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Chapter 7

Response to poetry: Studies of language and structure

David S. Miall

1. Introduction

Responses to a literary work appear to be governed by two main determinants, both arising from textual properties of the work in question. First, a range of specific linguistic and semantic features directs the focus of attention; second, such features form a network of relationships that gives the work an intrinsic structure. At the same time, since readers bring to their reading both personal and culturally-endowed expectations, readers will often differ in the meaning they place on the text as a whole. Putting together both these components, the intrinsic and extrinsic, points to a two-factor model of response: an invariant factor due to the text, and a variant factor due to the reader. The model is testable, and some empirical support for it is now available.

Current theoretical accounts of the literary text, however, are at odds with this model. Fish (1980), for example, asserts that response to texts is determined by the interpretive community of readers, thus literary meaning is a type of sociological construct or convention. Barthes (1977), like other poststructuralist critics, argues that all texts are intertextual, made from other texts. Neither theorist accepts that response to a literary text is based on intrinsic features, partly because such a view has in the past seemed to imply an essential unity to the text. The single authorized meaning bestowed by the author is a Romantic fallacy that recent theorists have justifiably wished to reject. As will be apparent, the model proposed in this chapter does not imply the unity of texts; but it denies that the significance of the text is to be found primarily in Fish's social domain or in Barthes's intertextual realm. It locates the significance of the text in the act of reading itself, in the shifts in consciousness of the individual reader. This view, I would suggest, offers an account of the role of literature which has better ecological validity: it proposes a way of explaining the sense of personal significance which readers attribute to the texts they read, while showing that response is based on objective features of texts that are open to empirical study.

The focus of the present chapter, however, is narrower, confined to studying responses to single poems. I describe two studies that tested the model, then discuss ways that the model might be further developed within a knowledge-based computer system. The studies to be described are only preliminary: I shall end by pointing to the need for further research.

2. Language and defamiliarization

Van Peer's (1986) detailed study of foregrounding represents a major step forward in our understanding of the language of poetry. Foregrounding, however, is the linguistic dimension of a psychological process: readers are more attentive to lines of poetry that contain foregrounding, but behind this lies a complex interaction between the reader's existing knowledge and attitudes and the alternative perspectives suggested by the foregrounded features. Foregrounding matters, in other words, because new knowledge and shifts in feeling evolve at such points. For example, when Blake begins his poem "London" with the line "I wander thro' each charter'd street", the metaphor is defamiliarizing: it indicates a view of the streets as both licensed (by what authority?) and imprisoning; our ordinary view of the streets of London is overturned, replaced by a sense of the streets as agents of some power (as yet unknown). In this way, the linguistic device of metaphor turns something familiar into the unfamiliar or strange.

As a view of poetry, the concept of foregrounding was developed by Mukarovský (1932 [1964]) on the basis of previous work by the Russian Formalist critics. Among these, Shklovsky (1917 [1965]) in particular emphasized the "estranging" effect (*ostraneniye*) of poetic devices. But here again the Formalists (without appearing to be aware of it), were restating a view of poetry that was first formulated in England by such poets as Wordsworth, Coleridge and Shelley. Both Shklovsky and Coleridge, for example, speak of the automatic nature of ordinary perception. We become accustomed to understanding the world about us in standard and familiar ways. One of the primary effects of poetry, therefore, is that of defamiliarization – in Coleridge's phrase, "awakening the mind's attention from the lethargy of custom and directing it to the loveliness and the wonders of the world before us" (Coleridge 1817 [1965]: 169; Coleridge gives the process an idealistic gloss, but this is not essential to the process). Defamiliarizing, therefore, is the psychological component of foregrounding.

If this account of poetry is correct, it follows that we can identify those parts of a poem that show foregrounding and expect that readers will experience defamiliarization at those points. But what kinds of effect are involved in defamiliarizing? And how does a reader generate a meaning for the poem as a whole from the alterations

in meaning or feeling that defamiliarization brings about? These are complex questions, but study involving actual readers raises additional practical difficulties: how does one intervene in the reading process without unduly distorting it, and what data is it feasible to collect?

Given these difficulties, the two studies I will describe had limited objectives: I looked at only one aspect of the defamiliarizing process, but it was one that I expected to play a key role in the effect of defamiliarization. The Romantic theorists who spoke of defamiliarization placed considerable emphasis on feeling. For example, Coleridge notes that the primary impact of Wordsworth's poetry for him was on his feelings, and that the "modifying" power of poetry works by altering the "tone" and "atmosphere" through which customary objects are regarded (Coleridge 1817 [1965]: 48). This comment is supported by another that Coleridge made earlier in one of his notebooks: "Poetry [is] a rationalized dream dealing ... to manifold forms our own feelings, that never perhaps were attached by us consciously to our own personal Selves" (Coleridge 1962; Note 2086; I have examined Coleridge's account of feeling in more detail elsewhere: Miall 1989c). These and similar remarks suggest that the first effect of defamiliarization is on the reader's feelings. But Coleridge's note also suggests that feelings are not just an epiphenomenon of response, but play a role in constructing the meaning of the poem as a whole. The note goes on to say: "O there are truths below the surface in the subject of sympathy, & how we become that which we understandly [sic] behold & hear, having, how much God perhaps only knows, created part even of the form."

In current theory, whether psychological or literary, feelings are not generally assigned a constructive role. Accounts of emotion most commonly describe it as an interruption: only when normal cognitive functioning is derailed for some reason, are arousal and a state of emotion said to ensue (for instance Mandler 1984; Oatley – Johnson-Laird 1987). No doubt this is true at times, but there is also reason to believe that at other times emotion may precede and then direct cognitive functioning. I have suggested (Miall 1989b) that emotion has three properties that enable it to perform in this manner:

1. Emotion is self-referential: an emotion embodies information about some central aspect of the self concept, or a current concern of the self, to use Klinger's term (Klinger 1978a: 249; see also Klinger 1978b).
2. Emotion enables cross-domain linking: we can have similar feelings about objects or events that are in different cognitive domains. The feeling then serves to relate domains that would normally remain separate (Bruner 1966: 12–13).
3. Emotion is anticipatory: in a situation of cognitive uncertainty, the outcome of a given process is represented as a feeling, which then guides cognitive processing (Spiro 1982).

Some evidence for each of these functions of emotion has been obtained in previous studies, mainly in relation to readers' responses to narrative (Miall 1989a, 1989b). In the case of poetry, it can be argued that emotion is also the key to a range of constructive processes: these enable the reader to go beyond the immediate impact of the foregrounded linguistic features toward an understanding of the poem as a whole. In the two studies I will now report, however, the aim was a simpler one: I was asking whether emotion does indeed form a primary component of defamiliarization. Readers were tested to see if foregrounding correlated with emotional response.¹ In the first study readers were presented with a poem; in the second the study focused on emotional responses to metaphors, similes, and literal statements.

2.1. Study 1: response to a poem

The study was carried out with students studying English literature as part of the first year of a humanities degree. The poem chosen was one of those analyzed by Van Peer (1986), Roethke's "Dolour", as I wanted to take advantage of Van Peer's careful work in establishing which lines of the poem contain foregrounding. Van Peer provides both a detailed analysis of the linguistic and semantic features of the poem, and empirical data on readers' responses which show important correlations between foregrounding and readers' ratings for memorability, importance and other criteria. For example, Van Peer's analysis showed the first line of the poem, "I have known the inexorable sadness of pencils", to contain a range of foregrounded features such as alliteration and metaphor; readers gave this line a high rating for importance. On the other hand, line 12, "Lonely reception room, lavatory, switch-board", which has almost no foregrounding, received a low rating for importance.

As a way of verifying the data of Van Peer, I asked sixteen students to rank order any ten phrases in the poem for importance. The mean rank orders I obtained for the lines of the poem in this way showed a high correlation with the rank order for importance reported by Van Peer (p. 209), $r = .824$, $p < .01$, showing that the effect of foregrounding in the poem is robust across widely differing groups of readers. The mean rank order I obtained for nine of the thirteen lines of the poem provided the data for the next part of the study.

Here I prepared a response sheet in which thirteen nouns or adjective-noun phrases were extracted, one from each line of the poem, and listed on a check sheet. Ten students unfamiliar with the poem were asked to recall an experience they had had which could be associated with each of the words, and to jot down a few phrases about it on the sheet. They then rated each of the experiences on six scales using a six-point scale. The rating criteria were designed to test potential candidates for the defamiliarization process. The six scales were:

surprising – expected
emotional – non-emotional
insignificant – significant
passive – active
pleasant – unpleasant
complex – simple

For example, if a particular experience was "very pleasant", it was rated 1; if it was "very unpleasant", it was rated 6. After the students had completed all the ratings, they were given a copy of the Roethke poem. A normal seminar session followed, lasting over an hour, in which students studied the poem in groups, concluding with a whole class discussion of the poem. The students were then given a second response sheet in which they rated their experiences a second time.

In examining the ratings, I was looking to see to what extent the encounter with the poem led to shifts in students' ratings of their experiences. The first stimulus word, "pencils" for example, was associated with a personal memory by each student with no difficulty. In the poem, however, the word occurs as part of the metaphor, "the inexorable sadness of pencils". It was predicted that this unusual context for the concept "pencil" would reflect back on the original memory of at least some of the readers, and create a new perspective on it. Their associations for "pencils" would be defamiliarized to some degree. However, the question remains whether the defamiliarizing effect lies chiefly in surprise, in an increase in complexity, or in one or more of the other criteria listed above.

The shift in each reader's ratings was calculated, and the mean overall shift for all ten readers computed in two ways. First, the shift was considered regardless of its direction, and a mean figure was obtained for each of the nine key phrases on each of the six rating scales. The mean ratings were then correlated with the mean ranks of the lines for foregrounding. This showed (as predicted by the hypothesis) a significant correlation between ratings for emotion and foregrounding, Spearman's $r = -.8$, $p < .01$. The only other set of mean ratings to reach significance was that for complex – simple, $r = -.63$, $p < .05$. Thus the main impact of the foregrounding in the poem was to change the emotional significance of the experiences: the more foregrounding contained in a given line the more the experience associated with a word in that line changed emotionally following study of the poem.

Second, I computed the direction of the shift: did readers report, for example, that their experiences now seemed more complex or seemed less pleasant as a result of reading the poem? The results of this analysis showed that the only consistent directional shift was that for emotion: mean ratings for emotion correlated with foregrounding at a significant level: $r = .66$, $p < .05$. In other words, the more

foregrounding in a line, the greater the degree of emotion now attributed to the associated experience. None of the other mean ratings reached significance.

If it is assumed that reading the poem, having first thought about ordinary contexts for several key words contained in the poem, was a defamiliarizing experience, then it can be concluded that an increase in felt emotion is a salient feature of defamiliarization. None of the other candidate features (surprise, significance, passive – active, pleasantness, or complexity) showed any consistent directional relationship with foregrounding. If this finding is confirmed by other studies, using other candidate criteria and other poems, it will strengthen the case for viewing emotion as a primary agent in the process of understanding poetry.

2.2. *Study 2: response to metaphors and similes*

One of the most important and most studied types of foregrounding is figurative diction, in particular metaphors and similes. From the time of Aristotle the highest form of poetic language has been considered to be metaphor; metaphor has been analyzed and celebrated in innumerable studies by students of literature, philosophy, linguistics and psychology. Despite this extensive study, the process through which metaphors are comprehended is still poorly understood (Ortony 1979, includes a number of papers on this topic). But it is clear that metaphors form one of the more powerful defamiliarizing components of poetry. Hence a study to test if emotion plays a role in response to metaphors might be expected to cast some light on the defamiliarization process. This was attempted in the study 1 will now describe.

Metaphors and similes also offer a particular advantage for the study of defamiliarization. Other features of poetic language that participate in foregrounding, such as assonance or ellipsis, do so by contrast with ordinary language: the tension they create is by implicit reference to a standard lying outside the literary text. By contrast, similes and many metaphors present terms to the reader which create the defamiliarizing tension intrinsically. For example, in the first verse of the Blake poem "London" mentioned earlier, repetition of the word "mark" and alliteration of "m" and "w" occur: "And mark in every face I meet/Marks of weakness, marks of woe." But these aspects are foregrounded because they violate the norms of ordinary language, where such semantic shifts and alliteration would not be expected. The metaphor in the first line, however, "each charter'd street" contains within itself a violation of a norm, "charter'd" and "streets" constituting in Beardsley's term an indirect self-contradiction (Beardsley 1958: 141). To be precise, the normal meaning of "streets", which enters the metaphor, is disrupted by the connotations of "charter'd". This property of metaphor gives an advantage to studies of the defamiliarizing effect, since by comparison with the "norm" of ordinary language

(a slippery notion), we can ask more precisely about both the normal and the metaphoric meaning of the subject term (here, "streets"). This was the purpose of the present study.

Like the previous study, the organizing hypothesis concerned the role of emotion. It was postulated that reader's emotional response to common words is disrupted by metaphor, and that metaphor in this respect is more disruptive than simile, which in turn will be found more disruptive than syntactically identical literal phrases. This view relates to the constructive role that emotion was assumed to play in comprehension. Disrupting the normal cognitive processing of a concept by using a metaphor obliges the hearer to fall back on the emotional implications of the figure. In particular, the cross-domain work of emotion enables novel meanings for the subject concept to be discovered, guided by the emotional tone of the modifier (in Blake's metaphor, "streets" is the subject, "charter'd" is the modifier). The hearer must find or construct a situation for the subject which matches the modifier in emotional valence, a search which is initiated by the emotional impact of the modifier (this account is developed in more detail in Miall 1987). The process is asymmetric: while the subject term, as the target of the metaphor, will be shifted emotionally, the modifier can be expected to retain its normal tone. In similes a less radical version of the same process can be expected: whereas a metaphor (for example, "the clock is like a tyrant") imposes a new identity on the subject, a simile ("the clock is like a tyrant") allows the original identity of the subject to remain, while asking the hearer to locate aspects that the two terms have in common. Thus in a simile the emotional valency of the subject will shift less than in an equivalent metaphor.

To examine the role of emotion, sets of phrases were constructed that allowed direct comparisons between metaphors and similes, and syntactically equivalent literal statements ("literals"). The phrases were all of the noun-is-noun type, such as "the dream is a window" (metaphor), or "the man is a thief" (literal). The phrase lists were matched for imagery potential, since it was felt that imagery was likely to interact with emotional judgements being made by subjects; nouns were balanced for strength of imagery across lists by referring to the norms in Paivio, Yuille, and Madigan (1968).

Forty students participated in the study as part of an educational psychology course. The subjects were run in groups of between eight and fourteen. Each subject received thirty-two phrases, of which half were figurative and half were literal. Half of the subjects (twenty students) received the figurative phrases as metaphors, the other half received them as similes. In addition all subjects received four buffer phrases at the beginning and end of the list, which were discounted for the purpose of analysis. Prior to receiving the phrase lists, however, all subjects received the nouns separately as single words (a total of 64 nouns, plus eight buffer nouns). The

noun and phrase lists were delivered to subjects by tape recorder, the nouns at intervals of fifteen seconds, the phrases at intervals of twenty seconds.

On hearing each noun, subjects were asked to recall an experience related to the noun, either an experience of their own or that of a friend. They then rated the experience on three scales: for importance (on a scale from 1 to 7); for negative or positive feeling (on a scale from -3 to +3); and for uncertainty or certainty regarding what the experience meant to them (on a scale from -3 to +3). Having heard and responded to the nouns separately, they were then given the phrases, and asked to make the same response: to think of an experience, and rate it on the same three scales. It was explained that at this stage some of the experiences that would occur to them would be the same as those in the first stage, but that this was acceptable.

The purpose of the study, it will be recalled, was to investigate shifts in emotional response. Thus the ratings for emotion were analyzed in the following way: the ratings for the single nouns were compared with the ratings for the figurative or literal phrases that contained the same nouns; this was done by correlating the ratings separately for each subject. Thus the data of each subject provided two correlations, one for the subject term in the phrase, the other for the modifier. To allow comparisons between subjects, the correlations were squared, then the correlation data from each condition (subject v. modifier; metaphor v. simile; figurative v. literal) were examined by analysis of variance.

The main predictions were confirmed. There was a large main effect for subject and modifier: across all phrases, both literal and figurative, the subject nouns showed markedly lower correlations between the two sets of ratings for emotion than the modifier nouns, $F(1, 36) = 23.3, p < .001$. In other words the emotional meaning of the subject terms, as expected, was shifted more as a result of their appearance in phrase form (the mean correlations are subject nouns, $r = .43$; modifier nouns, $r = .56$). This supports the view that the subject term is the focus of the defamiliarizing effect. However, this result conflates figurative and literal phrases. More interesting was the finding that the shift in emotional meaning was significantly more in the case of figurative compared with literal phrases (this result includes both subject and modifier terms): $F(1, 36) = 85.3, p < .001$ (means: figures = .39; literals = .59). Looking more closely at the differences between subject and modifier terms in the figurative phrases alone, using a pre-planned t test, it was also found, as expected, that subject terms (mean: .36) showed a lower correlation than modifier terms (mean: .41), $t(36) = 2, p < .05$. This again shows the defamiliarizing effect at work on the subject of the metaphor or simile.

Comparing subject terms alone, using pre-planned t tests, there was a clear gradient in emotional shift, with metaphors showing the maximum emotional impact. The difference between metaphor subjects and simile subjects (means .33 and .39 respectively) was marginally significant, $t(36) = 1.4, p < .1$, while the

difference between figurative subjects (metaphor and simile combined) and literal subjects (means .36 and .49 respectively) was highly significant, $t(36) = 5.17, p < .001$. In summary, the lower correlations were found for subject terms, and the lowest correlation of all occurred with the subject nouns in metaphors. Thus the view that a primary feature of defamiliarization lies in its emotional impact, with metaphor providing the most radical example, is borne out by this study.

Both this and the previous study asked the students who participated to recall experiences (generally of their own) as a part of the experiment, and to rate the experiences for emotional intensity or valency. Both studies, especially the second, represent impoverished conditions for such responses some distance from the usual conditions under which literary texts are read. Yet the convergence of both studies on the same phenomenon, showing the emotional component of defamiliarization, suggests that the studies illuminate a genuine part of literary response. Both argue for the view, presented earlier, that the psychological dimension of foregrounding is to be found primarily in the work of emotion.

3. Text structure

To experience emotion in response to the foregrounded features of a poem appears to be the first step towards understanding: it is a crucial first step, however, since it engages the prior understanding and personal memory of the reader with the text, and through the constructive role of emotion (its self-referential, cross-domain and anticipatory powers) provides an instrument through which a view of the poem as a whole will be generated. Beyond the unsettling effects of defamiliarization comes the constructive effort of the reader to relate different parts of the poem, to build a coherent picture of the text's meaning.

Very few studies have been made of the process of response to poetry while that response is taking place: exemplary studies are provided by Kingen (1983,) and the authors in Benton et al. (1988), notably John Teasey; I have also reported two small-scale studies (Miall 1986, 1990). Such studies tend to show that readers concentrate at first on the detail of particular phrases and words, influenced (as might be expected) by the more striking (foregrounded) features of the text; they begin to formulate concepts to account for their understanding of such features as they read and reread the poem, then gradually generate superordinate concepts that include more of the detail of the poem. Finally a complex high level concept may emerge, adequate to all the main features of the poem. Such a pathway is not, of course, universal: Patrick Dias has described four main strategies shown by the student readers he has studied, of which the fourth, "problem-solving", is most similar to the pathway I am describing; the other three strategies are less satisfactory in

various ways, since they fall short of responding fully to the intrinsic structure of the poem (Dias – Hayhoe 1988). According to Dias, problem-solvers postpone settling on a meaning: they set hypotheses and test them against the details of the text; they look for analogies in their own experience and “search actively through the text for cues that might point to what is happening”; they employ “feelings and intuitions to direct their reading” (p. 56).

Tracing the pathways taken by readers in this respect is clearly hard to do (the researchers I have mentioned use talk-aloud or free-writing methods), and the risk that the research method will seriously distort the reading process itself is always present. While no method currently conceivable can bypass this problem, one promising alternative will be to employ a computer to help monitor and analyze literary response. The complexity of the response process, however, will require the use of a different class of algorithm from the statistical methods used in the studies reported above.

If we assume that all readers are likely to respond to at least some of the foregrounded phrases of a poem, as the previous studies suggested, then we can immediately begin to think in terms of the probability that any given phrase will receive readers’ attention. The way in which a reader then begins to interpret that phrase will be shown in part by the way that phrase is related to other phrases, and by what the reader is able to say about the meaning of that relationship. Within this pattern of features and relationships the meaning of the poem for that reader will begin to take shape. That the readers in our studies have been reliably sensitive to foregrounding suggests that, while the process of response may be personal, it is not idiosyncratic: there is a consistency across readers’ responses which it should be possible to discover. To quote Coleridge once again, poetry has “a logic of its own as severe as that of science; and more difficult, because more subtle, more complex, and dependent on more and more fugitive causes”. (Coleridge, 1817 [1965]: 3). It is because this alternative logic that readers follow cannot easily be studied by the statistical methods conventionally used for nomothetic research, that we must turn to the new logics developed by artificial intelligence, able to handle probability, incomplete data, and multiple relationships.²

3.1. *Applying knowledge-based systems to readings of poetry*

Knowledge-based (or expert) systems have been devised in order to capture some significant domain of expert knowledge. The methods for solving a problem used by an expert, which may involve intuitions and hunches as often as explicit knowledge, are analyzed in order to embody the expert’s procedures for problem solving in a set of rules (the literature on knowledge elicitation is now extensive: but see, for example, Agnew – Brown – Lynch 1986). Normally a given outcome will

govern which rules are deployed: a doctor who deals with infectious diseases, for instance, will be presented with a set of symptoms by a patient; his task is to run certain tests and arrive at a diagnosis. MYCIN was one of the first expert systems to be developed that was able to handle such medical problems effectively. Rule-based systems of this kind most usually operate by backward chaining: that is, given a limited number of possible outcomes, the symptoms which suggest each outcome (some will be ambiguous) can be checked against the data actually present: Is condition A or B present? Do you suspect condition C, if so with what degree of certainty? In this way symptoms are checked off, the various possible pathways are pruned, until a single outcome is reached.

To some extent this model will be appropriate for the domain of response to poetry. If we view the foregrounded phrases that a reader notices as “symptoms”, we can see which phrases a given reader notices, what relationships are made between phrases, and what descriptions are given by the reader. Assuming a particular poem has several distinctive interpretations or “readings”, it should be possible to infer at least some of the rules underlying the process of a given reading. The ideal system would be capable of dealing with all the details of the reading process: verbal responses of all kinds together with information about the poem (which phrases and sections of the poem were being considered by the reader).

There is no expert system at the moment that is capable of handling all the complexities of reader-response data, but it is possible to use the facilities of existing systems to map at least some of the data. This can be illustrated with examples from a study of my own. I show two ways of examining data from readers, using some of the basic algorithms of knowledge-based systems. The goal of such a study is to infer the rules that structure response to a poem as a whole, thus the algorithms are employed to look for systematic relationships between the phrases that readers select for attention, and the comments that they make as they work towards an understanding of the poem.

The data set to be described was obtained from a group of nine student readers. The poem they were asked to read was “The Unknown Bird” by Edward Thomas (see Appendix A for the text of the poem). The students were given a copy of the poem with numbered phrases and asked to focus on relating phrases in the poem. They noted down the numbers of the phrases that they wished to relate, and then wrote a brief comment on the nature of the relationship. For example, one reader related phrases 8 and 19 and noted: “bodiless = spiritual quality; grammatical devices, ‘far-off’, emphasize this.” Each reader noted several phrase groups in this way, ranging from four to eleven groups. Forty-five groups were provided in all.

For the first analysis I studied the comments made by readers about their phrase groups. I was able to classify them into eight categories according to the type of comment. For example, the comment quoted above was one of five that emphasised

the mystery and other-worldliness of the bird's call. Other categories concerned the distance of the bird, the situation of the poet, the poet's various emotional responses, and the issue of time in the poem. Each set of phrases thus gave rise to one of eight types of interpretive comment; from the reader's point of view, these comments can be seen as a way station on the route to understanding the poem as a whole.

The phrase groupings together with the classification for each group were then placed in a table and analyzed with the ID3 algorithm.³ This algorithm offers one of several inductive methods that can be used to obtain rules from data (Forsyth 1984, offers a brief review). ID3, developed by Quinlan (1984), is available in several expert system shells (such as Expert-Ease, or VP-Expert), since it is able to take a set of examples and quickly generate the if-then rules that form the basis of such systems. For the present study I made use of the ID3 algorithm provided with Knowledge Garden™ software (Thompson - Thompson 1987): this generates a decision tree as well as a set of rules. The decision tree, which is a graphical representation of the rules, enables the key phrases that participate in forming the rules to be immediately identified. A small part of the decision tree is shown in Figure 1 (it is redrafted from the form in which the Knowledge Garden software writes it). To the basic decision tree I have added example comments from readers who discussed the phrases related in each leaf of the tree. For example, the first line of the tree shows that if phrases 9, 11 and 1 are related, the comments can be classified as concerned with "distance" (this can be stated as a rule: IF 9, AND 11, AND 1, THEN comment = distance). Statement 10 in the Figure is a typical comment in this class.

Looking at the decision tree as a whole, phrase 9 appears to be the most important phrase in the data set. Other key phrases in the tree are 16, 20 and 30. The phrases are key ones because in relationship with various other phrases they are associated with the widest range of different comments. Phrase 9, it will be noted, contains a striking simile, "As if a cock crowed past the edge of the world." A highly foregrounded phrase, in the view developed earlier in this chapter, is also likely to be a highly ambivalent phrase. Readers will show the most uncertainty about how to understand such a phrase, thus a wider range of alternative (perhaps incompatible) interpretations will be provided in response to such phrases in protocols. This is clearly the case in the present data set (for example, another comment not quoted above, refers to the cock crow to Peter's betrayal of Christ). The readers' attempt to develop their ideas, in part, by relating phrase 9 to other phrases in the poem. These phrases thus act as seed-points for the generation of interpretations. The decision tree shows the phrases forming the nodes of multiple relationships across the poem. Thus readers tend to focus on a phrase such as 9 because it offers a greater potential for forming a relationship with a greater number of other phrases (in fact phrase 9 occurs in twelve of the forty-five phrase groups - more frequently than any of the other phrases).

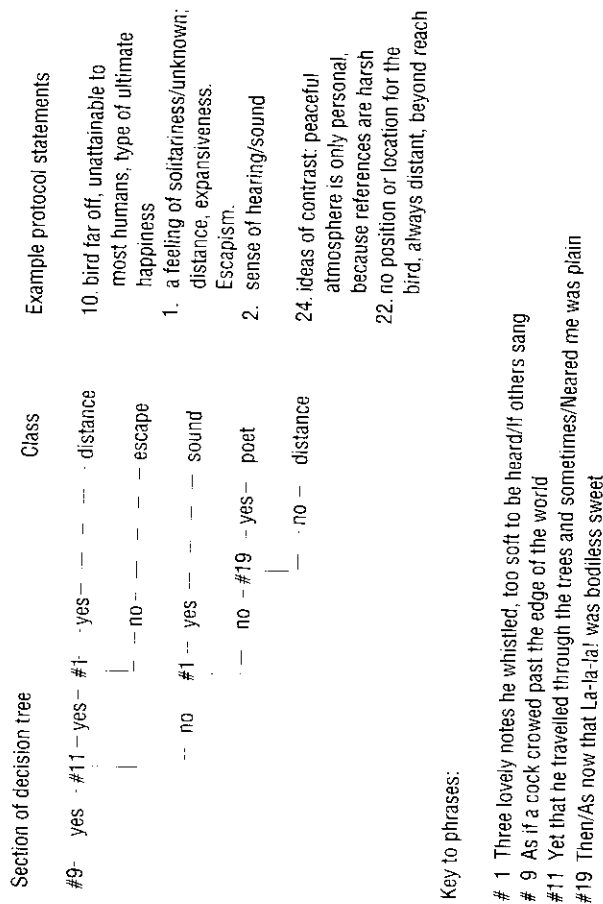


Figure 1. Part of ID3 decision tree for phrases from "The Unknown Bird", based on classes of protocol statements

4. Discussion

A data set of the present kind also offers a second way of looking for the rules underlying readers' responses. If phrases are systematically related to other phrases to arrive at views of the poem as a whole, then it is possible to compute the probability that any given pair of phrases will be related. In other words, if phrase 9 is being studied by a reader, what is the probability that the reader will go on to relate phrase 11 to phrase 9? Other probabilities can also be calculated: for example, based on the frequency with which particular ideas are mentioned, probabilities can be estimated for mentioning a given idea in relation to a particular phrase. I used Bayes's theorem to derive such probabilities from the present data set.

The way in which Bayes's formula enables probabilities to be computed can readily be illustrated. A number of readers were interested in the isolation that the poet describes. The overall probability of mentioning the word "isolation" in any given comment was .13 (it was used in six out of forty-five descriptions). Then, given that the word was mentioned, the probability that it would be used to describe phrase 16 is .50. This is based on the fact that, of eight comments referring to phrase 16, four used the word "isolation". The overall probability of phrase 16

being mentioned was .18. From this it is possible to compute the probability of using the word "isolation", given that a reader is responding to phrase 16, according to Bayes's formula ($Pr = \text{probability, } Wd = \text{word, } Ph = \text{phrase}$):

$$Pr(Wd:Ph) = Pr(Wd) \times \frac{Pr(Ph:Wd)}{Pr(Ph)} = .13 \times \frac{.50}{.18} = .36$$

In other words, next time we observe a reader looking at phrase 16, the analysis tells us that there is a .36 probability that this reader will use the word "isolation" in interpreting the phrase. Additional probabilities are computed in the same way. If a reader is studying phrase 16, for example, we will know what the probability is of phrase 6 or any other phrase being mentioned in relation to phrase 16. Chains of probabilities can be traced in this way across readers' data, so that the analysis provides a predictive tool for studying response patterns as they develop.

Taking all the phrases in the poem, the possibilities of mentioning each phrase in relation to every other phrase can be computed. This reveals that certain pathways through the poem are much more likely than others. A small section of the map of probable pathways is shown in Figure 2 (a diagram of all the phrases in the poem would unfortunately be too confusing). This shows, for example, that if a reader is examining phrase 9, relationships with at least six other phrases are probable (the Bayesian probabilities range from .22 for phrase 1 to .78 for phrase 8). The absence of probabilities between pairs of phrases also serves to delineate clusters of phrases

that give rise to particular classes of interpretive comment. These are indicated by the boxes that enclose certain phrase groups. Examining the groups in the light of the ID3 analysis described above, it is possible to identify three partly overlapping groups in the phrases shown in Figure 2. Thus readers who relate some or all of phrases 1, 8, 9, 11, 12, and 30, tend to comment on the distancing implications of the bird and the poet's apparent desire to escape from the mundane world. The diagram also serves to indicate those phrases that are foreground and those that are background: phrase 9, once again, seems to act as a context for understanding a number of other phrases in the poem. Phrase 11, by contrast, which is literal and lacking in foregrounded features, depends mainly on other phrases for its incorporation in the network of probability relationships. In itself it predicts only a relationship with phrase 30.

5. Conclusion

The data and methods of analysis I have presented here remain at a somewhat elementary level. At the same time, they serve to indicate avenues for further development, using the tools of artificial intelligence. It is quite possible that other logics will prove to be more suitable to reader-response studies than ID3 or the simple Bayesian model I have illustrated here. The purpose of my discussion has been to outline some of the principles involved in developing a knowledge-based system for handling response to poetry, rather than to offer a prototype of such a system. An adequate working program will require much further research.

Appendix

"The Unknown Bird", Edward Thomas

Phrases used in study

- Three lovely notes he whistled, too soft to be heard
 If others sang; but others never sang
 In the great beech-wood all that May and June.
 No one saw him: I alone could hear him
 Though many listened. Was it but four years
 Ago? or five? He never came again.
 Oftenest when I heard him I was alone.
 Nor could I ever make another hear.
 La-la-la! he called seeming far-off –
 As if a cock crowed past the edge of the world.

(with initial words)

1. Three lovely
2. but others
3. No one
4. Was it
5. He never
6. Oftenest
7. Nor could
8. La-la-la!
9. As if a

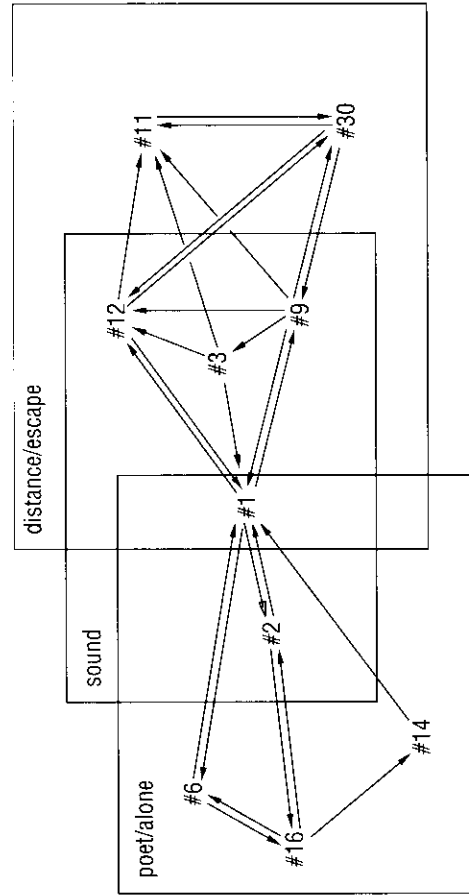


Figure 2. Network of selected Bayesian probability relationships and phrase groupings derived from protocol statements for "The Unknown Bird."

Phrases used in study

As if the bird or I were in a dream.
 Yet that he travelled through the trees and sometimes
 Neared me, was plain, though somehow distant still
 He sounded. All the proof is – I told men
 What I had heard.

I never knew a voice,
 Man, beast, or bird, better than this. I told
 The naturalists; but neither had they heard
 Anything like the notes that did so haunt me,
 I had them clear by heart and have them still.
 Four years, or five, have made no difference. Then
 As now that La-la-la! was bodiless sweet:
 Sad more than joyful it was, if I must say
 That it was one or the other, but if sad
 'Twas sad only with joy too, too far off
 For me to taste it. But I cannot tell
 If truly never anything but fair
 The days were when he sang, as now they seem
 This surely I know, that I who listened then
 Happy sometimes, sometimes suffering
 A heavy body and a heavy heart,
 Now straightway, if I think of it, become
 Light as that bird wandering beyond my shore.

(with initial words)

10. As if the
11. Yet that
12. though somehow
13. All the proof
14. I never
15. I told
16. but neither
17. I had them
18. Four years
19. As now
20. Sad more 21. if I
22. but if sad
23. too far
24. But I
25. The days
26. This surely 27. that I
28. sometimes suffering
29. Now
30. become

Notes

1. For a study complementary to this, see the research by Anderson – McMaster reported in this volume, which shows that the local affective tone of a text, as measured by the semantic differential, correlates with foregrounding.
2. Note that this approach is quite different from the logics currently used by artificial intelligence workers to investigate narrative, based on story grammars. The limitations of the story grammar approach for research on literary texts are discussed by Ide – Véronis (1989); Colomb – Turner (1989); and Miall (1989b).
3. The ID3 algorithm is used to derive rules from a data set cast in the form of a table (such as a spreadsheet), where each row is a case with a specific outcome and the columns are attributes. ID3 looks for the attribute that will maximally predict the outcomes: it forms a rule, then looks for the next attribute, and so on iteratively. Each rule that is generated forms one or more branches in the decision tree.

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Part II

The production of meaning