Consensus ex Machina? Consensus qua Machina!

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Abstract

This paper discusses whether the aim of literary computing to facilitate a scholarly 'consensus' on texts is realistic. A number of methodological points of principle are raised with the aid of the author's current research project, EPITEST, which deals with computer-aided action and plot analysis. These revolve around the need to integrate two distinct methodological paradigms in computer models which aim to simulate high-level interpretive processes: a numeric (statistical) and a semantic (hermeneutic) paradigm. Against this background the idea of a 'consensus ex machina' is rejected and replaced with that of a 'consensus qua machina', i.e. a strictly methodological consensus concerning the form of a literary text as opposed to a consensus on its 'meaning'.

1. Introduction

ASCII 63—that's all it takes to turn a confident, programmatic announcement into a veritable philosophical problem. 'Consensus ex machina', the bold motto of the 1994 ALLC conference in Paris, would have epitomized humanities computing's claim to produce a scholarly consensus by means of (better) computing technology—had it not been for the question mark attached to the conference title.

This question mark symbolizes two distinct reservations vis-à-vis our motto. The more obvious and pragmatic one is that the discussion of technological aspects, requirements, and limitations in humanities computing applications needs to progress much further before we can claim to facilitate or produce a 'consensus' on matters of relevance. But the interjection also expresses an immediate and genuinely humanist ceterum censeo concerning matters of principle. When Catherine N. Ball recently listed the most common pitfalls in automated text analysis, such as 'sample size, the recall problem, analysing only what is easy to find, and counting what is easiest to count' (Ball, 1994, p. 295), her survey presented a critique of the new discipline which transcends the pragmatic and technological aspect, thus pointing to some of its underlying methodological problems. The current paper will follow a similar pattern, leading from the specific to the general. Such deliberations are triggered by a reading of our '?' that concerns itself not with its pragmatic, but with its philosophical potential. For apart from posing the question of 'how' to do something, the interjection also raises the more fundamental question of 'why' do it in the first place. The main problem discussed in this paper, therefore, is not whether, when, how, and to what extent the use of computers in the humanities has made

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a consensus possible—rather, it is whether the reaching of a consensus is at all desirable in our disciplines, and what type of consensus we are talking about.

It is here where we begin to touch upon the philosophical (or shall we say ideological) dimension of the conference title. What makes us so confident that a consensus is 'good' and desirable for the humanities? Perhaps we ought to clarify what the function of the anticipated consensus would be, i.e. whether it is a goal, or a means. But first and foremost we will have to clarify our primary interest in dealing with our subject matter: are we involved in an empirical research process that aims to reach agreement on the quantity and distribution of phenomena, or are we involved in an hermeneutic activity that concerns itself with the meaning of these phenomena?

If we assume that a humanist will never be content with merely registering the existence of symbolic objects, but will eventually always become involved in a kind of exegetic activity-sampling data in order to interpret them-then the pursuit of 'meaning' is indeed the ultimate goal. What keeps us going is the hope and promise that meaning is possible, even though we might have to admit to fabricating it ourselves. And yet the pursuit of meaning, in a philosophical sense, is deeply dilemmatic. The semiotician Umberto Eco, in his novel Foucault's Pendulum, has used the esoteric paradigm to discuss man's obsession with construing perfectly coherent, hermetic systems of thought that liken 'meaning' to a secret, a hidden signifié that may be revealed to the knowledgeable, the 'initiated'. Drawing on his 'theory of infinite semiosis', Eco cautions against approaches that are based on such finite concepts of meaning-not only for philosophical, but also for aesthetic reasons, because

... the moment a secret is revealed, it seems little. There is only an empty secret. A secret that keeps slipping through your fingers. The secret of the orchid is that it signifies and affects the testicles. But the testicles signify a sign of the zodiac, which in turn signifies an angelic hierarchy, which then signifies a musical scale, and the scale signifies a relationship among humors. And so on. Initiation is learning never to stop. The universe is peeled like an onion, and an onion is all peel. Let us imagine an infinite onion, which has its center everywhere and its circumference nowhere. Initiation travels an endless Möbius strip. (Eco, 1990, p. 620f.)

The metaphor of the onion which is all peel demonstrates what any interpretive activity aimed at literature (and other symbolic systems) is, or rather, should be, about: a search not for the final referent, the stone, or heart of the matter that often forms the object of

our naive interest in literature, but an activity aimed at 'learning never to stop', at conceptualizing 'meaning' as a process, and not as a singular 'secret'.

Set against this background, what are the chances for ever reaching a 'consensus', and, even more so, a 'consensus ex machina' in our disciplines? I would like to discuss this question by extrapolating from some of the problems that I have encountered in the course of my current research on computer-aided analysis of literary 'action' structures. This makes it necessary to give a brief outline of my project's aim and approach in the first part. On the basis of this example I will look at some of the methodological problems associated with such projects, which might also be of relevance to humanities computing research in general.

It will hardly surprise the reader to find that the concluding part of this paper rejects the idea of a substantial 'consensus ex machina'. What will be argued instead is that the genuine aim of humanities computing should be of a methodological order—a 'consensus *qua* machina'. It is this type of consensus that enables us to transcend mechanistic concepts of meaning such as 'ASCII 63 = ? ' and engage in a discourse that is transparent and meaningful to humans at the same time.

2. The EPITEST Project: Action Analysis by Computer

A plot, if there is to be one, must be a secret. A secret that, if we only knew it, would dispel our frustration, lead us to salvation; or else the knowing of it in itself would be salvation.

Umberto Eco, Foucault's Pendulum

2.1 Coherent and Fragmented 'Action'

The question of 'action' has been central to aesthetic reflection ever since Aristotle, who in his Poetics tried to define criteria for the well-built, coherent, and, at the same time, meaningful story. Aristotle was convinced to have found these criteria fulfilled paradigmatically in Homer's Iliad. Modern structuralist narratology, associated with names such as Todorov, Greimas, Bremond, Genette, Prince, Bal, or Pavel, has generally come to the conclusion that 'action' is a phenomenon to be defined in terms of elementary events, their transformations, and the coherence of the sequence that these transformations form. In other words: whenever in the context of a story something happened, something changed, and an end-result or consequence is arrived at, we find ourselves confronted with an 'action'. But things often aren't as easy as that. Consider, for example, the many cases where within a story there appear to be loose ends, resulting in a lack of logical motivation for some of the events. Is there still 'action' in such a story? Of course there is some action, but it is diffuse and incoherent. What about its lack in logical and thematic coherence, and what are the implications for the meaning of the story on the whole?

This seemingly rather formal problem can be encountered in many contexts. Moreover, it will invariably have a direct bearing on any attempt to interpret a given story or novel. Cyclically arranged novels and novellas, consisting of a number of stories within a story, are a particularly challenging case. Depending on whether or not one is able to integrate the individual episodes into one overarching structure, one will often arrive at vastly different interpretations of the work. Consider for example Boccacio's *Decamerone* or Ovid's *Metamorphoses*: do they present just a loose conglomerate of episodes, or can we actually prove that they are structurally coherent before arguing that their coherence is of a thematic order? In other words: shouldn't we at least be able to reach a consensus as to the formal characteristics of the text before we embark on its interpretation?¹

EPITEST (= 'episode test'), a program written in PROLOG, attempts to facilitate this limited consensus on the formal structure of (fictional) action in its literary representation. The text which is currently being used to develop and test the various modules of EPITEST is a book by the German author Johann Wolfgang Goethe, titled Unterhaltungen deutscher Ausgewanderten (1795). This text, despite, or rather because of, its internal formal inconsistency, is considered paradigmatic in the development of the genre of the German Novelle. Similar to many of its famous precursors in the romance literatures, it contains a cycle of novellas. But instead of merely representing a series of variations on a certain theme, this structure also confronts us with a methodical progression in narrative complexity.²

A particularly good example for this is the novella known as *History of the Singer Antonelli* (*Geschichte der Sängerin Antonelli*). No reader will fail to notice that this novella consists of two distinct parts, namely a first one which presents a traditional and coherent line of action, and a second part where the action lacks logical consistency and motivation, coming to an abrupt end as if Goethe had suddenly become disinterested in the *sujet*.

Many attempts have been undertaken to relate the formal characteristics of this particular novella directly to its thematic context, and to its meta- and intertextual aesthetic dimension (e.g. Dammann, 1990; von Wilpert, 1991). But nobody as yet has presented a thorough and detailed description and an analysis of what triggered all the curiosity and debate in the first place: the astonishing juxtaposition of two sequences of action, one fairly coherent, and one downright deficient, and the further embedding of this controversial pair within an entire series of progressively complex action-sequences. Goethe's Geschichte der Sängerin Antonelli thus constitutes one of those numerous cases where layer upon layer of impressive hermeneutic meta-text has been produced, while little use was made of analytical tools that could help to reach an explicit agreement on what it is that we are actually interpreting.

2.2 Designing a Tool for Action Analysis by Computer

The reason for this shortcoming may well be that the formalist analysis of literary texts often becomes a rather tedious and somewhat boring business. Instead of granting us the instant gratification of new insights into the text's meaning or function we have to perform

repetitive acts of micro-analysis, anxiously trying not to deviate from the formal conceptual grid.

To practice such hermeneutic sublimation in the face of an aesthetic object which by its very nature invites us to jump to conclusions may be difficult for humans. But for an electronic brain whose design restricts it to performing mathematical algorithms it is the only possible modus operandi. Formalist literary analysis thus renders itself to literary computing applications, and research into the structures of plot, story, and action in the tradition of Vladimir Propp would seem to benefit in particular from the new analytical tools. A computer-assisted analysis of plot and action structures may thus yield answers to many of the questions which are of relevance in plot-analysis, such as: where and why is the second part of the 'Antonelli'-story deficient in terms of its logic of action? Why do readers intuitively recognize the first part as a coherent line of action? How does the problematic narrative structure of this particular novella compare with the other novellas in the text? Can one identify a unifying principle beyond the individual structure in a given novella, i.e. a sort of 'blue-print' for all of Goethe's stories which might be related to circumstantial data, such as the influence of the French Revolution on the narrative process?3

It is obvious that (even) a computer-assisted formal analysis of plot will eventually bring to the fore the type of question normally addressed by scholars who favor the direct interpretive, hermeneutic approach, reminding us of Roland Barthes' *dictum* that, whereas a little formalism might lead away from history, a lot of formalism will eventually lead back to it. But the EPITEST-approach aims to do so only once a 'critical mass' of empirical data has been collected and sifted through in the course of its computer-assisted analysis of action structures.

The empirical work, however, is always based on certain theoretical assumptions. The first concrete step in the design of a research tool must therefore be a clarification of the basic features by which we choose to identify the relevant phenomenon. As far as 'action' is concerned, the following questions come to mind:

- What are the elements of an 'action'?
- How do we define a basic 'action'?
- What are its structural and logical features?

Such a clarification is of relevance for the design of any analytical algorithm. In the case of the EPITEST project our answers to the above questions represent our choice of the most fundamental conceptual parameters concerning the phenomenon of 'action'.

As far as their diachronic order is concerned, individual events—which constitute the base elements of any action—are understood to be linked by the formalism of decisional logic explicated by Claude Brèmond (Brèmond, 1964, 1973 *et passim*). Following on Brèmond, Thomas Pavel has subsequently referred to game theory to describe the logical connections within a sequence of events in more detail (Pavel, 1985). In game theory every sequence of events is interpreted as a sequence of individual strategic decisions made by the 'players', the protagonists, who are faced with a

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'Problem', and seek a 'Solution'. Every individual decision results in a MOVE, which in turn changes the overall strategic situation and triggers the following MOVE. In the ideal case this step-by-step development will continue until the full potential of strategic conflicts has been exploited.

However, in terms of logic of action, as well as in terms of game theory, an individual MOVE does not automatically constitute a coherent sequence of events. For example, let us think of a game of chess: an opening move alone will not be considered a coherent sequence. Such an elementary coherent sequence, i.e. the action-sequence of minimal extension and complexity, is termed an EPISODE. Whereas a MOVEmodel of action will allow us to represent the individual links from one MOVE to another, and (in the case of Pavel) to some extent also the overall orientation of a sequence of doings/happenings,⁴ we still lack the necessary semantic criteria that would define when and why a given sequence of events may be considered an EPISODE. The reason for this is that the MOVE-grammar of plot is a mere surface grammar, and as such its chief concern is to describe the principles of diachronic ordering in events. If we want to define the criteria for coherence and completeness, we will have to introduce the aspect of semantics into our model by paying attention to the synchronic, or deep structure manifested in a string of events. For this purpose my formal definition of the EPISODE integrates the description of diachronic event-sequences as a MOVE-structure with Greimas' well-known model of the 'Semantic Square' which captures the elementary structure of signification.5

Figure 1 illustrates the representation of an action in Pavel's MOVE model, using the example of the fairly simple 'Antonelli'-storyline. As we can see, this chain of moves proceeds from a state of *isolation=lack* to a state of *platonic friendship=thrift*, a subsequent *interpretation of friendship as lack of intimacy*, which triggers a marriage proposal=wealth, and then a rejection of the proposal=waste, resulting in a final situation of restituted autonomy.

In the next step Greimas' 'semantic Square' is mapped onto the MOVE-structure of this story (Fig. 2). This enables us to see how the above sequence of individual *Problem–Solution* transformations taking place on the surface level actually serves to 'fill-in' the four semantic positions required to establish a complete square of signification. In 'performing' this static, virtual structure as fictional action the entire potential of theoretically possible implications, presuppositions, and contradictions between the 'terms' of an action will be exploited, which is exactly what, according to the definition chosen in EPITEST, would constitute a coherent and complete EPISODE.

On the basis of these two integrated models an analytical algorithm aimed at searching complex data samples for occurrences of EPISODES, and perhaps even of nested and fragmented EPISODES, can now be formulated. Once we have achieved a non-ambiguous definition of all basic terms, the task of identifying EPISODES and their generics in literary texts can, in principle, also be performed by computer, which is



Fig. 1 MOVE-structure of the 'Antonelli' novella, part 1

what the PROLOG-program EPITEST is designed to do. An overview over the various modules and components that interact within EPITEST is presented in Figure 3.

3. Statistics and Semantics: Some Methodological Considerations

Two different prototypes of EPITEST—excluding the MOVE-parser—have been programmed thus far: the initial one in a DOS implementation of PROLOG (IF PROLOG 4.1), the second one in a newer Windows-based 32-bit implementation (LPA PROLOG for Windows, 2.6).⁶ The practical problems encountered during this initial phase were manifold, yet interesting.

Logic programming enforces strict discipline in the conceptualization of interpretive acts that are performed intuitively by human beings. How extremely well-organized this intuition seems to be in humans is perhaps best demonstrated by the fact that a simple swap of two lines of code in the last version of EPITEST helped to increase the speed of program execution by a factor greater than 100.

This observation brings us back to the initial question concerning the methodological impact of the theoretical models used in our attempts at processing symbolic systems via computing devices. It seems to me that the example of the EPITEST-project points to three important characteristics of literary computing (and perhaps humanities computing) projects. The first



Fig. 2 Semantic 'deep grammar' of the 'Antonelli' novella, part 1



Fig. 3 Modules of EPITEST

one is a fairly standard *sine qua non* of all computing applications. Programs like EPITEST will only work if the original data—the literary text or texts—are made available to the computer in a particular format that will be compatible with the algorithm. The algorithm has to be able to interact with the data, which makes it imperative that well-defined and consistent data-capture and mark-up conventions be applied. In EPITEST the machine has to be supplied with pre-encoded MOVEstructures, and thus not with the raw material of a literary text, but with a meta-text that is already the result

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of an act of interpretation.

Secondly, whether we pre-encode the text manually or automatically (for example by using a MOVEparser),⁷ we will in any case have to refer to predefined knowledge-bases on which the interpretive and encoding procedures can operate. The reason for this is that in action structures we are dealing with semantic phenomena. Again, the compilation of a knowledgebase is a hermeneutic activity.

Finally, the characteristic of greatest impact in literary computing applications like EPITEST is this: once integrated theoretical models of different origin are used, we must expect them to be inhomogenous in epistemological and methodological terms. EPITEST, for example, combines a strictly formalist, empiricist, and descriptive component, the MOVE-model, with a semantically oriented, evaluative, and thus contextdependent component, i.e. the Semantic Square. This, by contrast, is not normally the case if we process lexical structures following a purely statistical approach, as would, for example, be the case in a typical application of TACT. Statistical analyses are based on a strictly taxonomic methodology and will generate patterns of statistical distribution and deviances in the sample of data investigated. Of course there is an element of choice in the design of the taxonomy itself, but this is fairly transparent. Here we can limit the effect of preinterpreting our data by using the maximalist approach in the definition of the taxonomy: provide and apply as many elementary categories as possible during the first phase and then cut out those that do not yield any statistically relevant returns. But the processing of highlevel semantic material, such as 'action'-structures, presupposes more. Semantic categories are not just a merely formal taxonomy, but are already arranged systematically and thus semantically 'loaded' themselves. A genuine statistical approach sorts the lexic pieces that were found into little boxes of static description and then counts their numbers. A semantic analysis, on the other hand, uses a jig-saw puzzle approach, trying to slot the pieces into empty spaces of exactly the same shape, the added difficulty being that the shape of the remaining empty spaces changes whenever one has been filled. The real methodological problem with projects like EPITEST is that they try to do both, and at the same time. They count the pieces and find out how to put them together in a 'meaningful' way. But what is the definition of 'meaningful', if not a cultural convention?

In the case of the EPITEST program this cultural blue-print for the jig-saw puzzle is represented in the two SUB-MODULES 2.1 and 2.2 which consist of sets of semantic opposites and synonyms. It is against these sets that the program has to check whether the Problems and Solutions that constitute a sequence of MOVES fit into the abstract relational structure of a Semantic Square, thus forming an EPISODE. The programming of the kernel algorithm for a software like EPITEST merely reproduces the logical structure of the theories chosen for the symbolic representation of the relevant phenomenon. But the choice of contextual information to be supplied to the program via the various data bases is of an eminently ideological character,



Fig. 4 Search algorithm or 'kernel' of EPITEST

limiting the 'intelligence' of the program with every single element of cultural knowledge (an opposite, a synonym, the value assigned to a certain state of mind, etc.) that we have failed to register in the SUB-MOD-ULES. Figures 4 and 5 show the actual search algorithm or 'Kernel' of EPITEST and excerpts of those parts of the two sub-modules which have to be consulted by the algorithm in order to identify an EPISODE in part 1 of the 'Antonelli'-novella.

4. Literary Computing: Oscillating between Paradigms

EPITEST is a typical example of a literary computing application which aims to process high-level textual structures by imitating the rather complex cognitive and intuitive operations of the human mind. These operations, however, are to a very large degree dependent on processes of cultural encoding. This is why any attempt to transcend the purely lexical and/or syntagmatic sphere and advance into the territory of semantics in literary computing is inadvertently faced with the need to simulate these processes.

Textual data has to be pre-processed, i.e. interpreted in order to make it structurally homogenous and thus compatible with the analytical algorithm. This need arises from the fact that the algorithm itself is not the very flexible 'real thing' at work in the human mind, but just an abstraction or a model of a highly complicated human faculty.

A finite, limited data-base, representing those

```
/* 2.1.1 'Hard' antonyms - type EXCLUSION */
exclus_dic([['Abundance'],'Lack']).
exclus_dic([['Abundance'], 'Hunger']).
exclus_dic([['Abundance'],'Poverty']).
exclus_dic([['Abundance'],'Solitude']).
exclus dic([['Abundance'],'Isolation']).
exclus_dic([['Extravagance'],'Lack']).
exclus_dic([['Extravagance'],'Hunger']).
(....)
/* 2.1.2.. 'Soft' antonyms - type OPPOSITE */
opposite(['Abundance','Thrift']).
opposite(['Abundance','Conservatism']).
opposite(['Abundance', 'Carefulness']).
opposite(['Abundance', 'Reservedness']).
opposite(['Abundance', 'Calmness']).
opposite(['Abundance','Limitation']).
opposite(['Abundance', 'Modesty']).
opposite(['Abundance', 'Self-control']).
opposite(['Abundance', 'Thriftiness']).
opposite(['Carelessness','Thrift']).
opposite(['Carelessness','Conservatism']).
opposite(['Carelessness', 'Carefulness']).
opposite(['Carelessness', 'Reservedness']).
opposite(['Carelessness', 'Calmness']).
opposite(['Carelessness','Limitation']).
(....)
/* 2.2 Synonyms */
synlist(['Hunger', 'Poverty', 'Lack']).
synlist(['Lack', 'Solitude', 'Isolation']).
synlist(['Money', 'Opulence', 'Wealth', 'Prosperity',
'Responsibility', 'Indifference']).
synlist(['Prosperity', 'Prestige', 'Safety']).
synlist(['Prestige', 'Acclaim', 'Popularity']).
(....)
```

Fig. 5 Excerpts from sub-modules 2.1 and 2.2

aspects of our *Weltwissen* (knowledge of the world) considered relevant to the task of identifying 'meaning' in a literary text, has to be provided, which entails a further act of selection and evaluation.

The ultimate goal of the analytical algorithm must be to facilitate a seamless integration of a formal and a semantic model.

The last point poses the most fundamental problem. Opponents of humanities computing projects often accuse the new discipline of serving merely to accentuate the rift between humanist and empiricist traditions and practices in research and scholarship. Indeed, how can we prevent our fascination for the new tool, the computer, from persuading us to adopt a reductionist attitude vis-à-vis aesthetic objects? Breaking down poems into pixels for the sake of keeping a piece of silicon busy may of course have to do a lot with com-

puting, but whether it deserves the epithet 'humanist' is rather doubtful.

What needs to be understood, though, is that the project of humanities computing spans two distinct epistemological paradigms. I would like to refer to them as the numeric and the semantic paradigm, thus avoiding more traditional distinctions like deductive versus inductive, or empiricist versus hermeneutic. Computing as a methodology would obviously fall under the numeric paradigm. The latter can be characterized as follows:

- It is based on a clear differentiation of objects and procedures.
- It presupposes and/or effects a complete de-semantization of all its objects. In the numeric paradigm we deal with pure signifiers, or rather quantifiers that can be added, multiplied, divided or subtracted irrespective of their potential arguments, their 'content'.
- In this paradigm the result of any given manipulation and/or processing of data serves to confirm the validity of the procedure as such. As computing procedures, i.e. algorithms, will always produce nonambiguous and non-contradictory results, such results are effectively nothing but a more or less sophisticated re-formulation (one might even say a 'translation') of the original data input.

None of the above holds true for the operations falling under the semantic paradigm—the paradigm we usually choose when we deal with literature with the aim of explicating its meaning. The semantic paradigm is rather defined as follows:

- It is based on a constant reciprocal logical link between objects and procedures, and it presupposes the concept of reference between a signifier and a signified.
- Instead of the procedure (the 'algorithm') de-semanticizing its object, the object that is manipulated within the semantic paradigm will inadvertently semanticize the very procedure, thus making transparent the epistemological and ideological presuppositions embedded in the algorithm *per se*.
- Only those results that are different, that happen to question the validity or confinements of the procedures which produced them, will ultimately be found to be relevant and noteworthy. A result which amounts to nothing but a simple and transparent repetition or permutation of the original input is mostly considered to be redundant.

A pessimist's résumé would be that literary computing, like all current intellectual activity, is caught right in the middle of the dilemma of the 'two cultures': computers cannot produce a consensus in cases where *différence* is of essence. An optimist's view, however, would be that an intelligent and well-balanced application of literary computing tools allows us to reconcile the two paradigms by measuring and mapping *différence* in literary structures, and then forwarding them to the ultimate hermeneutic machine, the human mind.

Oscillating between the numeric and the semantic paradigm, literary computing's claim to facilitate a consensus can be upheld, but it has to be narrowed down.

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It is of course possible to quantify observations that concern literature. But observations are different from results: the former are an empirical entity, the latter are a logical one. Moreover, symbolic systems are dynamic systems, which is why it is a contradiction in terms to propagate a static, numerical consensus on 'results' of interpretive acts-with or without computers. In the sphere of literature a 'result' will always have to fall under the semantic paradigm: a momentary hypothesis concerning a 'meaning', a transitory instant encountered somewhere along our travel along the Möbius-strip of interpretation. This is why I do not believe in something like a 'consensus ex machina' for literary studies, at least as far as higher-level applications are concerned. However, I do believe that there is a strong possibility for something like a 'consensus qua machina'. Like every technology, the 'machina' of the computer forces us to conceptualize problems and phenomena in a very specific way because otherwise they cannot be processed by that technology. Therefore, as long as it doesn't learn, the machine will also force us to be consistent and explicit in our definitions and procedures-something that many humanists aren't and perhaps even feel they need not be, because they can always bank on their counterpart's intelligence. One might speculate whether the rigor admired in the empirical and the hard sciences' methodologies isn't, to a large extent, a consequence of applying nonintelligent mechanical or conceptual tools-the microscope, a spectrometer, a formula, etc.-that will simply cease to function reliably if one tries to apply them in a way that they weren't designed for. Natural scientists are as selective as humanists when it comes to sampling data input, and as speculative when it comes to interpreting data output. But in the natural sciences it is much easier to reach agreement on what the input was, how it was processed, and what came out. Likewise, literary computing will never enable us to reach an ontological consensus, but it might help us to formulate a methodological one. This does by no means preclude us from pursuing further our quest for 'meaning'; only, we will be quite sure whether or not we're actually peeling the same onion, and how we go about it.

Notes

- 1. This is not to say that the formal analysis should be assigned prescriptive powers—formal and thematic characteristics of a structure may well oppose each other, which in turn can result in a specific interpretation of the system. However, what needs to be upheld is the independence of the former from the latter: the coexistence of a certain formal and thematic structure cannot automatically be read as proof for their causal interconnection; nor can the lack of formal consistency be compensated for and simply be brushed aside by referring to cultural conventions that have established a particular coherent 'reading' of a text despite its formal short comings.
- 2. This was of course intended by Goethe. The *Unterhaltungen deutscher Ausgewanderten* were initially published in the journal *Die Horen* in 1795, used by Goethe and Schiller as a medium to discuss and present to the public their aesthetic, literary and philosophical principles.

- 3. On the various interpretations of the 'Unterhaltungen' see the comprehensive survey in Dammann,1990.
- 4. This distinction points to the important debate in philosophy of action that concerns itself with the question of the intentionality of action. EPITEST is based on a strictly non-intentional concept of action. This is necessary in order to avoid confusion between the phenomenological description, and a normative evaluation of action. For further details see Meister, 1994.
- 5. Incidentally, Greimas' model is all but original: the logical structure of signification had already been represented in a similar fashion, e.g. in a 'square', by the scholastics, for example in Petrus Hispanus' *Tractatus dudecim* (Straßburg, 1514). This underscores the close methodological link between hermeneutics and the traditional *ars rhethorica* which we must take cognizance of when attempting to model the interpretive faculty in human beings in literary computing applications.
- 6. Both implementations adhere to the standard PROLOGsyntax (e.g. the so-called 'Edinburgh Standard').
- 7. As one can see in the above flowchart, one module (MODULE 0) planned for the fully developed version of EPITEST is a 'MOVE-parser', a discriminating device that can automatically identify MOVES within a digitalized text, then generate a MOVE-structure and subsequently pass on this information to the KERNEL, the search algorithm. The automatic segmentation of narrative texts can of course also be based on purely statistical analyses of word frequencies, assuming that a given sequence is delimited by so-called 'cue phrases'. On this aspect see the very interesting work presented by Hideki Kozima and Teiji Furugori in their recent article 'Segmenting Narrative Text into Coherent Scenes' (Kozima and Furugori, 1994, pp. 13-19). It should be noted, though, that here the concept of 'scene' is understood in an almost cinematographic sense: it is the extension of a narrative text that fits into one 'cut'. The organizing principle for this is the 'camera', i.e. the perspective of the reader, not the immanent logical cohesion in the scene's action.

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