

COMPUTERS AND LITERARY THEORY

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Abstract This article addresses from three different angles the assertion that extended computer-supported interpretive studies of literature include an inherent critical point-of-view. First, the point-of-view, itself, is described as it derives from the underlying architecture of the computer and the structural framework it provides for handling texts and representations of meaning. Second, that perspective is compared to major formalist, structuralist and semiotic schools of criticism. Finally, implications are examined of incorporating the Computer Critical perspective and methodology into the mainstream of critical theory. The paper discusses the implications for a science of criticism, the concept of literary proof, and the training of literary scholars.

Introduction

THE initiative for this paper comes out of the forum held at the 1978 MLA Convention in which Professors Culler and Scholes spoke on general aspects of Semiotics and the half-dozen or so other sessions where more specialized semiotic topics were discussed. There was considerable debate in all of these; however, nowhere was that debate sharper than in the forum itself where Professor Paul Ziff responded to the Scholes/Culler presentations. While Professor Ziff's style often obscured the substance of his remarks, he did point out forcefully the absence of a developed methodology for formalist/structuralist criticism in general and for Semiotics in particular. Ziff observed repeatedly and in a variety of contexts that recent critical theory in its preoccupation with breadth and generality and in its fascination with specialized, quasi-scientific terminologies, has lost sight of the specific text or the phenomenological response to specific aspects of that text. That criticism, not of Scholes and Culler, but of recent trends in critical theory, I believe, is valid. Perhaps we need to remind ourselves that the real value of any theory or hypothesis lies not in its elegance but in the range of phenomena it draws into focus and the relations it reveals. This article might be seen as an attempt to narrow the gap between at least one aspect of current critical theory and a methodology that has evolved that lends itself to characterizing literary texts and their interrelations with reader responses. As Professor Culler addresses the problem of making Semiotics explicit and as I consider some of the theoretical implications of extended computer-assisted analyses of literary works, we may be approaching the same point from opposite directions. Should it be possible to link formalist/structuralist theory with the rapidly developing methodology of Computer Criticism, the ramifications would be extensive. Later, I shall return to some of the possible consequences that I foresee, but first I wish to discuss several aspects of the relation between computers and critical theory. I shall look at some of the assumptions necessary for computer analyses of literary works leading to what I believe is a coherent intellectual perspective that grows out of such studies. In doing so, I shall point out several of the more

important links this perspective has with recent formalist/structuralist perspectives. Finally, I shall try to show that some of the challenges recently addressed to current critical theory are met by the Computer Critical approach, but in meeting these challenges significant new problems arise.

The Computer Critical Perspective

A text for the computer exists as a material sequence of signs. Its ultimate reality, configurations of electrical impulses, has no external 'meaning'; signs are 'recognized' only in relation to one another and are externally viewed by their human manipulators as corresponding to characters of the alphabet or, in groups, as words, phrases, sentences, ... ; texts. Consequently, a text within a computer represents the ultimate self-referential semiotic reality.

These signs within the computer, however, constitute a system exhibiting a basic structure derived from the rather peculiar diachronic and synchronic structures inherent in the architecture of the machine. Storage within a computer is organized sequentially. Consequently, the text is retained as a long string of characters, beginning with the first word and running, tickertape fashion, to the last. Other concepts of form can obtain, but these must be imposed over this inherent diachronic structure. At the same time, the computer has random access to collections of data on the scale of any text or any practical corpus of texts. This capability gives the human inquirer complete synchronic recall of the entire text. That is, the text may be viewed as a long sequential string of signs or words but one in which we may recall any feature and all occurrences of that feature on demand. Thus the computer greatly amplifies the reader's power of recall, but it also can expand his/her sense of form.

All concepts of meaning are formal and relational. Since no concept of meaning exists within the sign itself, meaning must be inserted from outside the system and takes the form of relations among specific signs. Let me illustrate. We might assert that a theme or motif is a concept indicated by any one of a specific collection of words or phrases. Thus, the motif, *fire*, might be indicated by the words 'burn, burned, burning, fire,

heat, hot', etc. These individual words have no inherent relation to one another within the computer; they are related by virtue of their relation in the reader's experience. That relation must be imposed over the text. To represent that relation, the computer might be instructed to form a second sequence of signs parallel to the text and to mark the thematic collection by a single, identifiable sign within that sequence. In similar fashion other 'meaning' groups could be defined and identified by other signs. Once imposed in this fashion, meaning becomes a formal component of the text system.

If we can impose one hierarchical stratum parallel to the text (in this case to represent a primitive concept of thematic or, perhaps, semantic meaning) we may develop other sequences at the same hierarchical level. For example, the critic may observe, say, the responses of an audience to a play or he/she may attempt to recall or record the responses he/she has had while reading the text. Such observations may be characterized and represented as symbols placed parallel to the sections of texts where they occur. Or the linguist may wish to mark syntactic function and record this within a stratum. The range of such germinal categorization schemes is as diverse as the range of interpretive perspectives.

While first level conceptual categories can, in some instances, be of interest in themselves—for example, Caroline Spurgeon's categorization of Shakespeare's imagery into thematic groups allowed her to reveal their role as background motifs for the plays—it is in the derivation of higher strata that interesting patterns usually begin to emerge. The computer affords a variety of techniques for developing higher strata. For example, specific patterns or paradigms within a stratum may be used to define a third level of signs. Applied to a syntactic stratum, such paradigms could reveal phrases; applied to a thematic stratum, they would produce thematic clusters or 'hyperthemes'. Statistical techniques do not require the prior specification of pattern and permit a more exploratory approach. Correlation analyses of various sorts reveal characteristic patterns of interdependencies; thus, one might explore the particular thematic and syntactic patterns that correspond, consistently, with specific responses. Regardless of what technique or concept of structure is used to derive a higher, more abstract level from those below it, that stratum becomes available for analogous examination and characterization to derive still higher strata. The process is open-ended. The important point, however, is that no matter how broad or how abstract, generalizations can be traced back through the strata of the system to patterns within the text and/or closely observed details of response.

Because of the extremely close relationship between form and interpretive statement for Computer Criticism and because the computer offers through its library a large collection of general analytic tools, the concepts of structure available for literary analysis have been greatly expanded. These include not only paradigms and correlation models, mentioned above, but also principal component analysis and other multivariate techniques,

multidimensional scaling, and a variety of parametric and nonparametric models. To characterize the sequence of signs within a stratum there are also a number of models available including Fourier Analysis and other time series models. These are only a few of the classes of available concepts. At present, the store of resources is much larger than our understanding of how to utilize them in pursuit of the questions that interest us.

In summary, then, the computer begins with a material text that exists both diachronically and synchronically. All meaning is formal and relational and can be viewed as hierarchical strata parallel to the textual sequence. Since the sign system within a level is arbitrary, meaning can be as conventional or as idiosyncratic as the critic's intent dictates. Since meaning is, thus, inherently responsive, included in this level can be not only semantic concepts but reader/audience responses, other aesthetic responses, the conventional functional responses that constitute syntactic categories, and numerous others. Interpretation becomes the articulation of, or response to, patterns derived from elements within lower strata. Such interpretive responses can then be codified, incorporated into a higher level sequence of signs, and, in turn, analysed to derive still higher abstract patterns. The range of structural models goes far beyond the concepts of paradigm, transformation, and lattice that have dominated traditional formalist and structuralist criticisms to include and make available for use any concept of form that fits the inherent hierarchical structure of the text/response system.

Relation to Formalist/Structuralist Criticisms

While the preceding discussion addressed the inherent intellectual perspective involved in extended analyses of literary works with a computer, I mentioned briefly several points of contact with conventional critical perspectives. I hope others came to mind, but I now wish to point out several specific shared assumptions. I can only mention here a few of the more important similarities; however, I have discussed this in much greater detail in an essay entitled 'Computer Criticism'.¹

The assumption of a material text 'waiting' to be characterized by the responsive critic is an assumption shared not only by recent Structuralist critics but by their New Critical ancestors and by the earlier Russian and Prague Formalists. The last group, however, went further than most other branches of this tradition in attempting to characterize the distinctive aspects of that material text and the effect produced on the reader. The Russians did so conceptually under the term, *ostranenie*, but it was the second and third generations in Prague that proposed techniques for actually characterizing the language of a specific text. The most ambitious of these attempts is that of Lubomir Doležel who proposed an actual statistical taxonomy that might be employed to characterize the conventional as well as the distinctive features of language.² Professor Doležel's encompassing

model has proved impractical to apply manually, but the availability of the computer makes his approach an actual possibility now.

Similarly, most formalist/structuralist schools have employed, to one degree or another, a hierarchical perspective of the text. This has ranged from Welleck's and Warren's very loose eight-tiered framework³ to the more controlled five level structure Roland Barthes uses in *S/Z*.⁴ While the former makes no claim at formality, the latter does by implication. Barthes uses the framework to factor his responses as highly informed reader into different foci for each of the 561 segments, *lexies*, into which the text is divided. Virtually no attempt is made to consider patterns across *lexies* or generalizations growing out of the interaction of features identified within the various strata. Thus, hierarchical stratum serves to focus critical perspective and response but is not used in the interpretive act itself.

The concept of form or structure used by most structuralists has been, overwhelmingly, the concept of the transformation, borrowed from linguistics. This is not surprising given linguistics' radical shift to a generative basis some twenty odd years ago. However, while useful for describing sentence generation, that particular mathematical model has proved troublesome for analytic purposes at the level of sentence and bears no apparent relation to language patterns larger than the sentence. Within a literary context, this model has proved most successful in motif studies, such as Todorov's description of the *Decameron*,⁵ where he sought to show that individual narrative sequences could be derived through basic transformational rules from a few prototypical tale forms. The only other structural model that has been used very extensively is the lattice. The most ambitious suggestion for its use that I know of is that offered by Paul de Man in a essay published in *Diacritics* in 1973. After considering the metonymic structure of associations found in a passage of Proust, de Man goes on to suggest

The further text of Proust's novel ... responds perfectly to an extended application of this deconstructive Pattern: not only can similar gestures be repeated throughout the novel, at all the crucial articulations or all passages where large aesthetic and metaphysical claims are being made ... , but a vast thematic and semiotic network is revealed that structures the entire narrative and that remained invisible to a reader caught in naive metaphorical mystification.⁶

Since de Man asserts in the essay that 'there certainly have been numerous excellent books of criticisms since, but in none of them have the techniques of description and interpretation evolved beyond the techniques of close reading established in the thirties and forties', techniques to present the actual thematic structure of a novel were not available to him.⁷ The computer can take him two steps beyond such statements: it can be used to display the actual thematic structure of a text and it can

then be used to characterize that structure so that the thematic organization of one novel can be compared with that of another.

The final similarity that I will mention is that between the computer perspective and the critical perspective that has grown out of the work of J.R. Firth. Firth's linguistic model is remarkably similar to that which grows out of the internal characteristics of the computer engaged to perform literary analysis. He began with a material text or utterance and then developed successive levels of meaning, each defined formally in terms of the patterns established in the level below it, concluding in a pervasive context of situation that included behavioural observations and cultural generalizations.⁸ The model is equivalent to a restricted version of the Computer Critical perspective outlined earlier. It is restricted in the sense that it uses fixed levels, does not include specific relational models to govern movement from level to level, and does not include multiple sequences at the same hierarchical level. Perhaps the best example of a Firthian interpretation of a literary work is M.A.K. Halliday's analysis of William Golding's *The Inheritors*.⁹ There Halliday selects continuous samples from three portions of the text, develops syntactic descriptions of the sample sentences (a second level category system), identifies syntactic patterns or collocations (third level patterns), and, finally, shows that the growing conceptual awareness of the central character (fourth level abstraction) is revealed in the evolving syntactic complexity of the collocated syntactic forms of the third level. While Halliday performed his analysis manually, it is precisely the type that could be extended and applied to other works more easily with the aid of the computer.

While I have not 'proved' that the Computer Critical perspective is coincident with conventional formalist/structuralist theories, I hope this brief discussion will support the claim that the two are compatible and, consequently, that the computer offers a developed methodology that can be used in support of such theories to make possible actual analyses that have not been practical before. As I understand the contemporary critical context, the time has never been more propitious for a joining of Computer Criticism with current conventional schools of literary theory. The latter have evolved, in my view, into abstract formulations that while very exciting to contemplate are dissociated from any textual or responsive reality; the former has evolved from a collection of tools useful for the mechanical production of conventional scholarly aids (bibliographies, concordances, and the like) to a position of self-awareness where it is attempting to articulate the inherent nature of its methods and to relate them to other perceptual frameworks. In the final section of this article I shall look at a few of the results that would ensue from their cooperation.

Implications of a Merger

Should Computer Criticism come in from left field and

be incorporated into the mainstream of developing critical theory, I believe we would see a number of significant developments. I would like to concentrate on four of these: the realization of a science of criticism, the realization of an enriched Semiotics as the central focus of developing critical theory, a shift in the concept of literary proof, and, finally, a shift in professional training programs.

While some may claim that interpretation is an inspired response of the gifted, the question of the disciplined, scientific pursuit of a scientific basis for criticism was, to my mind, settled years ago. Northrop Frye has stated that position as clearly as anyone

It seems absurd to say there may be a scientific element in criticism when there are dozens of learned journals based on the assumption that there is, and hundreds of scholars engaged in a scientific procedure related to literary criticism. Evidence is examined scientifically, texts are edited scientifically. Prosody is scientific in structure; so is phonetics: so is philology. Either literary criticism is scientific, or all of these highly trained and intelligent scholars are wasting their time on some pseudoscience like phrenology.¹⁰

While I agree that we desire a more developed scientific basis and methodology for our studies, I would disagree with Professor Frye that we have achieved those goals; however, the computer, the tools that it offers, and the procedures that it requires could lead us closer to them. At present that movement is slow, but the incorporation of computer methods into the main stream would accelerate the process greatly.

Second, Semiotics would, as a result of the first point, become the central focus of critical theory. At present Semiotics claims to be a metascience that encompasses not only literature and other humanistic disciplines but all of the sciences as well by virtue of their formulation within sign systems. In practice Semiotics has divided into two primary positions. The position that has been most prominent in this country and in Europe is the faction that focuses primarily on the behavioural aspects of sign use. Much like Barthes' use of a hierarchical framework to focus responses, they have used semiotic categories/terminology and some elementary relational tools to facilitate observations of sign use behaviour; interpretation has usually followed immediately upon observation. The other group, represented much more strongly in Russian Semiotics, has taken the additional step beyond observation to codify sign use into a second, perhaps third, level sign system and to work toward interpretive statement through the elaboration of successively higher strata of abstract patterns. For a discussion of this approach see the essay by Zaliznjak, Ivanov, and Toporov entitled 'Structural-Typological Study of Semiotic Modeling Systems', in Daniel P. Lucid's *Soviet Semiotics*.¹¹ There the obvious similarity with Firth is acknowledged but the actual analytic framework described is much more general and

closely resembles the perspective of Computer Criticism that I have outlined but without its practical methodology. The shift in emphasis to include analysis of codified sign use in conjunction with the developed methodology of Computer Criticism, with its facility for incorporating responsive and contextual features, would place Semiotics in a position to demonstrate that it offers a scientific basis for criticism.

Third, the concept of proof would change. Until now, the primary standard of proof for critical theory has been internal consistency; for critical description, citation of authority and citation of example have been added. Computer Criticism, because it can seek all occurrences of a pattern within a text, can extend the concept of proof to include pervasiveness. By virtue of its requirement for complete specification of elements within a categorical stratum, it can also reveal adequacy or completeness of an interpretive generalization.

Finally, what will be the effects on professional training? Computer systems exist today that do not require that the individual have a great deal of technical preparation. However, if their use grows and the unfamiliar models afforded by the computer become incorporated into critical theory, research at the forefront will inevitably become more technical. The individual preparing himself/herself to work in this area will need to know the range of structural models that are available. He/she will need to have an intuitive concept of how they configure data and the relation between descriptive parameters and structural 'meaning'; he/she need not be completely familiar with the actual mathematics but will have to be able to communicate effectively with someone who is, until a familiarity with these models develops. Finally, and most importantly, this new theorist or interpreter will need to be able to move easily from a conventional description of a critical problem that our colleagues can understand to an operational restatement of that problem that the computer can understand. Gradually the critical questions will change and the profession at large will become more familiar with analyses of this type, but for the present a graceful translation is a necessity.

The realization of a science of criticism, with the accompanying shift in importance of Semiotic studies, with the change in the concept of proof, and with the change in the preparatory programs for members of our discipline, would, indeed, mark a major change in the profession. The situation may be analogous to that of linguistics in the early 1950's. At that time linguistics retained its humanistic orientation as it had evolved out of philology. With the publication of *Syntactic Structures* all of that changed. The concept of the mathematical transformation became the primary descriptive model; the centre of linguistic activity shifted to M.I.T; linguistics became a scientific discipline. It was, in fact, a textbook example of Thomas Kuhn's discipline revolution.¹² I would overstate the case were I to claim that a change in literary studies of this order of

magnitude is imminent. But I must confess that I do believe that the potential for a change of this magnitude exists.

Notes

1. John B. Smith, 'Computer Criticism', *Style*, 12, 4 (Fall, 1948), pp. 326-56.
2. Lubomir Doležel, 'A Framework for the Statistical Analysis of Style', *Statistics and Style*, edited by Richard W. Bailey and Lubomir Doležel (New York: American Elsevier, 1969).
3. Rene Welleck and Austin Warren, *Theory of Literature*, third edition (New York: Harcourt, Brace, and World, 1956), p. 157.
4. Roland Barthes, *S/Z*, translated by Richard Miller (New York: Hill and Wang, 1974).
5. Tzvetan Todorov, *Grammaire du Decameron* (The Hague: Mouton and Co., 1969).
6. Paul de Man, 'Semiology and Rhetoric', *Diacritics*, 3 (Fall 1973), p. 32.
7. *Ibid.*, p. 27.
8. J.R. Firth, 'A Synopsis of Linguistic Theory, 1930-55', in *Selected Papers of J.R. Firth*, edited by F.R. Palmer (Bloomington: Indiana University Press, 1968), pp. 168-205.
9. M.A.K. Halliday, 'Linguistic Function and Literary Style', in *Literary Style: A Symposium*, edited by Seymour Chatman (London: Oxford University Press, 1971), pp. 330-68.
10. Northrop Frye, *The Anatomy of Criticism* (Princeton: Princeton University Press, 1957), p. 8.
11. Daniel P. Lucid, *Soviet Semiotics* (Baltimore: The Johns Hopkins University Press, 1977), pp. 47-58.
12. Thomas Kuhn, *The Structure of Scientific Revolutions*, second edition, enlarged (Chicago: The University of Chicago Press, 1970).