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RATSALL:

A LANGUAGE ANALYSIS COMPUTER SYSTEM

FOR THE EIGHTIES

Overview

RANDOM ACCESS TEXT SYSTEM FOR THE Analysis of Language and Literature (RATSALL) is a computer system that is the result of some twelve years work; since it is likely to continue in its development for some time to come, the only description that can be given is a "work in progress" report. The system is designed, however, in a highly modular fashion so that it is "complete" at any given time in the sense that it offers a range of verified services for the functions implemented. New functions are developed, tested, and added without disrupting the system as it exists at that time. RATSALL consists of three basic components: an instructional system, a data base of texts available for analysis on demand, and the analytic system that performs the analysis or retrieval requested. The system differs from other language analysis systems in several respects; perhaps most important is the pattern of use for which it is designed. Assumed is the situation in which the user is a conventional scholar who wishes to retrieve specific information from a text or texts or who wishes to build through interactive analyses an extended interpretation of the text(s). The system supports the inclusion of extrinsic information as a semiotic sequence and permits the gradual, dynamic development of a reading or interpretation that is sensitive to the nuances of literary experience. RATSALL is designed with the intent and the hope that it can help meet the requirements of contemporary literary theories and can assist in the realization of valid, practical poetics or methodologies for those perspectives; consequently, in the discussion that follows, attention must be given to the system's mode of use, the conceptual perspective it suggests, as well as the functions it performs.

Background

Anyone who has used a computer for any length of time would, I suspect, agree that the computer usually tells us more about our understanding of the problem under consideration than about the problem itself. Nowhere is this clearer than in computer-assisted studies of literature. While RATSALL and other computer systems will tell us some things about the texts we consider and, perhaps, about our responses to those texts, they will tell us more about the critical points of view of their designers and of ourselves. Because of the extreme literalness of the computer, the designer must make decisions on a number of fundamental points: the nature of the text, the

nature of literary understanding, the relation between intrinsic and extrinsic features, the relation between diachronic and synchronic structures, and many more. Inherent in these choices, by intent or by accumulation, is a specific critical perspective. The critic who uses a computer system to assist interpretation, in my opinion, is well advised to verify that the inherent critical orientation of the system is compatible with that of the study about to be launched.[1]

The use of the computer in literary studies is largely a product of the sixties and seventies. During that first decade, critical theory in this country was dominated by two very powerful influences: the declining vestiges of Anglo-American New Criticism and the rise and peaking of French Structuralism. The notions of the fixed text and the architectonic function of images and other figures embraced by New Criticicism proved particularly adaptable to computer analysis. Thus, many systems, including RATS, the first ancestor of RATSALL, came from what was essentially a New Critical perspective. Compatibility with French Structuralism was always more apparent than real. The tone of mathematical rigor, the concept of meaning that is relational, the interest in large systemic bodies of material suggested that the French Structuralist approach should be readily adaptable to computer analysis. The less-than-expected influence can be traced to two aspects of Structuralism. First Structuralism never developed a very large repertoire of relational models; because of its roots in linguistics, it relied almost exclusively on the concept of the transformation. While useful for describing some processes of generation, the mathematical concept of the transformation is particularly awkward for analytic purposes. Second, in spite of its mathematical sounding terminology, Structuralism never developed a coherent, rigorous methodology; it remained an *ad hoc* collection of approaches loosely oriented around a particular point of view. Although no truly Structuralist system was developed, to my knowledge, computer systems did adopt several features of Structuralism. These were the notion that meaning is closely associated with, but not equivalent to, relational structure and, second, the notion of vertical strata of synchronic patterns above the diachronic text. Both of these features can be found in the second RATSALL predecessor, RATSATAN, as well as in other systems.

The seventies, if it is not too presumptious to attempt to sum it up in a few phrases, seems largely a polyglot of responses to the sixties each of which sought to reassert the central role of the reader or interpreter in the reading experience but each with different emphasis or from a different intellectual tradition. Phenomenology, Marxism, Semiotics, Reader Response Theory, all have contributed to the general and pervasive trend of Post-Structuralism. From this development RATSALL has adopted two major features. It has included the capability of integrating into the analysis extrinsic features, coded as semiotic sequences parallel to the text. More importantly, it has shifted the focus from a static textual analysis system to a retrieval, modelling, and management system designed to aid the interpreter in clarifying, representing, and retaining in dynamic form an evolving understanding of the text in relation to other experiences.

As we emerge from the eclecticism of the seventies and look toward the eighties, several trends seem clear. While Post-Structuralist criticism has revealed the inad-

equacy of purely abstract systemic analyses, the interest in rigor has not been diminished, only shifted to focus on the reader in a complex intellectual environment. Second, and related, the field of analysis has shifted from the text to one of several wider domains: the collective phenomenological experience of the reader, the system of signs in which the reader and the text are embedded, the cultural context that sustains the reader and from which the reader is constituted. Because computer systems take considerable time and effort to develop, it is important to identify the direction in which critical theory is moving. As I look to the eighties, I believe that we will see a more consolidated critical mainstream. As Marxism reduces its emphasis on a specific ideology and, instead, develops conceptual frameworks for considering ideology, *per se*, as one of several major cultural forces interacting in the formation of the self, the perspectives growing out of the different phenomenological traditions will be absorbed into the larger cultural perspective of this expanded Marxism. Second, developments in Russian Semiotics point to the eventual fusion of Semiotics, also, with a general cultural Marxism. I am not sure what the result should be called, but it will be marked by the conjoining of author-text-reader within the larger domains of the canon and the culture on the one hand and the phenomenology of the reader, the nature of literary expectation, and collective cultural experience on the other. My sense of conviction is re-enforced by the fact that when Marxism has run its theoretical course and finally turns to the task of developing a viable poetics, these factors are precisely the ones that will have to be embedded in a methodology. Yuri Lotman and his colleagues at Tartu have already taken the initial steps in this direction; others, I suspect, will follow. When they do, what they will find is that the dimensions of the task are evident enough but that the only hope of consolidating into a single instance of critical perception the range of factors required will be through the assistance of a computer. That system will have to reference a corpus of texts that includes not only the traditional literary canon but the culture as a whole; it must provide a wide repertoire of relational models; and it must respond to the subtle, dynamic shifts of an evolving perception.

It is from this background that RATSALL comes and toward this future that it points.

Technical History

RATSALL is the third stage of evolution in a series of computer support systems to assist the scholar in natural language analysis. The first stage, culminating in 1972, was a system designed to facilitate custom programming applications in IBM's PL/1.[2] That system, titled RATS, accepted as input the natural language (e.g. English) text encoded virtually as it appeared on the page. RATS scanned the text, extracted each primitive segment (word), numbered it both hierarchically (volume, chapter within volume, paragraph within chapter, sentence within paragraph, and word within sentence) and linearly (the first word numbered one, the second two, etc., until the last). The collection of all such words with their respective contextual or indexing information was sorted alphabetically and, secondarily, by textual location (e.g. linear index

number). From these sorted records, RATS constructed three files, linked by pointers, that provided random access to the text; that is, using the three files, a computer program could locate immediately all occurrences of a given word and then go immediately, without searching, to the contextual location of each. The three files were labelled: 1) Dictionary, 2) Alphabetic, and 3) Linear. The Dictionary consisted of the alphabetically ordered word types, the frequency of occurrence or token frequency of each, and a pointer to the Alphabetic File. The Alphabetic File contained the index information, both hierarchical and linear, for each token arranged in order corresponding to the associated word, sorted alphabetically and, secondarily, by textual location. A pointer was also stored with each record in the Alphabetic File that identified the corresponding record in the Linear File. The Linear File duplicated the Alphabetic File except that records were ordered corresponding to the associated token, sorted into linear or text order, and the pointer in the Linear File identified the corresponding type record in the Dictionary. Thus, the entire structure was joined into a ring, permitting access to any component from any starting point.

For a specific study, only the components necessary for that study were transferred from tape or disk storage to main memory. Many analytic programming tasks became quite simple; for example, a basic concordance program reduced to fewer than a dozen PL/1 statements for the central extraction and context generation steps. The system, however, had several major limitations: it did not handle large texts whose structure could not fit into main storage and it supported most directly only those interpretations that addressed intrinsic aspects of the text.

RATSATAN met the first of these limitations and extended the power and flexibility of RATS.[3] This system was designed to accept as input the three files created by RATS and to provide for the PL/1 scholar/programmer complete data management support for texts of (virtually) unlimited size; also provided was a set of macro-type functions to assist with generic language analysis tasks. These included search functions, frequency computing functions, as well as several analytic functions (factor analysis, Fourier analysis, etc.). Using RATSATAN – enriched PL/1, the scholar/programmer could write custom programs to handle long texts with the same ease as programs to handle texts small enough to be held in memory. In fact, the generic functions made this task even simpler. RATSATAN was limited, however, in that it still assumed that the analyst was either the programmer or had access to custom programming help; and, in its initial form, the system did not provide support for including extrinsic features in the analysis.

RATSALL was designed to meet both of the deficiencies noted for RATSATAN and to permit open-ended development of additional analytic capabilities. Begun in 1976, RATSALL attempts to provide a complete computer working environment for the human interpreter. It is written in RATSATAN-enriched PL/1 with several additional support functions added. No knowledge of programming is assumed for the interpreter; all interaction with the system is handled through a natural language like command language. The system can support the quick, single inquiry: for example, a

retrieval of the contexts (say, three sentences, centered) for each occurrence of a given word-type; however, it is better suited for extended analyses. Perhaps a clearer sense of the system will emerge if we consider how the typical scholar who knows nothing about computers could begin to use RATSALL.

Use

The working environment for using RATSALL is not necessarily a computer center but rather any place with electricity and a conventional telephone. Let us presume the scholar chooses to work in his or her office or home study. The first level of entry to a typical university computer, and the one presumed for RATSALL here at Penn State, is the terminal file system and editor. There are a number of such systems; typically, they allow the user to type information into the computer, edit it, store it. Most also allow the user to combine information supplied with programs from the system's library to perform general tasks. The scholar unfamiliar with computers could expect to spend several hours learning the basics and several weeks, an hour or so a day, mastering them. In addition to gaining access to RATSALL, the scholar would also gain access to formatting programs that greatly facilitate scholarly writing, bibliographic programs, and other aids that can assist normal academic work. Once the file system and editor are mastered, the scholar may begin to use RATSALL.

The system has three main components: an instructional system, a collection of texts, and the analytic system, *per se.* The instructional system, accessed through the terminal, tells the scholar exactly what he or she needs to type on the terminal to use any part of the system. For example, the instructional system will describe how to obtain a list of texts available for consideration and how to select one for analysis. After a text is selected, the instructional system can inform the scholar of the various forms of requests or commands that are available. All commands or requests use quasi-natural language formats that include key words; for example, the scholar might type:

Please display a concordance for the word: fire.

The computer would respond with each sentence in the text that includes the word "fire"; this information would be displayed on the terminal, or printed, if that is desired. The typical pattern of work is to request information, consider it, perhaps establish categories of words or text locations and store them for future reference, identify patterns of words or reponses, name and store the patterns, define larger patterns in which earlier patterns or categories figure as elements, etc. Thus, the system both locates or computes the information requested as well as assists the scholar in managing that information and the patterns of relations perceived as he or she explores a thesis or follows a critical intent.

RATSALL functions may be divided into two goups: access functions and relational functions. Access functions are those that extend the interpreter's recall of the text by displaying on demand the information requested in its textual form (as in a concordance request) or in some analyzed form (as in a graphic distribution of a

theme). Relational functions are those that apply some analytic model to the text or data derived from the text; these functions can support both syntagmatic analyses (e.g., sequential patterns of specific words or groups of words) and paradigmatic analyses (e.g., lattice representations of thematic associative structures). Both access and relational functions, however, rely heavily on the notion of category.

There are two basic kinds of categories, but they may be used in a number of different ways. The distinction is between a category that represents a set of word types and a category that represents a set of textual locations. The category of word types, or dictionary category, is simply a collection of word types that are considered to be equivalent within some conceptual framework. It can be used to represent the set of words considered single word images, the set of words denoting a basic theme, the set of words functioning as a particular syntactic class, etc. The category of textual locations, or linear category, is a collection of points in the text. It can be used to distinguish between homonyms, to identify locations where specific syntactic or semantic patterns appear, to mark passages in the text where some extrinsic feature occurs, etc. Either kind of category may, optionally, have symbolic values associated with it or its individual members; if, for example, the interpreter is interested in the dynamics of the audience viewing a particular performance of a play, he or she could observe the points where the audience reacts and then code the nature of the particular reaction with a corresponding symbol; this information could then be represented as a linear category of locations with accompanying values. Since the category function is recursive, the elements that comprise the category may be not just words or locations but other categories, as well. In this fashion, successively higher strata of abstractions can be defined: categories of words, cateogries of categories, categories of categories of categories, ...

There are two primary approaches to establishing higher strata of categories: taxonomic and analytic. A taxonomic approach originates in some paradigmatic structuring of categories that the interpreter imposes. For example, the interpreter might begin by identifying the following first level categories of images:

birds

animals

insects

trees

flowers

bushes

woodland

streams

Each of the above would be comprised of specific word types or word token locations. From these first-order categories, three second-order categories and one third-order category might be established:

images of nature

fauna

birds

animals

insects

flora

trees

flowers

bushes

landscape

woodland

streams

The analytic approach to establishing higher order categories comes after the fact; that is, on the basis of results derived from the application of some relational model, the interpreter establishes categories to represent the occurrences of specific patterns. For example, the interpreter might establish the following first-level categories:

prep: at, in, of, over, . . . , under

art: a, an, the;

noun: apple, bear, car, . . . , zebra;

The locations in the text where the pattern "prep + art + noun" occurs could be grouped and identified as a linear category. However, either process of establishing higher strata must be understood as both analytic and conceptual; that is, RATSALL will provide various analytic data, but this information must be assimilated by the interpreter, modified as the growing conceptualization warrants, codified into higher levels of categories, or discarded. The process is, thus, dynamic and responsive to the interpretive experience of the human being at the center of the entire system.

We may now look at the various functions that supply information to the interpreter or impose relational models over the text and/or the interpreter's symbolized observations of extrinsic factors. Important to keep in mind is the fact that each function that applies to a word or location also applies to categories of words or locations at any level of category abstraction.

RATSALL access functions cause the requested information to be displayed on the terminal or printed on a high-speed printer for more thorough examination. One

such function displays a selected concordance; context may be specified in terms of any of the index units (words, sentences, etc.) with separate specification of preceding and succeeding contexts. The "items" concorded may be a word type, a category of word types, a location, or a category of locations. This contextual information is supplied on demand to the interpreter at the terminal, usually within a matter of seconds. If the context is insufficient for any given passage, the interpreter may ask that additional textual information be displayed for that particular occurrence. Another function creates a graphic distribution of a word type or category over the text, enabling the interpreter to note segments where relative concentrations occur. A function useful for establishing categories, rather than revealing properties of categories, is the display dictionary function. It displays all or a specified part of the dictionary including word type and the frequency of occurrence of that word type in the text. While the primary mode of access is the terminal, any information displayed may be directed to a high speed printer with a single command.

RATSALL relational functions produce information that reflects the conjunction of specified critiera or the application of a specified analytical model to the text, to data derived from the text, or to extrinsic factors observed and encoded.[4] One function permits the interpreter to locate all locations where a logical or Boolian combination of words or categories occurs, within specified constraints of context; that is, the interpreter might ask RATSALL to locate all of the passages having an image from the landscape group as well as the flora group, but not one from the fauna group within, say, the same sentence. When the categories employed are thesaural or semantic categories, the function is equivalent to the General Inquirer concept of content analysis.[5] The set of all such locations becomes a category like any other category and can be used accordingly; that is, the interpreter may look at the contexts of all locations identified, produce a distribution, etc., but he or she may also define more abstract logical configurations of categories in which the category just produced serves as an element. The resulting configuration then becomes a category, but on a higher level. The process can be repeated indefinitely as the interpretation and the levels of generalization expand. Of course, the configuration function can use concepts of category other than those based on semantics. For example, since a category may indicate the locations and kinds of responses to an underlying text, the configurational function can be used to relate extrinsic features to textual features.

Described above was the distribute function that computes a numerical distribution of a word type or category over the text; a number of such distributions can be analyzed using a factor analysis model – principal component analysis – to determine categories that reflect interdependencies. The model produces category "clusters" that consistently appear in the same contexts as well as numeric indicators of the relative strength of each category within a cluster and the overall strength of each cluster. The clusters, in turn, can be used with the concordance function to examine quickly each such context to determine the precise relation, or they may be used with the configurational function to refine further the conjunction. Another relational model available is a Fourier analysis model. This mathematical tool views a distri-

bution as a complex wave form; the model then decomposes the composite into a set of rhythms and notes the relative contribution of each to the whole. By choosing only the most important rhythms or those that contribute the most to the composite, the interpreter can uncover the characteristic form of the whole. When extrinsic responses are incorporated, Fourier analysis offers a powerful tool for considering questions of orchestration of textual and other features to produce a complex aesthetic experience.[6] It may also be used to indicate the inherent complexity of structure carried in the diachronic sequence of category elements.[7]

Extensions

The access and relational functions are currently part of the RATSALL repertoire; several additional functions are scheduled for implementation in the near future. Graphic output is now either returned to the terminal or printed off-line in a character format. An expanded graphic capability will produce numeric distributions with finer resolution, if that is requested, formatted for output on the small Tektronix hard copy graphic plotters available at Penn State. The final output process, however, will be confined to a single module to permit later modification for other plotter devices, here or elsewhere.

CGAMS is a visual analog system that was originally developed to produce a three-dimensional graphic image of structural relations among a set of themes or semantic categories.[8] Produced is an image that resembles an aerial view of a mountain range: there is a peak for each category; the height of each peak is proportional to the relative frequency of that category; the distance between two peaks reflects the relative tendency of those two categories to be close to one another in the textual segment under examination versus the distance relation between every other pair of categories; and the shape of the facet between each pair reflects the tendency of that pair to be stable in their distance relation (resulting in an abrupt fact) versus the tendency for that distance relation to be variable (resulting in a sloping facet). By producing CGAMS images for, say, the first 1000 words of a text, the first 2000, the first 3000, etc., one can note in the progression of images the way in which categorical structures grow and shift in relation to one another. CGAMS is currently a separate analytic system; the proposed modification will implement it within the context of RATSALL so that it may deal with categories of any sort, at any level of abstraction.

The final function currently under development is a generalized statistical analyzer. This function is in many respects analogous to the Boolian configuration analyzer described above. The latter function evaluates a Boolian expression under constraints of context. The generalized statistical analyzer will begin with a set of primary values or statistical counts that can be obtained from the text (segment length distributions, incidence counts over various segments, etc.); these values, in turn, may be symbolically represented within an algebraic expression. The analyzer will evaluate the expression and store the resulting value, distribution, or matrix. The result (s) may then be displayed using any of the available and appropriate display functions or

used in another, more general algebraic expression.

A more ambitious set of functions includes a larger corpus analysis system, a syntactic parser, and a general transformational grammar support system. The current version of RATSALL is adequate to handle collections of texts on the order of the corpus for a single author. Plans underway at the University of Chicago and elsewhere indicate the desirability of extending this range. If funded, the Chicago project will eventually make a data base of some 3,500 volumes from seven centuries of French culture available. Highly desirable will be interactive analytic systems capable of interrogating larger and larger collections. As questions of poetics for Marxist and semiotic theories begin to emerge, the development of computer systems capable of supporting examinations of this scope becomes a matter of high priority. The inclusion of a syntactic parser is a straight-forward matter of locating an adequate parser from those currently available and providing it with an interactive query capability to permit disambiguation. The inclusion of a generalized transformational grammar support system will permit the application of specific transformational grammars to specific analyses. Coupled with the corpus management system, this function will be applicable not only to textual segments but to large abstract classes, even those including entire texts as elements. For research utilizing characterizations of cultural context(s) and homologies between complex structures, a generalized transformational capability seems the best solution. This last set of functions is ambitious, but all three are possible using contemporary technologies. Their implementation, however, will require additional time and resources.

Theoretical Implications

Above, I outlined briefly the historical background for contemporary computer critical theory, pointing out the strong early influence of New Criticism and Structuralism; I want to return to several specific implications of that influence in an attempt to show that some of the associated limitations may now be overcome. Susan Wittig in a brief but incisive essay has identified three inherent limitations which she discusses in relation to notions of the text:

> In computer-based literary analysis, three notions of text predominate: first, the notion that the text is a linear entity; second, the idea that the text is a one-time, completed work, firmly confined to its graphic representation, the printed page; and third, is the belief that the text is autonomously independent of any other entity, that it is meaningful in and of itself. All three of these ideas, I will suggest, derive from prevailing linguistic and critical models: structuralist-formalist grammar and New Criticism. And all three of these ideas. . . have placed unfortunate constraints upon our approaches to the study of literature.[9]

Wittig's answers are cast within the context of Wolfgang Iser's phenomenology of reading. From that perspective she suggests a view of the text that includes vertical, synchronic dimensions as well as linear, diachronic structure; a more flexible concept

of text that includes textual revisions and variants; and, most important, a dynamic perspective in which the text merges with other experiences in the act of reading. To what extent can RATSALL meet these challenges? I raise the question not to dispute Wittig's helpful observations; to the contrary, I hope to show that those of us engaged in developing computer systems for humanistic interpretation have anticipated many of these same points and have attempted to design systems that can support the mode of critical examination she advocates.[10]

Growing out of the 60's, Computer Criticism quite naturally began by adopting the earlier textual perspectives of New Criticism and contemporary Structuralism. However, it is not necessarily limited to those perspectives. In addition to the given, presumed physical, text encoded for the computer, RATSALL can currently accomodate two extensions – semiotic representations of cultural categories and semiotic representations of behavioral and phenomenological responses – through the concept of linear category with values. The "text" is presumed to begin with one or more physical representations, but it is assumed to be, potentially, a multifaceted cultural phenomenon. Thus, RATSALL supports a view of the text that transcends physical autonomy and incorporates dynamically an open-ended range of associated factors, so long as those factors can be represented semiotically.

RATSALL supports a metastructural framework for interpretation that is multidimensional, including both paradigmatic as well as syntagmatic axes. The concept of recursive categories permits the construction of vertical strata of categories, each category composed of elements or configurations of elements from lower strata. At any given level of remove from the text, however, there can be numerous category sequences; for example, a third level might contain both thematic configurations, as one category sequence, and syntactic patterns, as another. While the underlying text provides a frame of reference, observations may be as loosely or as tightly tied to actual textual features as appropriate for the analytic intent. Thus, RATSALL assists the interpreter in forming and maintaining synchronic perceptions that, ultimately, encompass the entire text and, when RATSALL is extended, aggregates of texts.

Essential to the entire construct is the human interpreter. RATSALL is not a giant wind-up system that takes a text, a set of control statements, and produces a finished analysis. It is an interactive support system designed to facilitate and manage a dynamic, evolving interpretation. This should not suggest empiricism, for the approach demands a controlling hypothesis as much as any other methodology. Rather, it makes possible and practical a kind of inquiry not possible otherwise. The final perspective must be cast in terms of a phenomenology of interpretation. The system becomes animated, comes into "existence" only as an extension of a human will guided by an interpretive intent. Elsewhere, I have considered the nature of this experience within the context of a Marxist poetics.[11] I can't reproduce that entire discussion here. However, the primary line of argument asserts that a fundamental distinction exists between the experience of reading (or other literary experiences) and the experience of contemplation or interpretation. The moment the reader becomes self-aware that he or she is reading, the experience is no longer primary but mediated; a number of choices and decisions intrude as to purpose, preparation for understanding and responding, adequacy of information available, etc. In effect, the experience

ceases to be a *reading* experience and becomes an *interpretive* experience. Consequently, all commentary on literature or the literary experience is inevitably cast within a phenomenology of interpretation, not a phenomenology of reading. This does not deny the experience of interpretation; rather, it simply forces the recognition that it is a primary experience but of a different sort and in its own right. Within a Marxist framework, the situation becomes more complex as the culturally constituted interpreter must recognize the relativity of his or her own perceptual ideology juxtaposed against alternative ideologies within the culture; Fredric Jameson has recently explored some of the near-mystical implications of this expanding self-awareness.[12] Used as described, RATSALL is a compatible component within a phenomenology of interpretation. It is a medium for injecting information and perceived relation into the interpretive experience. Assumed to be part of the experience are the text(s) and the interpreter's recollections, associations, and other mental phenomena. RATSALL assists in the inter-relation of all of these components and in the management of the components of the evolving understanding. Since the system is dynamic, earlier perceptions can be modified as the perspective warrants.

Conclusion

I am in no better position to predict the future development of literary studies than anyone else. However, I believe that a serious gap has opened between the developing front of literary theory and the trailing body of critical studies informed and guided by that theory. Semiotic, Marxist, and Phenomenological theories are currently at the forefront. I believe systems such as RATSALL can assist in evaluating the viability and utility of these theories. Such systems will have to expand and develop to include the cultural factors now envisioned as informing current studies, but that is possible. The prospect for a genuine Marxist poetics or a poetics for Semiotics is, indeed, exciting. I don't believe either poetics is possible without computers and large, general textual archives. With them, perceptions of a qualitatively different sort may evolve. Wide-spread use will take place, however, only if the systems available are flexible, dynamic, easy to use, and aid in addressing the pressing questions of contemporary literary theory. RATSALL attempts to make a start in those directions.

NOTES

[1]For a discussion of the relation between literary theory – particularly Formalist and Structuralist theories – and computer-assisted analyses, see John B. Smith, "Computer Criticism," *Style*, 12, No. 4 (Fall, 1978), 326-56.

[2]John B. Smith, "RATS: A Middle Level Text Utility System," *Computers and the Humanities*, 6, No. 5 (May, 1972), 277-83.

[3]John B. Smith and Paul W. Shuepp, "Random Accessible Text System for Associative Text Analysis," *SIGLASH Newsletter*, (December, 1974).