement and analysing them in order to make the text more suitable to you and your blood pressure (or other problems) would not be to everybody's liking - if in addition to the physical location also the physical condition of the player-reader counts. Other obvious applications would require you to be at an intimate distance with someone to access a love story or pornography connected to sexual sensors and paraphernalia.

Aarseth's next grouping of fundamental game categories addresses control in terms of mutability, saveability, and determinism. Mutability refers to rewarding the player by strengthening her player-character or player position. In literary contexts such rewards might include gaining better access to or having more effect in the fictive world, or acquiring more resources like agents to help you scout the as-yet-unread territories, perhaps their style or genre. One form of saveability is already available and at work in *Book Unbound*, where the user can save her favourite

extracts from generated text before the next generation takes place. This type of collected work saved by the reader is yet another solution that could be expanded to certain other contexts and practices as well (to challenge copyright laws for one). Obviously, the way the text is used could be used to determine how much of it could be saved until the next reading. The category of determinism is about unpredictability and random functions that are always already there if two or more humans play against (or with) each other. An instrument with multiple degrees and criteria of determinability would be ideal for games of increasing and decreasing coherence or certain kinds of preferred coherence; playing de Sade with Christian tunings or the Bible with libertine lardings¹² could be fun.

Finally, there are rules and three simple meta-rule dimensions: the presence or absence of topological, time-based or objective-based rules. As a concluding inversion to our topic, this meta-dimension could be further analysed by running Aarseth's game typology through his cybertext typology, or vice versa. In any case, we'd have to make a fundamental distinction between textonic and scriptonic game structures, that is, game structures as they exist in the game and game structures as they appear to the players.¹³ This distinction would open up the possibility of meta-games where one plays both by the rules and about them, and where different teams play the same game by different rules without knowing it (at least for a while). Here, finally, literary knowledge might have some value, as in case we wish to build unfair and unequal games, we don't need to go any further than 20th century fiction for great ideas.

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Notes

1. Here's a crash course for those who are not familiar with the former: in cyber-text theory the elementary idea is to see a text or a work of art as a concrete (and not metaphorical) machine for the production and consumption of signs, and consisting of the medium, the operator and the strings of signs. The latter are divided into *textons* (strings of signs as they are in the text) and *scriptons* (strings of signs as they appear to readers/users). The mechanism by which scriptons are generated or revealed from textons is called a traversal function, which can be described as the combination of seven variables (dynamics, determinability, transience, perspective, links, access, and user function), and their possible values. This combinatory approach gives us a heuristic map of 576 different media positions into which every text could be situated based on how its medium functions, but independently of what that medium is. It is important to notice that the relation between textons and scriptons is arbitrary in digital media: that's the "essence" of its unique dual materiality – which stems from the separation of the storage medium from the interface medium. Aarseth's *Cybertext* (1997) focuses on ergodic literature, where the user has to do non-trivial work or effort to traverse the text, that is, ergodic literature requires more than interpretative activity from its user.
2. I made a somewhat similar point in an earlier article (Eskelinen 2001c). In her response to it N. Katherine Hayles (Hayles 2001) manages to confuse the tasks of theory with those of criticism and chooses to ignore the fact that in *Cybertext* functional differences are deducted from material ones (in Aarseth 1997, ch.3). She also claims that "A third limitation of cyber-text theory, especially as interpreted by Eskelinen, is mistaking numerosity for analytical power.(...) Simply because cyber-text theory predicts 576 different combinations, using Aarseth's scheme for parsing the semiotic components of cyber-texts, does not mean that all 576 combinations will be equally interesting or worthwhile. Nor does this number alone indicate the value of the theory, beyond setting up so many pigeonholes to be filled." Here she attacks only her own fabrications, as she turns

a blind eye to every single example I give of the theoretical power of cybertext theory and its already empirically existing ingredients in the context of modifying, transforming and expanding hypertext theory, narratology, and theories of postmodernism and new media (etc.) – and not in the context of analysing an individual text or filling pigeonholes. Hayles' blindness to theoretical matters (and consequences) is well in synch with the embarrassing theoretical blunders she makes in her *How we became posthuman* (Hayles 1999). I discussed some of them in my article, but for some reason Hayles didn't defend her shortcomings in her response. In retrospect, the funniest part of Hayles' reply is her firm belief that she's capable of setting the record straight "about what cybertext theory cannot do, as well as what it can do." If that's the professional appearance Hayles wants to keep up, then she should know a lot better than to confuse textons and scriptons with surface and depth (for further details, see <http://grandtextauto.gatech.edu/2004/04/23/narrative-digital-storytelling-12/#comments>).

3. At least they should be as Genette's study is also a reading of Marcel Proust's *Remembrance of Things Past*, and a lot has happened since the 1920's.
4. Stuart Moulthrop's *Reagan Library* (1999) rewards the persistent reader by adding more text to its nodes in the first three revisits. In our terminology, the frequency is limited during these revisits and unlimited after the text does not change anymore.
5. Here we could make a further distinction between static and dynamic architecture based on the stability of basic conditions. In *Afternoon*, as the result of its guard fields, the number of possible links to follow will vary at the level of nodes, that is, locally. In this scenario *Afternoon* is not dynamic as a whole (globally), as there are no changes in its basic architecture of nodes, links and guard fields.
6. Characters in literature and film are said to be independent as the readers and viewers can't influence them. The behavior of these characters is static as it remains exactly the same regardless of how many times the book or film is read or seen. They are objects as there's no direct communication or dialogue between the user and the fictional character. This simple chart with three basic parameters gives seven other positions for the possible existents, and I see no valid reason why all of these should be called characters too, as that practice would only help to mask the crucial functional differences in the control, communication and behavior of the existents. In live drama the characters are minimally influenced by the spectators (by applause and other feedback conventions), and they may also become dynamic if an actor is given the freedom to change certain attributes or personality traits of the character between performances.

7. These processes can be both teleologically and temporally indeterminate and infinite.
8. In books the continuity and discontinuity of the attention span is up to the reader. That's not the situation with works like *The Impermanence Agent* or *TheSpeaking Clock*. We should perhaps introduce two conceptual divisions to meet the demands set by the behaviour of programmable texts. First, the possible and necessary attention spans and their mutual relations, and second, the relation of the text's duration and speed to the reader's attention span (the former can either exceed or match the latter).
9. Wardrip-Fruin 2003. Instrumental texts are texts that can be played with a system that is inseparable from them; textual instruments are systems that can play many different "outside" texts.
10. See Bénabou 1986, and Mathews and Brotchie 1998, 213-214 (Queneleyev's table) and 227-228 (systematisation).
11. "Delusions of jealousy contradict the subject, delusions of persecution contradict the verb, and erotomania contradicts the object. But in fact a fourth kind of contradiction is possible – namely, one which rejects the proposition as a whole." (Freud 1979, 203). Needless to say this systematisation and mechanism could be situated or embedded as a parergon in all four great scenes and schemes of writing and textual production: sender/receiver, signifier/signified, text/intertext, and textons/scriptons.
12. See Mathews and Brotchie 1998, 163.
13. I'm not referring to the player's always possible non-understanding or non-knowledge of the rules and goals, but about potential game structures that vary in time and during the game depending on how the game is played.