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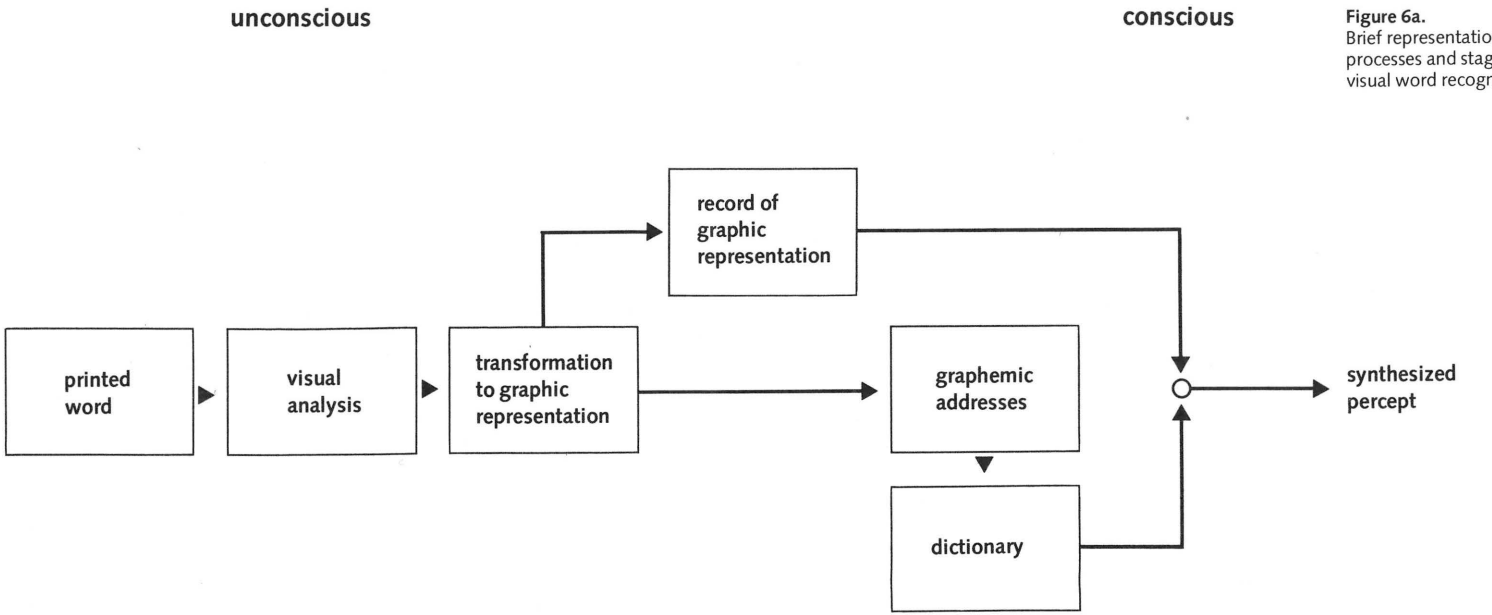

Figure 6a.
Brief representation of processes and stages in visual word recognition.

In the results we are not interested in the absolute reaction times but in the association effect. The time to respond "yes" to the second letter string when it is associated with the first is subtracted from the time taken when it is not associated with the first word. The mean difference when there was no mask was 62 milliseconds; when there was a pattern mask, 56 msec. Both of these effects are statistically significant, and do not significantly differ from each other in magnitude.

It should be noted that no subject realised that there was anything before the mask during the experimental session. Of course, this is a much more satisfactory experiment than the first, since one is not asking directly about the masked stimulus, only about its effect on something else, and sure enough, all subjects now showed the effect.

The important question is what do these results mean? At the simplest level it means that the analysis of the masked words must have reached at least a stage at which words are associated with other words in non-sensory ways (i.e., not in shape or sound). It probably means that the analysis has reached the stage at which the meaning is represented. Whatever is the specific process, the first word could not affect the second word differentially according to meaning unless that level of analysis had been reached. But it also means that once we have learnt to read, the meanings of individual words, at least, can be reached without the involvement of consciousness. Once we have learnt to read, analysis of words appears to be automatic.

In order to think about these experiments it is useful to refer to the diagram in Figure 6. (Of course, Figure 6(a) represents only one part of the system. Understanding of **spoken** language is normally developmentally prior to reading and some attempt is made to represent one view of rather more of the system in Figure 6(b), though this too is obviously still an oversimplification.)

When we read, somehow we have to get from the printed word to its meaning. Obviously the first stage must be to have a representation in terms of the pattern of light reaching the eye. This must then be recoded as, or "seen as" the symbols of writing – that is, strokes making up alphabetic characters. The patterns of this graphic, or graphemic, representation (words and letter combinations) could well serve as one type of "address" by which to find the meaning(s). Let us call the connection between words and their meanings a dictionary.

General Information

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Some experiments are summarized which employ the procedure of briefly exposing a word followed by a masking pattern. These studies show that under appropriate conditions, while people are unable to tell that anything has been shown before the mask, the meaning of the word has been analyzed and influences their behaviour. There is thus a distinction between (a) the availability of a word to consciousness or as a vocal response and (b) its having been read in the sense of lexical and semantic identification. In addition to its theoretical and methodological importance, this suggests re-evaluation of methods of assessing reading. Further, the techniques have been useful in investigating acquired dyslexia and understanding the cerebral organization of reading and language production.

This article is the text of a paper given to the British Association for the Advancement of Science in September 1976. More detailed presentation of the techniques, results, and theoretical discussion can be found in Marcel (1978a, b) and Marcel and Patterson (1978).

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Unconscious Reading: Experiments on People Who Do Not Know That They Are Reading

Tony Marcel

The work reported in this paper is theoretically, methodologically, and practically relevant for reading in particular and perception in general. It is relevant theoretically because it forces a distinction between conscious and unconscious processes. It is relevant methodologically because it suggests the importance of investigating perceptual processes in an indirect way. It is relevant practically because assessment of reading ability often relies on oral performance and this may turn out not always to reflect what we mean by "reading."

The phenomenon which I have examined was discovered by accident and suggests that psychologists have been misinterpreting a certain specialised experimental technique. The technique is called "masking," specifically "pattern masking." One may expose briefly a visual pattern — such as some letters or a word as in Figure 1 — and then ask a person to tell you what he or she has seen. If it is shown fairly briefly people may say, "Well, I saw U, Z, and I think R. I know there were more things there, but I can't seem to tell you what they were."

If we follow a stimulus like this with a second meaningless jumble of lines, as in Figure 2, then the shorter the time between the onset of the first stimulus and the onset of the second stimulus, the less the observer can tell you of what had been shown in the first display. The second stimulus is called a pattern mask because it seems to interfere with perception of the target stimulus by virtue of the pattern on it. This term is also used to differentiate it from another type of visual interference called brightness masking. This is different in several ways and does not yield the effects reported here for pattern masking. The effectiveness of a pattern mask in interfering with perception of the preceding stimulus is increased if the thickness and shape of the lines are similar to those in the initial stimulus. Thus the best mask for letters is letters or cut-up letters of the same typeface. The phenomenon of masking has been widely used and interpreted by psychologists as an interference with the process of visual analysis that leads to identification (Sperling, 1976; Turvey, 1973).

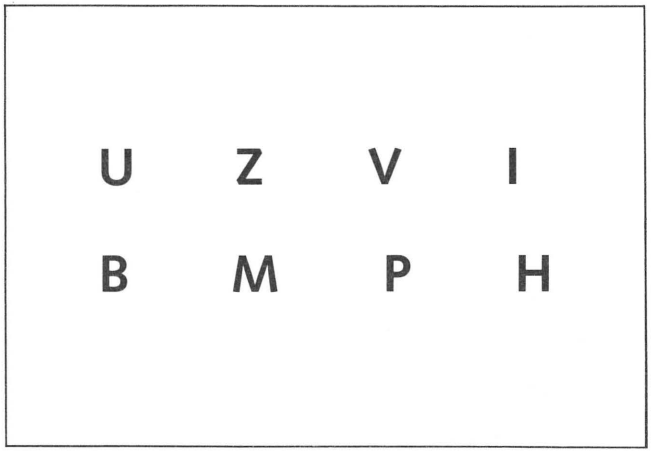


Figure 1.
Example of a test display of letters.

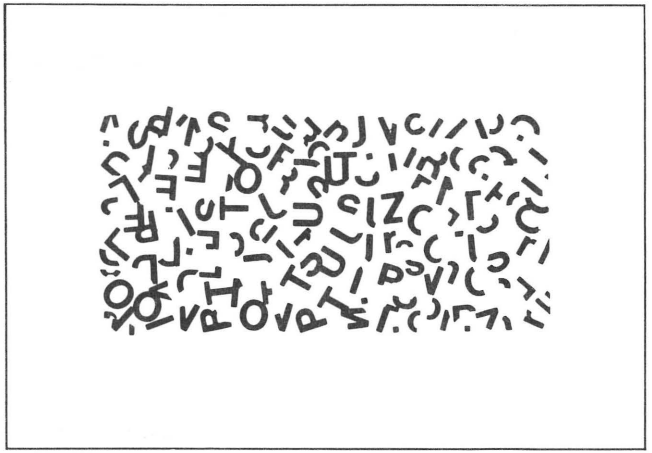


Figure 2.
Example of a pattern whose strokes and structure would be effective in backward masking of the display in Figure 1.

This and several other theoretical assumptions were called into question by some odd data. I was carrying out an experiment where I was briefly exposing single words to children and adults who were supposed to tell me what they could see — if not words, then letters — and indeed people are usually inclined to say only something which does not violate their visual impressions. However, several responses seemed to bear no visual or sound-like relation to the stimuli, but did show a striking relationship in meaning. For example the response "king" was made to the stimulus **queen,** and "yellow" to the stimulus **green.** This was reminiscent of two other phenomena. One is the responses of this type often given by certain aphasic patients when asked to read single words (Marshall and Newcombe, 1973). The other was some work on the thorny issue of subliminal perception. In both cases the point is that people seem to have understood the meaning of a stimulus word without being able to tell you exactly what it was. I will not dwell on the details of the particular research on subliminal perception, but it struck me as rather poorly controlled. For this reason I decided to try to redo the experiments in a more controlled way. What I did was the following.

I exposed either a single word or a blank card followed by a pattern mask. After each trial the subject had to make one of three decisions: (a) was there anything before the mask or not? (b) given two words, which of them was more similar visually to what had been presented? (c) given two words, which of them was more similar in meaning to what had been presented? The exposure duration of the field before the mask was kept the same for a number of trials and then lowered. So gradually the pre-mask duration became extremely brief.

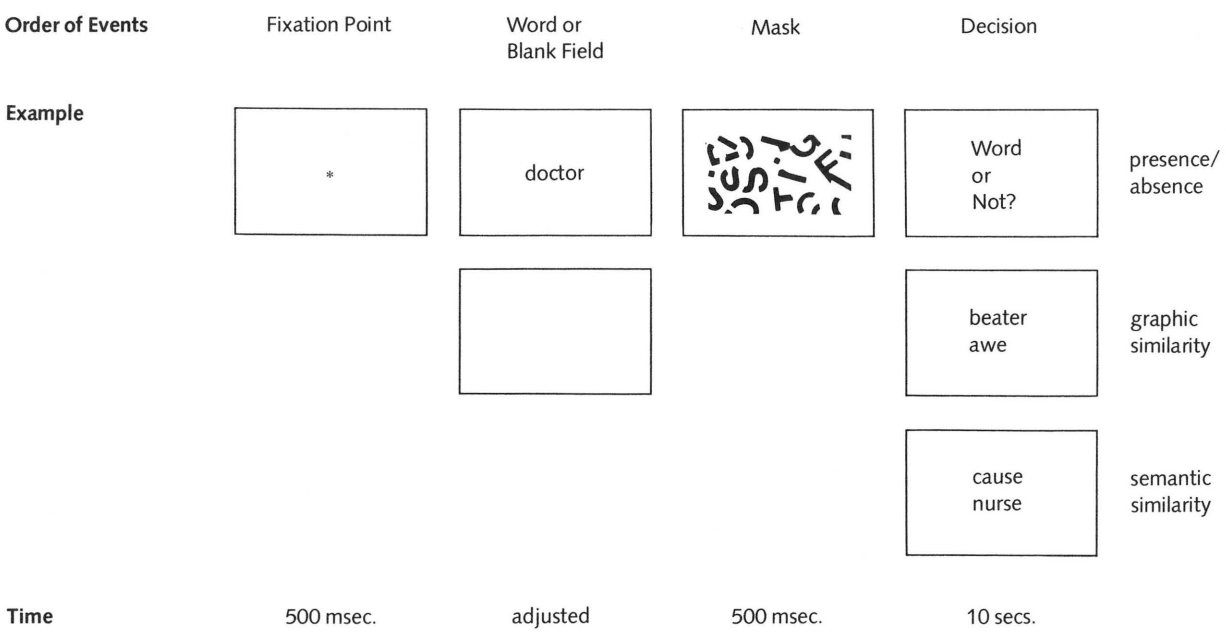


Figure 3.
Example of sequence of events on a trial to assess effect of stimulus-mask asynchrony on presence, graphic, and semantic decisions.

Examples of the sequence of events on each trial are shown in Figure 3. Then, for each exposure duration, I looked at the data to see to what extent each type of decision was correct or whether they were random guesses, predictable only by chance. Some subjects refused to go on when they could no longer see anything. Some others said afterwards that when they could no longer decide whether they had seen anything, they had thought the whole thing silly but had continued answering the other questions (about appearance and meaning) by inventing a strategy, like thinking of a word or a face and judging on the basis of that. Obviously the experiment was rather odd. It is bizarre to ask someone to make a judgement about something of whose presence he is not aware. However, about two thirds of the people said that although they could not see the point, they had just carried on guessing. These people produced some interesting results.

When they reached chance performance on the presence/absence judgement, they were all still guessing correctly above chance on the other two decisions. They all reached chance next on the graphic similarity decision, but were still guessing above chance on the judgement of meaning. Eventually, of course, they reached chance on that decision too. It is to be noted that all subjects while guessing correctly, claimed that they could not see anything!

As mentioned above, dramatic as the results were, they were not true for all of the subjects, and that is because I had asked people to make a judgement **directly** about the stimulus of which they were not aware. All the other experiments which followed overcame this problem by only looking at the effect of the meaning of the masked word on **another** task with related words.

I will describe an experiment which exemplifies this. The task I used is called "lexical decision." This involves presenting a string of letters to the subject who has to decide as quickly as possible whether it is a word or not. When it is not a word, in the experiments reported here, the letter string obeys the rules of English spelling and is pronounceable. In the example in Figure 4 you would respond "Yes" to PARTY and "No" to PRAIN.

One can also give two trials in fairly quick succession. It is known that if both strings are words, the decision that the second is a word is faster if it is associated in meaning with the first than if it is not (Meyer, Schvaneveldt, and Ruddy, 1972). Examples of the types of pairs of letter-strings are shown in Figure 5.

In order for this to happen the first word must have been identified at least to a level where it is associated with other words, if not to its meaning. This effect is called the "association effect" or "asso-

	Stimulus	**Response**
Word	PARTY	Yes
Non-Word	PRAIN	No

Figure 4.
Examples of letter strings in lexical decision task.

ciative priming." Here, then, is a task where the meaning of one word has an effect on a second, separate decision.

The method of the crucial experiment was to compare the effects of associated words on lexical decision time (word or not) when the first letter string is either left unmasked or pattern masked. Before carrying out the experimental session I first found out the time before the mask onset at which each subject individually was no longer able to detect the presence of a word above chance. I then asked each subject to carry out the lexical decision task under each of the two conditions. Subjects were not required to respond to the first pattern or letter string, but were told that it could be used as a temporal warning for the stimulus that they had to classify and that sometimes it might help them. Under the masking condition they were told that this was a control session, i.e., no first word.

Type of Pair	Letter String 1	Letter String 2	Number of Trials	
Nonword-Nonword	WOOT	GLAYER	45	Letter String 1 is either (a)
Word-Nonword	STREET	GLAYER	45	Left Unmasked or (b) "Pattern" Masked
Nonword-Word	WOOT	INFANT	30	
Word-Word Unassociated	STREET	INFANT	30	
Word-Word Associated	CHILD No response	INFANT RT (Word/Nonword)	30	

Figure 5.
Examples of pairs of letter strings used to assess effect of word association in lexical decision task.

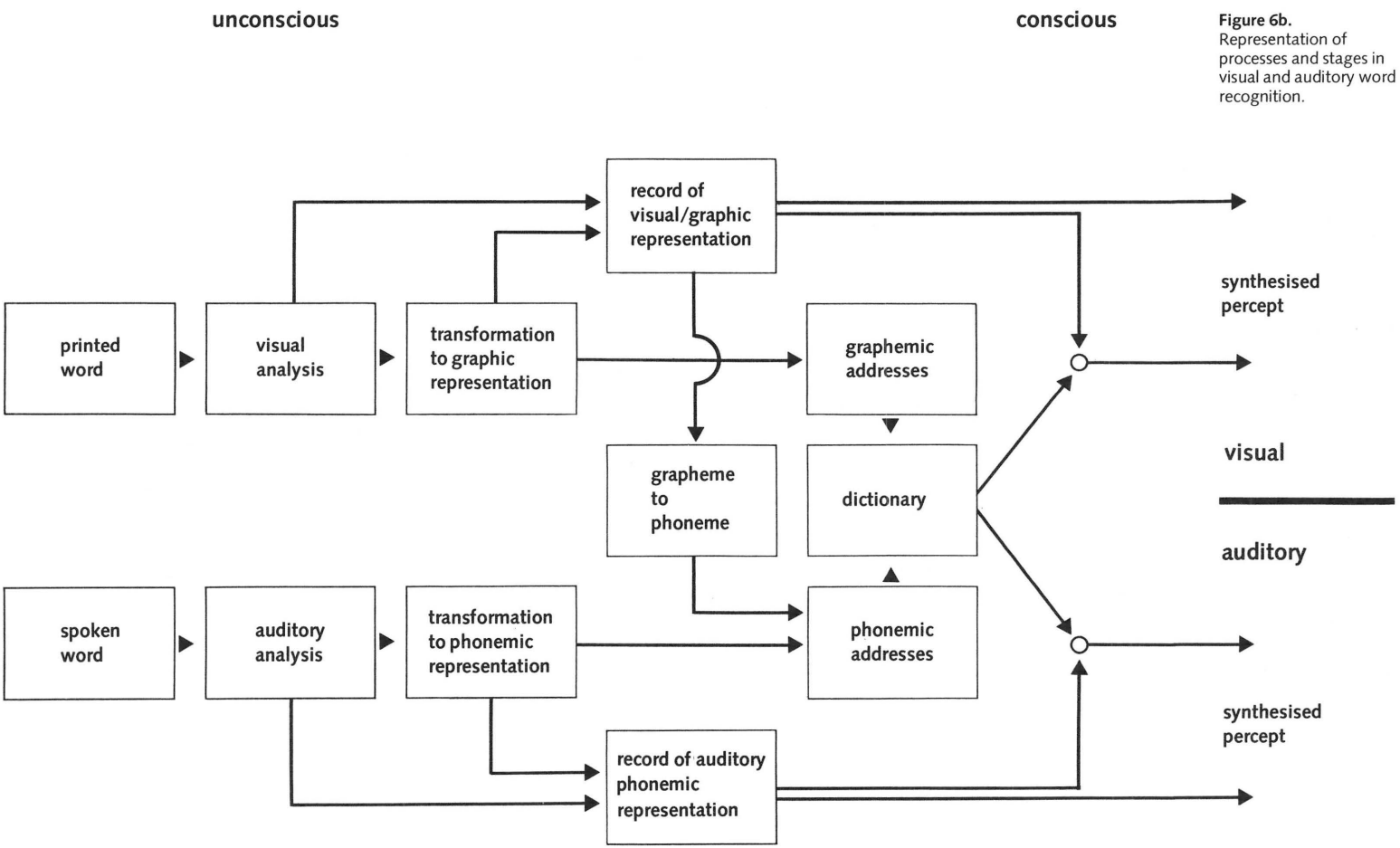
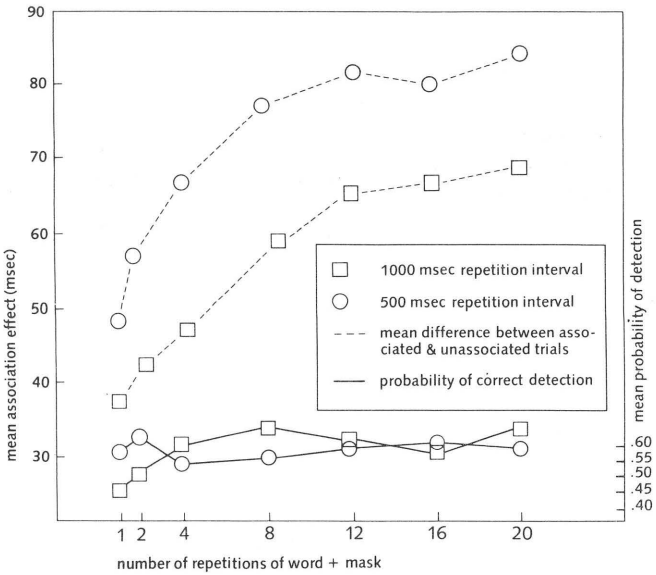


Figure 6b. Representation of processes and stages in visual and auditory word recognition.



What the experiments seem to suggest is that all the processes up to the dictionary are unconscious. Now, the mask must be having its effect at the level of either the visual representation or the graphic representation. But, since this is evidently not preventing access to the dictionary, I suggest that for us to be conscious of a stimulus we have to have a **record** of the visual pattern and it is with **this** that the mask interferes.

Evidence that the pattern mask is having its effect non-peripherally, or fairly high up the system, is that it works if the target stimulus is presented to one eye and the mask is presented to the other. Therefore the location of the masking effect must be at least beyond where information from the two eyes is combined.

I am proposing that we separate **processing** of information which transfers it to different codes or representations, and **records of the results** of such processing at each stage. In order to reach consciousness the output from the dictionary is not enough: we also need information from the record of the visual or graphic representation. That this is so is suggested by another experiment I have done. A word is masked so that it is not seen, and then that combination of word-followed-by-mask is repeated within a short space of time. The more times you repeat the masked word the greater is the effect of its meaning on lexical decision to an associated word immediately following the last repetition. But repetition makes no difference to the probability that the subject can report its presence or say the word. The results of such an experiment are shown in Figure 7.

Figure 7.
Effect of repetition of masked word on (a) size of the association effect, and (b) probability of presence-absence discrimination.

This implies that however strong is the unconscious representation of a stimulus, it will not become conscious unless the record is available. Conscious representation appears to be qualitatively different in its requirements from non-conscious representation. Another experiment illustrates a further way in which conscious perception differs qualitatively from non-conscious perception, which is the limited capacity of consciousness. In this experiment lexical decision was required to the first and third of three letter strings. When all three were words, the second one was a polysemous word like PALM (which has two meanings). This could be followed by a word associated to one of its meanings (WRIST) and preceded by a word related to the same meaning (HAND), a different meaning (TREE) or to neither meaning (SPEED). The second word was either masked to prevent awareness or left unmasked. When people were aware of PALM, it only aided the processing of WRIST if it was preceded by HAND. However when PALM was masked, it helped WRIST **whatever** preceded it. Thus it seems that both meanings are activated simultaneously non-consciously, but only one is activated consciously. This is consistent with the idea that only one interpretation of an event can be entertained by consciousness, and prior context (the first word) only selects the appropriate interpretation when a choice becomes necessary, i.e., if the representation can become conscious.

These experiments have some important implications. Firstly, it looks as if much of perception, even to high interpretive levels, is automatic and independent of intention or consciousness. For example, if you turn over a page of a book and are reading the top line, something right at the bottom of the page may "catch your eye." But this is only possible if its meaning has been analyzed independently of where your attention is directed. Another example is when you are following one of several conversations. You may be unaware of what your neighbour is saying, but will turn round if your name is mentioned. Consciousness is a "late" stage. Once you have learnt to read and understand speech, the analytic process itself is automatic and "unstoppable." Of course, analyzing the meaning of individual words is separate from the meaning that comes from combinations of words in particular sequences. This refers to sentence syntax, or the difference in meaning between "John hit Mary" and "Mary hit John." We intend to carry out experiments to see if that sort of analysis, too, is automatic and unconscious. However, there are empirical and theoretical arguments which suggest that this will not be the case (MacKay, 1973; Kleiman, 1975).

As far as cases where we want to **assess** someone's reading ability are concerned, the experiments give us a cautionary message. If a person is asked to read a passage or a series of single words, as in the Schonell test of reading ability, an error or a failure to give a response does not necessarily mean that he cannot or has not read the word. By "reading" we often mean computing the identity and the meaning of the word, and we often assume that if this is done there should be little difficulty in producing the word. In silent reading and speed reading we are not concerned with the production of the word. But, more crucially, the present experiments suggest that the production of the word may involve problems that have nothing to do with articulation, even if the word has been identified.

Although we should be wary of generalizing too quickly to the **teaching** of reading, let us take an example from the classroom. When children are asked to read aloud, they often come to words that they are unable to produce, and they stop. At least two strategies are open to the teacher. One is to try to get the child to go back to the elements making up the word (e.g., letters and graphemes or phonemes) and try to synthesize it. Another is to encourage the child to guess, in the belief that they can get him or her to use contextual information. The appropriate choice must depend on the particular stage the child is at. Although one should not make broad generalizations, the present experiments give a basis for using the second strategy. If on some proportion of cases the word has already been analyzed to the level of meaning, the added semantic or syntactic information given by context could, in those cases, operate at the appropriate level to help mobilise the response.

A further illustration of the point comes from certain cases of acquired dyslexia among aphasic patients, those whom Marshall and Newcombe (1973) call "deep dyslexics." These people have brain damage on the left side of the head and have speech problems. They make several interesting types of errors in reading single words. One of these is to produce semantically related words, e.g., "dream" for **sleep,** "horse" for **paddock**. Another is the relative inability to read "function" words or prepositions, e.g., they cannot read **in** or **be**, but can read **inn** and **bee**. Another is the reduced probability of correctly reading more abstract words. All of these problems have nothing to do with the physical characteristics of the words (e.g., shape, spelling, sound) but are connected with the **meaning** of the word. Incidentally, if you say the word and ask the patients to repeat it, they have no trouble. Therefore the problem is not in articulation. It is more likely to be in getting from the meaning to the specific instructions for saying the word, or in the representation of word meanings itself.

I have studied with Karalyn Patterson patients of this kind, and we have been trying to see if we can reproduce their performance in normal people. The patients all have damage to the **left** side of the brain. We have found that normal people show some of the same effects of the type of word as the patients, if one exposes single words briefly, ensuring that they are received first by the **right** cerebral cortex. (This is possible because nerves from the right halves of the eyes go to the right side of the brain, and vice versa.)

That is, people are much worse at perceiving abstract than concrete words when they are projected to the right half of the brain, but not much worse when they are projected to the left half of the brain.

But this is only so if we ask the subjects to **report** the word. If the word is masked so that it cannot be reported and one looks at the effects of its meaning on other words, as was described above, the results suggest that the meaning of different types of words is analyzed as effectively whichever cerebral hemisphere the word is sent to first (Marcel and Patterson, 1976). These experiments suggest to us that words are understood in both cerebral hemispheres, but that it is the **production** of speech — the putting of an idea into words — that seems to depend mainly on the left side of the brain. In most studies of the two cerebral hemispheres this distinction between recognition and production is not drawn. This is one way that the technique is helping us to understand normal and pathological processes.

But as has been implied, the techniques described here are relevant not only to reading and speech. It is usually assumed, quite reasonably, that if a person can make some judgment about a stimulus then he or she has processed it, and that such processing is synonymous with conscious attention. The converse, however, is not true. Not only is much processing done non-consciously, but also it appears that the results of processing often differ qualitatively depending on whether or not the person is aware of the stimulus. In carrying out experiments, we must be careful to separate the automatic aspects of perception and understanding from the contributions of consciousness and the demands made by the responses required, which usually involve conscious deliberation and volition.

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Biographical Note

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Minor details in the history of a language sometimes involve issues of theoretical significance. For example, major dictionaries record contradictory accounts of stylistic variations among the expressions **no, nay, yes,** and **yea** for Middle and Early Modern English.

Although the expressions are all recorded in writing, distinctions among them are systematically preserved only in the compositions of highly literate minds engaged specifically in writing and reading as opposed to speaking and hearing.

The basis of the distinction lies in the mental processes of composition rather than in the written or spoken forms of expression. Distinctions among the two sets of forms are not the product simply of care, grammatical precision, formality, or poetic excellence. For in Middle English the compositions of Chaucer may be distinguished in their use of the forms from poetry of the alliterative revival, which was composed for speech and hearing.

In Chaucer **no** and **yis** are marked expressions for performative, often specifically behabitive, speech acts. They occur only in responses in which behabitive involvement between interlocutors must clearly be interpreted, as, for example, between the Nun's Priest and the Host, or between the jealous Carpenter and his Wife in "The Miller's Tale."

Toward a Visual Stylistics: Assent and Denial in Chaucer

Spencer Cosmos

In this essay I describe a distribution among various expressions meaning "yes" and "no" in the poetry of Geoffrey Chaucer. Although it is true that the distinctions receive phonological as well as graphic expression, it is nevertheless my argument that the **systemic** character of the contrasts belongs fundamentally and essentially to visible rather than to audible language. I demonstrate this by showing that variations in the spelling of these expressions, distinguishing **no** from **nay** and **yis** from **yea,** are quite explicably systematic in the highly literate poetry of Chaucer, but in free variation in records preserving the oral traditions of alliterative verse. The implication of this research which I believe will most interest students of writing is this: If it is true that these contrasts — which are expressed both in writing and in speech — are systemic only in writing, then the visible form of expression must be afforded the status of **language** in every significant sense of that term as used in modern linguistics. In this research we have, in other words, further evidence that writing and speech are not simply alternative modes of expressing language, but rather that each is quite fully and integrally a language in its own right.

It is perhaps worth emphasizing here that the case for the autonomy of visible language is strengthened rather than weakened by the fact that these written variations correspond to differences in pronunciations. For the fact that **no** and **nay,** for example, correspond to speech variants only shows that the phonetic material was available for systemic distinction in audible language.
But the important fact is precisely that no such systemic was employed in speech while it demonstrably was in discourse which was conceived for visible expression. It is not, in the final analysis, an issue of audibility versus visibility, but rather of system versus free variation.

The research that led to this conclusion began with glossaries, so I begin with them. The glossary to F.N. Robinson's edition of Chaucer's **Works** asserts without explanation that **yis** is an emphatic form of **yea,** but it says nothing of any distinction between **no** and **nay.**[1] In fact, however, the forms of assent and denial in Chaucer's poetry are distributed in a pattern that suggests nuances of meaning beyond propositional affirmation or negation.

1. F. N. Robinson, ed., **The Works of Geoffrey Chaucer,** 2nd ed. (New York: Houghton Mifflin, 1957), Glossary, s.v. **Yis.**

The principal historical dictionaries of English, however, give confusing and sometimes contradictory accounts of the bases of discriminating among the forms; and so it would seem worthwhile to explicate their stylistic value in the profoundly literate idiom of Chaucer's text. I will undertake this explication by discussing the lexicographical history of the forms, setting out the communicational features by which they may be distinguished, and interpreting their meanings in the poetry of Chaucer.

According to the **Oxford English Dictionary,** the forms **nay** and **yea** were usually employed when the preceding sentence did not have a negative word in it. **No** and **yes** were used when a negative was expressed in the sentence being responded to. The distinction is "clearly stated," says the dictionary, in the 1557 edition of Thomas More's **Confutation of Tyndale's Answer.**[2]

At that place in the **Confutation,** Tindale is chastized for using **no,** rather than **nay,** to translate John I: 21: "Arte thou a prophete? And he answered, 'No.'" The use of **no** is incorrect, according to More, because **"Nay** answereth the questyon framed by the affirmative.... And a like difference is there bytwene these two adverbis **ye** and **yes."**

Neither More nor the **OED** mention emphasis as a criterion governing the distribution of forms. The authority for Robinson's assertion would appear to be the unabridged **Etymological Dictionary** of W.W. Skeat.[3] According to that source the distinction between **yea** and **yes** is "commonly well marked," **yea** being a simple affirmative, **yes,** "a strong asseveration, often accompanied by an oath" (s.v. **Yea).** The distinction between **no** and **nay** was based, according to Skeat, on the presence or absence of a negative in the sentence to which the particle is a response, and, "Besides this **nay** was the simple, **no** the emphatic form, often accompanied by an oath" (s.v. **Nay).** According to Skeat, the distinction is found until the time of Henry VIII. Little is added to this by other dictionaries, though the entry in the **Century** has some interest: "the fine distinction alleged to have formerly existed between **no** and **nay,** according to which **no** answered questions negatively framed...is hardly borne out by the records" (s.v. **No).**

2. **The Compact Edition of the Oxford English Dictionary: Complete Text Reproduced Micrographically,** II (Oxford: Oxford U. P., 1971), s.v. **Nay.**

3. **An Etymological Dictionary of the English Language,** 3rd. ed. (Oxford: Clarendon, 1898).

However, it characterizes **yes** as "a stronger term...chiefly used in answer to questions containing a negative or otherwise implying a doubt. But the distinction does not appear to have been rigidly maintained" (s.v. **Yea).**[4] Thus there is no general agreement among authorities about the stylistic or semantic distinctions among the terms. It is clear enough, of course, that the alternatives in each set are stylistically distinct in present day English, **nay** and **yea** bring reserved for formal and elevated speech. But the question that concerns us here has to do with usage before the time of Henry VIII; so the investigation must be historical in character. Both the model and the method of investigation bear some explanation. I shall write first of the model or conceptual framework.

When we consider the stylistic character of the affirmative and negative responses we cannot be concerned only with their categorematic function as affirming or negating propositions contained in a preceding statement, question, or command. For any verbal structure actually has three dimensions: the propositional, the modal, and the contextual.[5]

The propositional dimension extends into the dispassionate world of ideational reference where cognitive content, truth value, and taxonomic relationships are defined and delimited. Interpretation of the behavioral mode, however, involves more than logical analysis of verbal structure; it involves an understanding of the action effected by means of the locution, including recognition that some sentence is in fact a statement, command, wish, prediction, request, and so on. The contextual dimension has to do with the social and linguistic institutions in which any formulation participates, including the field of discourse (as distinct from logical reference of the proposition), social function of the discourse, relations among the interlocutors, relation of the specific sentence to the rest of the discourse, genre of the discourse, and so on.

Although responding "yes" or "no" is done by means of a very small set of expressions, variation in any one or any combination of functions in any of the three dimensions of the communication may motivate variation in the visible form of the expression. In modern English **yes, yeah,** and **yep** are just such variations. But their meaning is not self-evident.

Because there are many fewer forms of expression than there are communicative purposes, the interpretation of language is always an inferential process which attempts to derive epistemic content from the visible form of the signs themselves, from their configuration in the linear structure of discourse, and from hypotheses about the nature of the physical and social contexts in which they occur.

4. **The Century Dictionary,** 12 vols. (New York: Century, 1889).

5. Cf. M. A. K. Halliday, "Language Structure and Language Function," **New Horizons in Linguistics,** ed. John Lyons (Harmondsworth: Penguin, 1970), pp. 140-165.

Although the term **categorematic** leads one to expect that **yes** and **no** expressions respond only or primarily to the propositional content of a question, command, wish, or exclamation, they in fact respond to the entire formulation.
Consider, for example, the character of some possible responses to questions. To begin with, the question itself may be propositionally, behaviorally, or contextually oriented. The affirmative form of a question, say,

Has the train arrived?

does not grammaticize actional, attitudinal, or contextual features,[6] and so interpretation of such features depends upon analysis of the context and on hypothesis concerning the situation of its formulation. But the so-called tag-questions and the negatively framed question all suggest some special involvement on the part of the speaker in his question. All three of these forms actually have a negative in them:

1.
The train hasn't arrived, has it?
2.
The train has arrived, hasn't it?
3.
Hasn't the train arrived?

It is said of these forms of question that they "expect" or "hope for" some particular form of response.[7] Such expectation or hope is fundamentally behavioral rather than propositional in character. The linguistic form of questions such as these does not indicate whether the involvement of the speaker is primarily cognitive or affective — in the one case the speaker finds his ideas contradicted by some aspect of the situation, in the other some feature of the situation has alarmed or otherwise affectively contradicted the speaker's sense of the way things ought to be in the matter — but the form of the question clearly indicates that there is involvement in the behavioral dimension as well as in the propositional.

Such a question, of course, becomes part of the context in which one responds; and the response addresses the entire formulation, not just the propositional dimension. Notice the meaning of the responses to the negatively framed question (which will serve to illustrate the dynamics of all the behaviorally marked forms):

Hasn't the train arrived?
1.
Yes, I'm happy to say it has.
2.
No, I'm sorry to say it hasn't.

6. On the notion of **grammaticization** see M. L. Samuels, **Linguistic Evolution with Special Reference to English,** Cambridge Studies in Linguistics, 5 (Cambridge, Cambridge U. P., 1972), pp. 58-60.

7. Cf. Randolph Quirk, Sidney Greenbaum, Geoffrey Leech, and Jan Svartvik, **A Grammar of Contemporary English** (New York: Harcourt, Brace and Jovanovich, 1972), para. 7.58; and Otto Jespersen, **A Modern English Grammar on Historical Principles** (Copenhagen: Munksgaard, 1940), V, para. 25.1.

Notice that the affirmative and negative adverbs, **yes** and **no** respectively, actually address the behavioral modalities as much as they respond to the propositional content. In fact, in one sense they address the behavioral more so, inasmuch as **yes** actually judges the articulated proposition to be false:

Yes: **It is FALSE that the train has not arrived.**

It is AFFIRMED that the questioner's hope or expectations have been successful or felicitous.

No: **It is TRUE that the train has not arrived.**

It is DENIED that the questioner's hope or expectation has been successful.

Notice also that it is curious to respond in the following manner:

Hasn't the train arrived?

Yes, I'm sorry to say it has.

This response is curious, not ungrammatical or incorrect. It gives pause because it announces that the speaker is responding in terms of his own internal hopes rather than those of the questioner. It announces a conflict in interpersonal relations.

In these modern English examples the affirmative and negative particles have been amplified in such a way that the categorematic and behabitive functions are clearly expressed. But such amplification is almost required because a monosyllabic response would be interpreted as curtly indifferent to the affections of the questioner.

In vocalized discourse, of course, there would be numerous ways of conveying behabitive sympathy by intonational means; but in visible language the lone occurrence of **yes** or **no** is itself an expression of behabitive curtness as a response to a negatively framed question. The point here is that these particles unmistakably carry implications of involved behavioral relations between participants in the speech situation.

When the **OED,** following Thomas More, suggests that the form of response in older English is conditioned by the presence of a negative in the preceding sentence, I suspect that what is incompletely perceived is the behabitive character of the speech situation in which it is most typically used. My use of the term **behabitive** here is indebted to a conception of the philospher J.L. Austin who, in **How to Do Things with Words,** explains behabitive illocutionary force as "the notion of reaction to other people's behaviour and fortunes and of attitudes and expressions of attitudes to someone else's past conduct or imminent conduct."[8]

8. **How to Do Things with Words** (Cambridge, Mass.: Harvard U. P., 1962), p. 159.

My investigation of the early history of assent and denial in English suggests that **yes** (or **yis,** the form more commonly found in Chaucer) and **no** are behabitively marked forms, especially in texts that are carefully composed for reading rather than merely transcribed records of fundamentally oral language. It is widely agreed that Chaucer's poetry is composed in such a carefully formulated idiom, and so it is not surprising that distinctions among the forms are quite clearly preserved in his works.

The distinctions between **yis** and **yea** and between **no** and **nay** do not inhabit the central areas of the language where formal variation is clearly recognized by all speakers and acknowledged by grammars and dictionaries. Rather they are found in the outlying areas of stylistic nuance, encountered for the most part only by those who haunt such places. Chaucer was clearly such a man, not only intelligent and experienced but scholarly and learned, a reader of "old bokes" who encountered thought visually displayed and who planned in his composing for its visible representation. It is on this fact that an investigation of the forms must be focused; for there is reason to suspect that the distinctions among the forms are proper to the linguistic competence of such men and, in effect, rather special to them. A couple of curious printed errors first suggested this notion to me.

In attempting to research the primary sources on which the citations in Skeat's **Etymological Dictionary** and the **OED** were based, I was surprised to find contradictions which at first suggested inaccurate reporting by the lexicographical authorities. The researches on which the statements in Skeat's dictionary were based were done partly in preparing his edition of **William of Palerne,** a fourteenth-century alliterative poem; and, indeed, the first publication of Skeat's opinion about the distribution of the forms is recorded in the glossary of his edition.

A glance at Figures 1 and 2, however, will show that Skeat had first expressed an opinion contrary to that recorded in his later dictionary. And yet the **Dictionary** cites the edition as illustrating the distinctions recorded under its entry for **yea.** For its part, the **Oxford English Dictionary** observes that the distinction between **no** and **nay** is "clearly stated" in the 1557 edition of the **Works** of Thomas More. But an examination of that edition shows (See Figure 3) what More's modern editors, Lewis Schuster, **et al.,** term "an ironic blunder."[9]

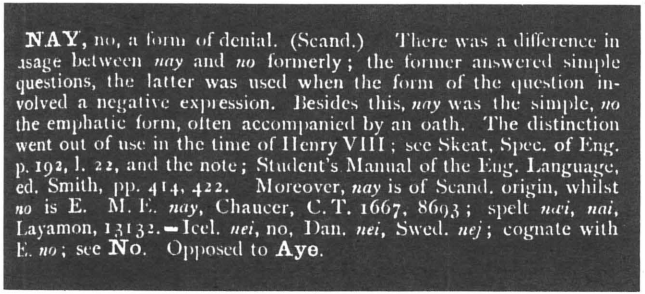
A glance at Figure 3 shows that for the sentence: "Nay answereth the questyon framed by the affirmative," the text actually reads:

No aunswereth the question framed by the affirmative.

Thus the primary sources cited by both the major lexicons show confusion between the negative forms. Both instances appear to have much the character of mere lapses in linguistic performance.

9. Lewis A. Schuster, Richard C. Marius, James P. Lusardi, and Richard Schoeck, eds., **The Confutation of Tyndale's Answer,** Vol. VIII, part i of **The Complete Works of St. Thomas More** (New Haven, Yale U. P., 1973), p. 1421.

But they are not insignificant lapses nevertheless, not mere slips of the pen or momentary inadvertencies. Rather, they suggest, I think, a refinement in the linguistic competence of authors whose reflections about the written word are more delicate than the idiom of daily speech.



NAY, no, a form of denial. (Scand.) There was a difference in usage between *nay* and *no* formerly; the former answered simple questions, the latter was used when the form of the question involved a negative expression. Besides this, *nay* was the simple, *no* the emphatic form, often accompanied by an oath. The distinction went out of use in the time of Henry VIII; see Skeat, Spec. of Eng. p. 192, l. 22, and the note; Student's Manual of the Eng. Language, ed. Smith, pp. 414, 422. Moreover, *nay* is of Scand. origin, whilst *no* is E. M. E. *nay*, Chaucer, C. T. 1667, 8693; spelt *nei*, *nai*, Layamon, 13132. — Icel. *nei*, no, Dan. *nei*, Swed. *nej*; cognate with E. *no*; see **No**. Opposed to **Aye**.

Figure 1: Entry For *Nay* in Skeat's *Etymological Dictionary* (1889).

Note the contradiction with the glossary of *William of Palerne* (Figure 2). The distinctions between *no/nay* and *yes/yea* are specific to written composition.

They are the visual counterparts of epistemic features expressed in speech by intonation.

It is not surprising that Skeat should have confused the distributions of **no** and **nay** and **yis** and **yea** in his edition of **William of Palerne,** for one cannot be certain that the distribution holds up there. A number of the instances of the forms are of uncertain interpretation, and some seem to contradict the pattern. But the poem, in spite of its being a translation from a French source, is not a literate composition. It comes from about the middle of the fourteenth century, when Chaucer was a child, and is written in an already obsolescent verse form conserved chiefly in remote and provincial communities.

Its alliterative meter, formulaic diction, and oral-thematic modes of amplification — none of which would remain viable after about 1450 — looked backward toward a time when literacy was unknown among the Germanic peoples. Fine distinctions in the usage of individual words are much more proper to the deliberate compositions circulating among aristocratic, urban, and progressively literate audiences whose usage reflected a mental organization which to some extent may be said to have been created by visible language.

In the idiom of such poetry, **yis** and **no** are reserved for utterances which are emotively or attitudinally involved in a way beyond the normal, neutral giving of an answer to a question. The question being responded to has irritated, frightened, delighted — involved — the respondent; or else it has given evidence of some affective state in the questioner which must be responded to in an involved way. In either case the response is itself behabitively marked. It should be recognized that the use of the unmarked forms **yea** and **nay** does not necessarily mean the absence of such involvement, but that **no** and **yis** signify such involvement.

All evidence leading to such a conclusion must, of course, come directly from interpretation of the text, and such interpretation cannot be regarded as self-evident. But certain linguistic forms suggest the correctness of an interpretation when they occur in the immediate context of such a reply. In reading the text of Chaucer I recorded four classes of such evidence:

1.
Some overt expression explicitly characterizes the speaker as involved.

2.
Some overt expression explicitly characterizes a response as so involved.

3.
The occurrence of generic features of character and/or situation make it reasonable to interpret a response as behabitively involved.

4.
Repetition occurs as a device expressing such involvement; or an oath or other collocated expression makes such involvement reasonably interpreted, but only when concatenated with one of the other three classes of evidence.[10]

(The requirement of concatenation is, of course, made necessary by virtue of the fact that some expressions and oaths are simply metrical fillers.) The evidence of classes one and two were regarded as strongest; three less so, especially if not accompanied by evidence of class four; and four not at all unless accompanied by evidence of one of the other three classes.

We turn now to Chaucer's text. **Yea** and **nay** can be regarded as the unmarked forms which express behabitively neutral, categorematic responses. By and large all formal variations from these expressions mark some deviation from functionally categorematic neutrality though, of course, not all to the same degree. Moreover, particular variations in form do not invariably express the same function under all circumstances. Nevertheless there is some justification for ranking formal variation according to a degree of markedness. Collocation with an oath or other attitudinally colored expletive in general carries the least functional force, at times constituting virtually a metrical filler, as in "The Pardoner's Tale," VI, 692: **"'Ye goddes armes,' quod this riotour."**[11]

10.
On the grammatical and stylistic functions of repetition in English, and especially for the repetition of **yes** and **no,** see Gunnar Persson, **Repetitions in English, Part I: Sequential Repetition,** Studia Anglistica Upsaliensa, 21 (Uppsala: Uppsala U. P., 1974), pp. 96, 101.

11.
The text of Chaucer, hereinafter cited in the text, is quoted from the edition of John H. Fisher, ed., **The Complete Poetry and Prose of Chaucer** (New York: Holt, Rinehart and Winston, 1977), which follows manuscript spelling of texts not from the Ellesmere MS more closely than Robinson, cited above. I have used the notes in Robinson, as also the editions of W. W. Skeat, **The Complete Works of Geoffrey Chaucer,** 7 vols. (Oxford: Clarendon, 1894-1897), and John Koch, **Geoffrey Chaucers kleinere Dichtungen** (Heidelberg: Winter, 1928).

Still, an examination of the context shows that the collocation serves somewhat to characterize the speaker. In "The Miller's Tale" 3719 the modal **certes** "of a certainty" has a slightly more specific meaning. Absalon has been tirelessly seeking the favor of Alison, who has not encouraged him and would be rid of him. When he asks for a kiss, she replies,

"Wiltow thanne go thy wey therwith?"

"Ye, certes, lemmon," quod this Absalon. **[beloved]**

The question itself is not formally marked, but its content is clearly less than encouraging to Absalon. In his reply he uses the unenthusiastic **ye,** but is nevertheless concerned to assure her her wish in order that he may at least get his kiss. There are very many such collocations in the text of Chaucer, but their stylistic force, though discernible, is of negligible interest.

Repetitions represent somewhat more forceful responses, and still more so when they also involve the lexical variants **yis** and **no,** which are strongly marked in any case. Since all the variations in form happen to occur in "The Franklin's Tale," we can see the stylistic implications illustrated there first. The tale concerns the knight, Arveragus, his much loved wife, Dorigen, and the squire Aurelius, who pines after her. When the knight went abroad for two years, Aurelius approached Dorigen with his proposition that they become lovers. She refused him in what she thought to be no uncertain terms:

"Looke what day that endelong Britayne **[the length of]**
Ye remoeve alle the rokkes, stoon by stoon,
That they ne lette ship ne boot to goon— **[hinder]**

I seye, whan ye han maad the coost so clene
Of rokkes that ther nys no stoon ysene,
Thanne wol I love yow best of any man.
Have heer my trouthe in al that evere I kan."

"Is ther noon oother grace in yow?" quod he.

"No, by that Lord," quod she, "that maked me!" **[V, 992-1001]**

The exclamation point is, of course, editorial; but it indicates at least one informed reader's understanding that the response should be interpreted as affectively marked. Such marking is clearly indicated, in any case, by the content of the passage preceding; it is clear that unnatural events would have to occur before Dorigen would accept the squire's advances.

Moreover, her behabitively marked response, **no**, is collocated with an invocation of the Lord's witness to her refusal. In this case, the evidence of behabitive involvement is of the third kind, arising out of the context and generic features of the situation which make it reasonable to interpret behabitive force.

Although I regard evidence of the third kind as "scientifically" weaker than that of the first two kinds, it is nevertheless quite clear in this instance that a behabitive interpretation of the response is correct.

Nay, on the other hand, is a more simply propositional response, as can be seen in this example of its occurrence later in the tale. Aurelius, dismayed by his rejection, bargains with an astrologer for power to make the rocks **seem** to disappear. It will cost him a thousand pounds, but the transaction is concluded. Aurelius is anxious to return home and would have preparations speedily concluded. He says to the astrologer,

"But looketh now, for no necligence or slouthe
Ye tarie us heere no lenger than to-morwe."

"Nay," quod this clerk, "have heer my feith to borwe." **[as pledge; 1232-1234]**

The astrologer is not involved in the urgency felt by the clerk, and his strategy in the speech situation is precisely to allay fears by giving the assurance of a propositionally oriented reply. He is in control of the situation; and from the point of view of Chaucer's narrative strategy, there is no reason to suggest behabitive involvement of a minor character who may just as well remain undifferentiated in the background.

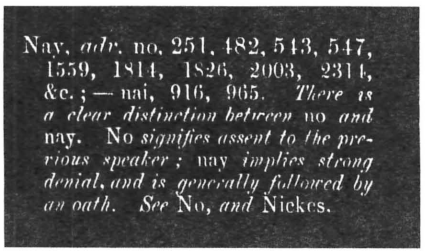

Nay, *adv.* no. 251, 482, 543, 547, 1559, 1814, 1826, 2003, 2314, &c.; — nai, 916, 965. *There is a clear distinction between* no *and* nay. No *signifies assent to the previous speaker; nay implies strong denial, and is generally followed by an oath.* See No, *and* Nickes.

Figure 2:
Entry For *Nay* in Skeat's *William of Palerne* (1867).
This edition, cited by the *Oxford English Dictionary* as evidence of a clear distinction between *no* and *nay*, actually has *no* instead of *nay* at the place indicated. It is a printer's error. The edition of 1533 has it right. This copy was owned by, and has the signature of, the poet John Donne. It is from the Rare Book Collection of the Library of The Catholic University of America.

Aurelius then returns home and uses his power to delude Dorigen who, in a literal-minded fashion, finds herself trapped by her own conditions. She tortures herself by contemplating the legends of good women undone by sexual abuse. Suicide occurs to her:

Hath there nat many a noble wyf er this,
And many a mayde, yslayne hirself, allas,
Rather than with hir body doon trespas? [1364-1366]

And she answers herself, dramatically,

"Yis, certes, lo, thise stories beren witnesse."

There can be no doubt of the behabitive character of this response. It is formally marked not only by the **yis** form, but also by the accompanying epithets, **certes** and **lo**. The specific context, moreover; the character of Dorigen as it has been consistently delineated throughout the tale; and predispositions implied by the **compleint** genre of this speech she is uttering; all make it quite reasonable to interpret this occurrence of the form as marking behabitive involvement.

Dorigen was still in an agitated state when her husband returned home. She went to him and "toold hym al as ye han herd bifore":

This housbonde with glad chiere in freendly wyse
Answerde and seyde as I shal yow devyse.
"Is ther oght elles, Dorigen, but this?"

"Nay, nay," quod she, "God heple me so as wys!
This is to muche, and it were Goddes wille."

"Ye, wyf," quod he, "lat slepen that is stille.
It may be wel, paraventure, yet today." [1467-1473]

At first glance the occurrence of unmarked forms here seems peculiar. After all it is quite clear that Dorigen is extremely distraught. But it is easy to miss the tone of the delicately drawn relations between husband and wife. Dorigen's **nay, nay** surely reflects her agitated state; but it does not constitute a behabitive involvement with the question put by her husband. She is not making an emphatic denial that there is "oght elles"; for the question is not put as a proposition or charge which is to be denied or rejected. Notice the affirmative framing of Arveragus' question (**oght elles,** not **noght elles**) followed by a trivializing **but**, as if to say, "Is this what you are upset about? Is this all there is to it?" The husband is not pressing Dorigen about the facts of the situation.

Rather "with glad chiere in freendly wyse" he is trying to allay her fear, to calm her, to reassure her. "There, there," he says in effect, "It may work out yet." His first question is no doubt put calmly, dispassionately, "Is ther oght elles, Dorigen, but this?" Since there is complete trust between them, there is no need to answer this question with any great force of denial. Indeed, Dorigen is reluctant to allow that "this" is such a little matter as her husband seems willing to take it.

He makes too light of it. The editors, by placing the terminal punctuation (!) at the end of her call for God's witness, suggest that this phrase attests to the truth of her denial.

Rather it ought to be associated with the following line: "God helpe me so as wys — This is to muche, and it were Goddes wille." I would paraphrase her response as follows: No, my dear, there is nothing but this. But this, God help me indeed, is too much if it were God's will. Within the conventions obtaining in this tale there is no possibility of interpreting anything but absolute trust between this husband and wife; and hence there is no reason to interpret Dorigen's reply as an emphatic denial of the proposition that there has been "oght elles" between Aurelius and herself. The response of Arveragus, likewise, is comforting rather than an emphatic agreement that "This is to muche."

Ye is an appropriate form because it represents mild assent to the proposition articulated as well as intentional downtoning of the emotionally charged state of Dorigen: Yes, wife, this is too much; but don't make it worse than it is. It may yet be well. In this instance the context is quite explicitly in support of an interpretation of **ye** as behabitively muted.

The next occurrences of the responses are highly charged with involvement. It is agreed between husband and wife that Dorigen must keep her pledge to the squire, and Arveragus sends her off to do so. But Aurelius, hearing of the knight's magnanimity, releases her from her obligation and returns to the astrologer unsatisfied in his claim for Dorigen and still owing a thousand pounds for his hallucinatory power. He has just asked for time to pay that money to the astrologer when he is asked:

"Have I nat holden covenant unto thee?"
"Yes, certes, wel and trewely," quod he.
"Hastow nat had thy lady as thee liketh?"
"No, no," quod he, and sorwefully he siketh. **[1587-1590]**

The behabitive involvement here lies in the painful acknowledgment. The astrologer **has** held covenant; Aurelius **does** owe the thousand pounds; and he **has not** had the favor of his lady. It has all been for worse than nought. The form **yes** marks

an emotively colored behabitive involvement, but hardly an emphatic agreement. The orthographic variation between **yes** and **yis** may or may not be significant. Michael Samuels has noticed that in forceful articulation of speech, there is a tendency to front and raise vowels.[12]
Presumably this is an articulatory correlate of the kinesic tension accompanying excitement or agitation. If this is so, and I am inclined to believe that it is, and if such a raising were institutionalized graphically by an **i** spelling for **e**, then the orthographic variation **yis** : **yes** may be Chaucer's visible means of conveying a stylistic distinction between enthusiastic or emphatic asseveration and, as here, deeply felt, deliberate, and unpleasant acknowledgment. But there are very few **yes** spellings in the major manuscripts of Chaucer's text, and it is difficult to draw any conclusions.

The squire's absolute denial of the astrologer's expectations about his having had the favor of his lady, on the other hand, is quite clear. Here the form of the response, **no**, is formally reinforced by the repetition and by the explicit statement of the narrator, **sorwefully he siketh.** Thus "The Franklin's Tale" provides at least one instance of each of the variants for "yes" and "no"; and each instance can be seen as marking a character's involvement in the events of the story.

The combination of overt statement about a character's feelings and lexical choice in the form of his response is used to good advantage by Chaucer in at least three places in **Troilus and Criseyde**. In the first of these Criseyde provides visual evidence of the confused state of her feelings about becoming amorously involved with Troilus. She and Pandarus are seated on her balcony watching the Trojans return from battle, discussing what response she should make to Troilus's discreet suit of her:

And right as they declamed this matere,
Lo, Troylus, right at the stretes ende,
Com rydyng with his tenthe som yfere, **[group of ten together]**
Al softly, and thederward gan bende
There as they sete, as was his way to wende
To palays-ward. And Pandarus hym aspyde
And seyde, "Nece, yse who comth here ryde. **[did tend toward]**

"O fle naught in — he seeth us, I suppose, —
Lest he may thynken that ye hym eschuwe."
"Nay, nay," quod she, and waxe as red as rose. **[II, 1247-1256]**

The visualized form of her speech doubtless represents her attempt to appear composed, and hence the unmarked lexical form **nay**. But it is repeated, and anyway her complexion gives away what she suddenly experiences. She is a woman of very delicate sensibility throughout the poem, but nowhere more so than here in this early revelation of her feeling.

Criseyde's public position in Troy is an uncertain one. She is a widow and the daughter of a deserter. No one in Troy has any particular interest in her well-being and, except for a potential and necessarily secret association with the Royal house by virtue of a possible **affair d'amour** with Troilus, she can only trust in herself. She is understandably upset, then, to hear of a law-

12. Samuels, **Linguistic Evolution**, p. 23.

suit pending against her. Pandarus, hoping to nudge her closer to the embraces of Troilus, reveals it to her:

'Be ye nought war how false Polyphete
Is now abowte eftsoones for to plete [bring a legal case]
And brynge on yow advocacies newe?"
'I? No," quod she, and chaunged al hire hewe. [II, 1467-1470]

The behabitively marked form, collocated with an explicit representation of her agitation, visualizes for us the extent of her alarm. A good contrast to this personal expression of feeling is provided later when the **parlement** discusses whether or not to trade Criseyde to the Greeks for Antenor, who had been captured by them.

For which delibered was by parlement
For Antenor to yelden up Criseyde,
And it pronounced by the president, [although;
Althey that Ector "nay" ful ofte preyede. IV, 211-214]

We can imagine some constraint and control in his use of **nay**, which was likely the properly decorous form for public and official expression of negation. But **no** and **yis** serve for the expression of deep feeling to intimate acquaintances. Thus when it is concluded that Criseyde will indeed be traded to the Greeks, conversation between Troilus and Pandarus uses the marked form:

"Lo, Pandare, I am ded withouten more,
Hastow nought herd at parlement," he seyde,
"For Antenor how lost is my Criseyde?"
This Pandarus, ful dede and pale of hewe,
Ful pytously answerde and seyde, "Yis,
As wysly were it fals as it is trewe,
That I have herd and wot al how it is." [know; IV, 376-382]

Once again we have the behabitively marked form, accompanied by the narrator's description of a man gone pale and dead looking. In addition to this it is placed in rhyme position, giving it still further visual emphasis in the rhyme royal stanza.

Another stylistic feature which can be discerned in Chaucer's patterning of the forms for "yes" and "no" is the revelation of courtly sensitivity in the address of some characters of refined sensibility. For example, the form of "yes" used by Deiphebus, brother of Hector and Troilus, gives almost the only evidence in the poem which shows his refined and noble nature. He plays a very small role in the poem, but larger than he does in Chaucer's source, **Il Filostrato** of Giovanni Boccaccio. Nevertheless Chaucer's conception of Deiphebus would seem patterned after Boccaccio's. And Boccaccio shows him as a person very sensitive to the feelings of others, for example in the following:

Deifebo s'accorse allor, che quello
Fosse che lo stringnea, **e fatta vista**
D'audito non l'aver, disse: fratello
Che no conforti omai l'anima trista?

[Deiphebus then perceived what it was
that constrained him (Troilus),
and affecting not to have heard, said:
Brother, Why dost thou not now comfort
thy sad soul?][13]

Chaucer expanded the role of Deiphebus by having a dinner party and meeting between Troilus and Criseyde take place at his house. The poet employs some delicate touches when Pandarus first approaches Deiphebus to set this meeting:

Quod Pandarus, "I pray yow that ye be
Frend to a cause which that toucheth me."

'Yis, parde," quod Deiphebus, "wel thow wost **[by God! knowest]**
In al that evere I may, and God tofore,
Al nere it but for man I love most,
My brother Troylus. But sey wherfore
It is, for sith that day that I was bore,
I nas, ne nevere mo to ben I thynke
Ayens a thyng that myghte the forthynke." **[II, 1406-1414]**

Pandarus has here addressed Deiphebus in the second plural forms of polite, formal discourse **(yow, ye, be);** but, perhaps in response to the word **frend,** Deiphebus responds encouragingly in the singular forms proper to the discourse of intimates **(thow, wost, the)** and to emphasize his willingness to cooperate, Chaucer writes, "Yis, parde."

13.
Cited from the edition and translation of N. E. Griffin and A. B. Myrick, **The Filostrato of Giovanni Boccaccio** (Philadelphia: U. of Pennsylvania, 1929), Canto VII, line 78.

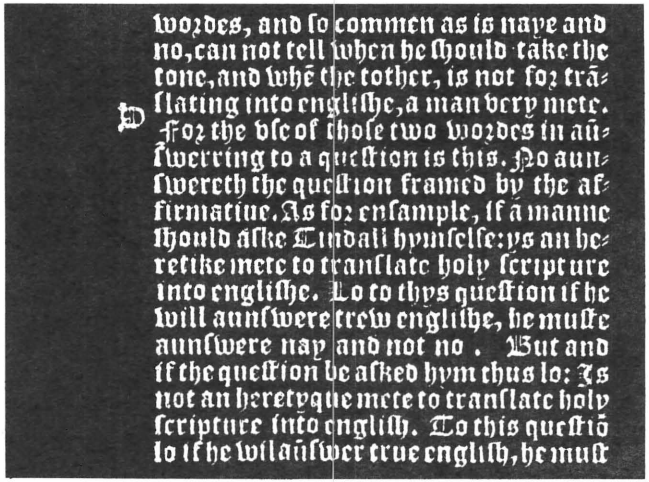

wozdes, and so commen as is naye and
no, can not tell when he should take the
tone, and whē the tother, is not foz trā-
slating into englishe, a man very mete.
For the vse of those two wozdes in aū-
swerring to a question is this. No aun-
swereth the question framed by the af-
firmatiue. As foz ensample, if a manne
should aske Tindali hymselfe: ys an he-
retike mete to translate holy scripture
into englishe. Lo to thys question if he
will aunswere trew englishe, he muste
aunswere nay and not no. But and
if the question be asked hym thus lo: Is
not an heretyque mete to translate holy
scripture into englith. To this questiō
lo if he wil aūswer true englith, he must

Figure 3:
No and *Nay* Distinguished in *Workes of Sir Thomas More* (1557).

This is an alliterative poem of the fourteenth century. Though prefests organizational, grammatical, and stylistic features more proper to the oral language of speech than to the visible idiom of literacy. *No/nay* and *yes/yea* are not kept distinct in

served in writing, alliterative poetry manithis text, and line numbers cited in the glossary by Skeat sometimes contradict his interpretation here.

The form **yis** is used in a similar way in the **Book of the Duchess** to characterize the gentility and good manners of an aristocratic character who is probably also the person for whom the poem was composed, and hence a possible benefactor of honorific intent. The narrator comes upon a figure contemplating, otherwise alone, in a garden:

'But at the last, to sayn ryght soth,
He was war of me, how y stoode
Before hym and did of myn hoode, [removed]
And had ygret hym as I best koude,
Debonayrly and nothyng lowde. [politely]
He sayde, "I prey the, be not wroth.
I herde the not, to seyn the soth, [no matter]
Ne I sawgh the not, syr, trewely."

"A, goode sire, No fors," quod y,
'I am ryght sory yif I have oughte
Destroubled yow out of your thoughte. [goodly]
Foryive me yif I have mystake."

"Yis, th'amendes is lyght to make,"
Quod he, "for ther lyeth noon therto.
There ys nothyng myssayd nor do."
Loo, how godoely spak thys knyghte, [arrogant nor
As hit had be another wyghte: affected]
He made hyt nouther towgh ne queynte. [514-531]

In his edition (p.551) Fisher cites this passage as an instance of "Chaucer's 'good ear' for voice as a clue to character." But no one actually talks in verse, nor did in the fourteenth century. The passage is carefully visualized to reveal character: the narrator uses polite, deferential, formal second person pronominal and verbal forms while the other person uses more intimate singular forms to put the narrator at ease. The form **yis** emphasizes how lightly the amends are to make, and by virtue of that, the grace and gentility of the speaker.

In the **Canterbury Tales** Chaucer uses the unmarked form **yea** five times as frequently as the marked **yis,** and **nay** is used at least ten times more frequently than the behabitively marked **no.**[14] It is thus quite clear that **yis** and **no** are more restricted than **yea** and **nay,** and contextual analysis shows unmistakably that the marked forms are reserved for expressing behabitive involvement of stylistic significance. Of the ten instances of **yis,** eight occur within individual tales. Two of these have already been treated in the discussion of "The Franklin's Tale." Three of the remaining six occur in "The Miller's Tale," all as responses to negatively framed questions that themselves have behabitive force. The tale tells of the cuckolding of the carpenter, John, by his young wife, Alison — **Jalous he was, and held hire narwe in cage** [I, 3224] — and a clerk, Nicholas. The wife, however, is terrified of her husband's jealousy:

Myn housbonde is so ful of jalousie
That but ye wayte wel and been privee,
I woot right wel I nam but deed," quod she. [3294-3296]

John and Alison are awakened one night by the sound of a love song performed by Absalon, another of her admirers. John asks,

"What, Alison, herestow nat Absalon,
That chaunteth thus under oure boures wal?"
And she answerde hir housbonde therwithal,
"Yis, God wot, John, I heere it every deel." [3366-3369]

Given John's jealous nature, there is doubtless some agitation in the negative framework of his question, as there is also in his use of **thus** to characterize the immediacy and erotic quality of the chanting. The line might also be scanned with non-syllabic **r** in **under,** giving metrical and rhetorical prominence to three successive words: **und'r oúre boúres wál.** Her response is clearly behabitive, marked not only by **yis,** but also by the oath, and amplified by the degree expression **every deel** "every bit of it" giving a sense of her desire to express absolute cooperation in her husband's indignation.

The other two instances in "The Miller's Tale" reveal character as well as situation. The opportunistic clerk, Nicholas, sets up an elaborate scheme by which to get the carpenter out of the way so he can make love to Alison. But he must get the carpenter to take the initiative in entering the trap. Nicholas's eagerness shows when John asks,

"Is ther no remedie in this cas?"
"Why yis, for Gode," quod hende Nicholas. [3535-3536]

Thus has the fish taken the bait; Nicholas has in mind a perfect "remedy," though it will not benefit John. Slightly later, as part of his developing scheme, Nicholas asks,

"Hastow nat herd hou saved was Noe...?"
"Yis," quod this Carpenter, "ful yoore ago." [3533, 3537]

The carpenter would have Nicholas know that he is no fool; of course, he knows the story of Noah, and has known it for a long time. This is not only the answer Nicholas wanted to hear, but the very eagerness he wanted to hear in it. In this way Chaucer shows the jealous carpenter's gullible cooperation in the seduction of his wife. A similar use of **yis** is seen in "The Friar's Tale" when the avaricious Summoner, having elicited a question which, he thinks, will lead to money in his pocket, responds, "Yis... pay anon—lat see—/ Twelf pens to me, and I wol thee acquite" [III, 1598-1599]. **Yis** is used in "The Parson's Tale" to answer the rhetorical question, "Is nat this a cursed vice?" [X, 555-560]. And it is used with scurrilous emphasis in "The Summoner's Tale" [III, 1685].

Of the three occurrences of **no** within the tales themselves, two, from "The Franklin's Tale," have already been discussed. The third occurs in "The Physician's Tale" when, like Dorigen, the maiden Virginia must choose between death and dishonor. She cries out to her father:

And seyde, "Goode fader, shal I dye? [must]
Is ther no grace, is ther no remedye?"
"No, certes, deere doghter myn," quod he. [VI, 235-237]

The three marked forms of response which occur in the pilgrimage framework of the **Canterbury Tales** are all examples of irony. By the very exaggeration of response, expressed by use of the marked forms, characters indicate meanings contradictory to the expressions used. The first instance occurs in the "Prologue to the Manciple's Tale." The Manciple, purchasing agent for a college, who juggled his accounts for personal profit, has openly derided the drunken Cook, with whom he may have done business in the past. The Host warns him:

'But yet, Manciple, in feith thou art to nyce, [silly]
Thus openly repreve hym of his vice.
Another day he wole, paraventure [per chance]
Reclayme thee and brynge thee to lure— [loss]
I meene, he speke wole of smale thynges,
As for to pynchen at thy rekenynges
That were nat honeste, if it cam to preef."

'No," quod the Manciple, "that were a greet mescheef!
So myghte he lightly brynge me in the snare.
Yet hadde I levere payen for the mare
Which he rit on than he sholde with me stryve. [as I may prosper]
I wol nat wratthen hym, also moot I thryve!" [IX, 69-80]

The Manciple's use of **no** is exaggerated; for he says that he will make it up to the Cook by giving him a draft of good wine although the Cook is already thoroughly soused. And then, addressing the rest of the Pilgrims, he adds:

"And right anon ye shul seen a good jape. [joke]
This Cook shal drynke therof, if I that may.
Up peyne of deeth, he wol nat seye me nay." [84-86]

The Manciple's derision did not end with the Host's warning, it only changed in character. For the Cook accepted the drink, and the narrator interjects:

What neded hym? He drank ynough biforn.
And whan he hadde pouped in this horn [puffed]
To the Manciple he took the gourde agayn. [89-91]

As Fisher notes, the **double entendre** is unpleasant; but it appears the Manciple has treated the Cook with great contempt and sarcasm.

The Friar uses **yis** with ironic courtesy when, after cutting off his argument with the Summoner, the Host demands that the Wife of Bath begin her tale:

"Do, dame, telle forth youre tale, and that is best."
"Al redy, sire," quod she, "right as yow lest. [please]

If I have licence of this worthy Frere."
"Yis, dame," quod he, "tel forth and I wol heere." [III, 853-856]

The remaining instance of a marked form in the **Canterbury Tales** occurs in one of the most interesting and commented upon bridges in the entire work. The interminable "Monk's Tale" has been interrupted by the Knight, and the Host looks about for another teller:

Thanne spak oure Hoost with rude speche and boold,
And seyde unto the Nonnes Preest anon,
"Com neer, thou preest, com hyder, thou sir John!
Telle us swich thyng as may oure hertes glade. [such]
Be blithe, though thou ryde upon a jade. [nag]
What thogh thyn hors be bothe foul and lene?
If he wol serve thee, rekke nat a bene.
Looke that thyn herte be murie evermo."
"Yis, sire," quod he, "Yis, Hoost, so moot I go.
But I be myrie, ywis, I wol be blamed."
And right anon his tale he hath attamed, [entered upon]
And thus he seyde unto us everichon,
This sweete preest, this goodly man sir John. [VII, 2809-2820]

The tale that follows this is among the most sophisticated of Chaucer's compositions, a tale of wit, gentle satire, and irony directed both at literary forms and conventions and at particular tales and tellers within the fiction of the pilgrimage. If it is at all true that Chaucer made some effort to fit tale and teller, then the Nun's Priest must be regarded as a man of refined linguistic capabilities. His response to the Host's rudeness is not disappointing. The Host has used derisive terminology, familiar grammatical forms proper to the address of an intimate or a menial, and the bald second person imperative.

The Nun's Priest has responded with exaggerated courtesy, overtly subservient but with masterful irony. There is too much evidence here of exaggeration to indicate any real subservience. For one thing the phrase **so moot I go** may very well refer to an imagined threat of physical abuse by the Host. **Moot,** "have opportunity, be permitted, be obligated to," is entirely ambiguous; but **go**, "walk, pass from place to place, move," usually refers in Middle English to physical movement, and it could hardly be used without at least an association of such movement. But however crude the Host may be, there is no suggestion, here or elsewhere, of his threatening physical violence. The reference of the Nun's Priest constitutes, by its exaggeration, a behabitive response to the Host's unseemly behavior.

Chaucer marks this response not only by the lexical form **yis** and the ironically courteous **sire**, but, with greatest visible effect, by splitting the repetition of **yis** to give an effect of its being not one repeated response, but rather an iteration of instances:

"Yis, sire," quod he, "yis, Hoost, So moot I go."

14.
John S. P. Tatlock and Arthur G. Kennedy, **A Concordance to the Complete Works of Geoffrey Chaucer and to the Romaunt of the Rose,** 2 vols. (Washington: The Carnegie Institution, 1927).

The subservience is so clearly exaggerated that the response can only be interpreted as another example of the subtly formidable wit of "this swete preest, this goodly man sir John."

Whatever we come to know of Chaucer's mind or artistry, we come to know from reading his words on a page. Such interpretation, an act of assimilation by which the organism derives from spatial configurations a material structure for its internal processes of consciousness, is possible for three reasons: first, because the organism has learned how to accommodate the world of visibility and to take advantage of it; second, because visible text perseveres and the aggregate of human experience has provided a mechanism by which translation through time is possible; and third, because Chaucer, in the very externalization of his consciousness, has planned for its transmission by visible means. He more than once expressed his concern, perhaps most eloquently at the conclusion of **Troilus and Criseyde:**

Go litel bok, go litel myn tragedye....

And for ther is so gret dyversite
In Englyssh and yn wrytyng of oure tonge,
So prey I God that noon myswryte the,
Ne the mysmetre for defaute of tonge.
And red wherso thow be, or elles songe, **[V, 1786,**
That thow be understonde, God I beseche— **1793-1798]**

And, in an apparently somewhat aggravated mood, he wrote:

Adam scryveyn, if ever it thee byfalle **[scribe]**
Boece or Troilus for to wryten newe,
Under thy long lokkes thow most have the scalle
But after my makyng thow wryte more trewe!
So ofte a daye I mot thy werk renewe
It to corecte and eke to rubbe and scrape;
And al is thorugh thy neglygence and rape!

The sense of vivid reality, the depth of vision, the profound realization of nature, the world, and the human condition in the fourteenth century come to us, finally, through his ability to choose visible forms of expression that would convey, and continue to convey. Without help and without feedback. The particular contours of thought traced from his expressions for "yes" and "no" are perhaps less significant in themselves than in illustrating the extent of detail to which he carried his effort to be understood through visible means. No wonder he took writing so seriously "it to corecte and eke to rubbe and scrape."

Biographical Note

Charles Cox is pursuing doctoral studies in the Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, where he has been a Western Publishing Company Fellow. He earned the BSEE and MSEE degrees from the Moore School of Electrical Engineering, University of Pennsylvania in 1970 and 1972 respectively. His areas of interest include visual perception and analogue circuit design.
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Barry Blesser is currently an Associate Professor of Electrical Engineering at Massachusetts Institute of Technology where he is engaged in research and teaching. He received his education at MIT where he received his S.B., S.M., and Ph.D. degrees in 1964, 1965, and 1969 respectively.
His current activities are concerned with the perception of auditory and visual stimuli with an emphasis on the recognition of handprinted characters. Other activities include the development of professional audio equipment and the perceptual basis for reverberation.
Dr. Blesser is a Senior member of the Institute of Electrical and Electronic Engineers, a Fellow of the Audio Engineering Society, and a member of the Acoustical Society of America.

Murray Eden is Professor of Electrical Engineering at Massachusetts Institute of Technology. Trained as a physical chemist and applied mathematician, he did research primarily on the modeling of physiological and biophysical processes until he came to MIT in 1959. In the early 50's he began to use generative models for the description of stochastic processes in morphogenesis. After moving to MIT he became interested in studying conventional symbol systems and developed (with Morris Halle) a generative theory of cursive script. With this theory as a basis, computer programs were developed to read standard cursive English. This also led to a series of studies of graphic symbols; hand printed block letters, printed music scores, circuit diagrams. He and his colleagues and students in Cognitive Information Processing Group have continued to study both the theoretical and the pragmatic aspects of pattern recognition. He is currently interested in the relation between pattern recognition and the psychology of perception.

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Analogous forms of the main tools — grammatical and contextual — used in the study of verbal communication are presented for the study of visible communication. The notion of an image context, analogous to linguistic context, is discussed for general two- or three-dimensional scenes. A specific example of image context is graphical context; it is the context embodied by the letters of a type font — all of which are designed with various consistencies among the style and placement of strokes and serifs. A grammar is presented for expressing the consistencies which exist within any one type font. Two sets of rules — one for strokes and one for serifs — are given together with examples of their use. Finally the inter-relationships of this work with that of the type designer is also discussed.

Context

	Character	Physical Attribute "Closure"	Functional Attribute "Closure"	Letter Label
(a)		Open	Open	C
(b)		Open	Closed	O
(c)		Closed	Open	C
(d)		Closed	Closed	O

Figure 2
Four characters, indicating the possible combinations of states for the physical and functional attributes "closure."

In an earlier paper, Blesser, et al. (1973) described a technique for formulating a set of underlying descriptors of characters called **functional attributes.**[4] Whereas physical attributes are those attributes which can be determined directly from measurements made on the physical image, functional attributes are abstract character descriptors, and, as such, do not have, a priori, any invariant relation to one or more physical attributes. In Figure 2, for example, there is shown a series of characters. In Figure 2a the character is physically open and since it is recognized as a "C," it is functionally open. In Figure 2b the character is still physically open; however, since it is recognized as an "O," it is functionally closed. The third character illustrates the reverse situation in which the character, though physically closed, is recognized as a "C"; hence, functionally open. Finally, the fourth character is closed in both senses. The procedure by which the physical representation is translated into the functional interpretation was termed

4
The term "character" will be used to refer to the symbol before recognition has taken place. Once the identity of the symbol has been determined, it will be referred to as a "letter." For a discussion of "The Correlation Hypothesis," a related concept in linguistics, see Watt (1970).

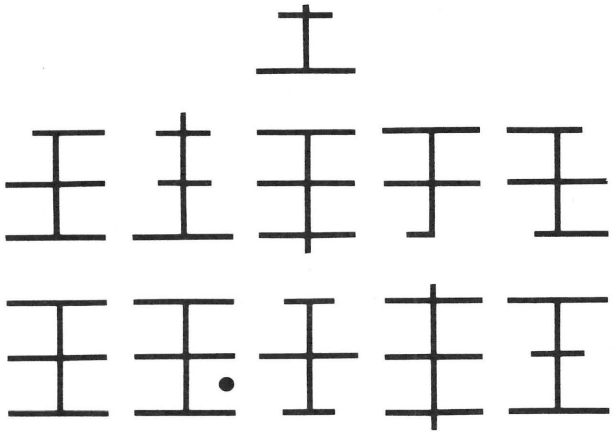


Figure 3
A Chinese ideogram and below it two rows of variations: some of these are sloppy versions of the same ideogram; others are different ideograms. For the "answers" see footnote 6.

graphical context in the paper of Blesser, et al., (1973).

Further work has indicated that it is more appropriate to term these procedures **physical-functional rules** (PFR). There is no unique set of rules applicable to a particular physical character standing in isolation. Their specific form depends upon the context of an image. We use the term **context** to refer to all the factors which can establish constraints on the definitions of the PFR's. One way to view a PFR, then, is as a function of two arguments. One argument is drawn from the set that contains the values of measures of attributes made on the physical image. The other argument is drawn from the set that contains the values of measures made on the various sources of contextual information. Note that these contextual sources will include all information which is relevant to the recognition of images. This will often include information which is not the result of any direct physical measurement of the image, as is the case, for example, with linguistic and cultural context which will be defined below.

With the definition of context so broad, many specific forms of context can be included under this heading. Semantic and syntactic context, which will be referred to here collectively as **linguistic context,** are two forms which have already been explored; see, for example, Chien and Ribak (1972), Harmon (1972), and Riseman (1971).[5]

Another kind of context might be termed **cultural context** — the context due to one's social or ethnic background. As an example of how powerful this form of context is, consider Figure 3, where a single ideogram from the Chinese

5
Linguistic context includes the use of information contained in structure and meaning of strings of characters (with reference to a particular language) so as to rule out strings of letters which could not possibly be part of the language. For example, consider the following sentence: During his stay in the dungeon the prisoner's diet was restricted to _____ and water. The syntax of English implies the blank must be filled with a noun phrase; the semantics of English implies that the most likely noun is "bread." Earlier work, however, made use of linguistic context in a somewhat different light. Typically, physical attributes are used to make a first guess at the letter or letters the given character may represent. Linguistic context is then used as a post-processor which maps letter label into letter label. The thrust of the work reported on here views context as that which establishes a link (via the PFRs) between the physical and functional representations. In other words, context will be used here between the character and letter representations, rather than within the letter interpretation.

language is shown at the top and below it a number of variations on this ideogram. Some of these variations result in ideograms which have meanings distinct from the one given at the top of the figure, while other variations result in ideograms which have the same meaning as the given ideogram. Probably most American readers will have difficulty in picking out the ideograms which are just stylistic variations of the given ideogram, whereas few Chinese readers will have such trouble. For the answers to Figure 3, see footnote 6.

Image Context

Of interest in this paper will be a further form of context termed **image context.**[7] This form of context will refer to all measurements which express the presence of pleonasm[8] in an image.

As an example of image context, consider a scene containing several different styles of dining room furniture sets; say, in a furniture store display area. The image context of this scene would consist of the types of molding and other routing work, the grain of the wood, and the taper of the table and chair legs, together with the way these artistic variations are blended together to form distinct sets of furniture. Again, the presence of image context can be appreciated by noting that a chair taken from one dining room set does not "fit" when used to replace a chair in a different syle set,[9] even though it can perform the same function with respect to sitting.

A general, more formal definition of image context is as follows. Image context will be operationally defined to be a set of algorithms; each algorithm will take images of the physical world as input and yield two sets E, R as output. Each member of E will be a description of the pattern present on various subregions of the image. This set, then, will be referred to as the **set of elements.** For example, when working with a modern face type font, members of E would typically include each of the stroke styles and each of the serif designs. Each member of R will consist of relations (or rules) which are satisfied by various spatial arrangements among the members of the set of elements and other portions of the image. This second set will be referred to as the **set of relations.**[10] Again, when working with a modern

6
The "Answers" to Figure 3 are as follows. The first and last ideograms in each row are stylistic variations of the given ideogram. The remaining ideograms in each row are different from the given one.

7
While admittedly an ultimate pattern recognition machine will incorporate many forms of context, there first must be an understanding of the various forms of context. Hence, the seemingly limited scope of this paper is not intended to belittle the importance of other forms of context; rather, the power and limitations of image context need to be studied and understood as a prerequisite of the overall goal.

8
In normal usage, "pleonasm" refers to the use of redundant words in a sentence; specifically, if these redundant words are removed by simply deleting them from a sentence, the meaning of the sentence is unchanged. For example, in the sentence "the man he went fishing," the word "he" can be deleted without altering the meaning of the sentence. In a similar vein, the study here is concerned with those aspects of a character which if removed or reduced to some neutral form (e.g., remove all serifs and reduce all stroke styles to a single line) do not change the letter label assigned to the character.

9
Image context, then, may be viewed as the visual analog of syntactic context in linguistics. For languages, syntactic context takes the elements, e.g., phonemes, of a language and provides relations or rules describing the valid combinations of the elements. Image context takes as elements patterns which occur on various subregions of an image and includes rules which describe the valid relationships among these patterns and the rest of the image. For a discussion of what appears to be the speech domain analog of image context, see the article by Lane (1965), pp. 288-290.

10
Strictly speaking, this second set should probably be referred to as a "class,"

face, typical members of R would be the allowable combinations of stroke ends and serifs.

Note that the above definition is not intended to be an alternative definition of a picture grammar or language. Image context is primarily a way of representing the pleonasm of an image and only secondarily its structure. In other words, image context is not concerned so much with the basic structure as with various attributes of a particular style which enable one embodiment of a basic structure to be defined as distinct from another. Thus, image context may be viewed as a portion of a picture grammar. This distinction can perhaps be clarified by considering again the dining room furniture example from above. A picture grammar, as usually defined, would deal with the relationships to be satisfied in order to define the object "chair." Image context would be concerned with relationships which enable one style of chair to be defined as distinct from another, as well as with the commonalities in design that inform the competent observer that a particular table goes with a particular chair.[11]

Graphical Context

The term image context, as defined above, is an all-encompassing term. The remainder of this paper will be restricted to a discussion of images composed solely of characters. Accordingly, the term, **graphical context**, will refer to all measurements which are derived to express the style and form of the type font. In other words, graphical context is a specialization of image context used when the image consists solely of characters.

Restricting the definition of image context to form a definition of graphical context implies that the criteria for membership in two sets E, R (which comprise the information conveyed by graphical context) need to be correspondingly restricted. It is to be hoped that greater insight into the definition will be obtained by interweaving it with the following example.[12]

Consider the case in which the input image consists entirely of characters from a single roman type font and consider what factors might constitute the graphical context of this font. Since it is a roman font, serifs are intuitively part of

11
Whether it is indeed possible to separate the aspects of an object fundamental to its definition from those which are pleonastic is currently being studied for images consisting solely of printed English type font characters.

12
Although this example deals with machine-printed characters, graphical context is also applicable to hand-printed characters.

the graphical context. Further, regularities in the shape or design of the serifs are a part of graphical context. To be sure, not all of a font's style is carried by its serifs: the design of the strokes which compose the characters are also part of a font's graphical context. Additionally, there are such factors as the weight — light, medium, or bold; width — condensed, normal, or expanded; x-height and axis. Also, there are the effects that all these factors taken together have on the viewer — e.g., the color and texture of a block of type. The above list is by no means an exhaustive one. However, it is sufficient to suggest that some restriction is necessary in order that the main thrust of the work is not obscured by a myriad of details. Therefore we will restrict the discussion to cover the first two factors only — serifs and stroke thickness. It should be borne in mind that this restriction applies to the discussion below and not to the method in general.

Such a set of attributes, however, is still not enough to describe completely the roles of the serifs and strokes in the graphical context of the font. For example, knowledge of the design of a serif in a particular font does not, in general, make it possible to tell whether these serifs occur at such places as the top of an "A" or the lower end of a "C." Another set must be formed which contains the relations between each serif and the stroke to which it is joined. Each element will be a relation or rule for predicting the valid arrangements among members of the set of elements for the font under consideration. One way of expressing such a relation is to give it explicitly by stating the locations at which certain serif/stroke combinations occur. Alternately, it may be expressed implicitly by giving a relation or rule which is satisfied by various stroke-serif combinations in particular subregions of the image. Such rules constitute the set R.

To summarize: The objectives of an image context algorithm are to search the image to determine the members of two sets. Members of E are patterns which occur in subregions of the image. Members of R are relations or rules among these patterns and the rest of the image. In the particular subfield termed graphical context, with the restrictions imposed above for this discussion, the

set E will contain a suitable description of each of the various designs of the serifs (if any) and strokes which occur in the characters. The set R will contain the relations present among the serifs and strokes of the characters under consideration.[13]

The aim of the sections to follow is to build up a general framework so that an arbitrary set of characters drawn from any single type font can be analyzed to determine their graphical context. Such a general framework will be approached by studying and developing a particular framework for expressing the graphical context of a few specific type fonts. First, we need to differentiate three sources of variability: those variations due to the style of an isolated character, those variations due to groups of characters, and those variations which might be termed physical noise. The last source of variability will not be discussed in this paper. Further, we choose to restrict our analysis to the single character level, thus variability resulting from forming groups of characters — such as ligatures and letter spacing — will also not be discussed in this paper.

We make no claim that the empirical methods used for determining the graphical context of a given set of characters were consciously used when the characters were created by the type designer.[14] Another point is that no attempt has been made to establish a recognition procedure for identifying the conventional name of the font from which a given sample of characters has been taken; graphical context may include necessary conditions for identifying the font, but it does not necessarily include sufficient conditions. A final point is that no claim of uniqueness for the rules is made; the criteria for choosing the final form of the rules presented below were compactness, completeness, and simplicity. Rules that better fulfill these criteria may be found.

13
The definition of graphical context does not imply that each character exhibits all the members of the set E of a given style. For example, one part of the graphical context will often be a serif which is used throughout a type font, but that is not to imply that all characters in that font have serifs. Specifically, O's rarely have serifs.

14
Evidently, according to Gürter (1967), when teaching students to draw letters, attention first focuses on the drawing of a couple of representative letters — e.g., n and o in Gürter's paper. Once these have been mastered, drawing the remaining letters follows quickly. If this approach is valid, it would lend at least indirect support to the implicit existence of these rules.

Type Font Style Rules

Recall from the discussion of graphical context that for the purposes of the present discussion there are at most two factors which cause differences in appearance among printed characters: 1) the markings which occur at such places as the ends of strokes and on corners, and 2) the style of the strokes of which the character is composed. In the formalism presented here, the effects of each of the above categories can be expressed by defining the contributions each category makes to the sets E and R.

First, consider the subsets of E contributed by each category. The most common marking is the serif — a short cross stroke which often occurs at the ends of the main strokes and on the corners of most characters. However, since not all markings can be classified as serifs, particularly when dealing with lowercase characters, it was found useful to adopt the following more general definition of markers. A **marker** is a portion of a character which, if removed, will not result in a loss of the character's identity, or in the formation of an ambiguity with another character.[15] Suitable descriptions of each marker will form one subset of E. This subset will be referred to as the **set of markers.**

Often the stylistic variations of the strokes take the form of two different stroke thicknesses or widths. Another variation is the use of a combination of decorated and plain strokes. Suitable descriptions of each stroke style will form the other subset of the set of elements, **the set of strokes.**

Clearly the task of expressing the graphical context of any printed character is enormous. The following assumptions and limitations are made to narrow down the task to manageable proportions.

The set E will be assumed to be given. We make this assumption because the determination of the elements is basically a detection question. It is more appropriately discussed when an implementation is under consideration, rather than as part of a theoretical study.

The discussion below will be limited to machine-printed characters. Within this realm there is, conceptually, no restriction on the family from which the type font is drawn. However, only a limited amount of work has been done on type fonts from the swash, script, and 3-D families. The main thrust of the work has dealt with fonts from the roman and sans-serif families. All of the examples presented below will be drawn from one of these two families.

The discussion below will be further limited to uppercase characters (majuscules) because initially they appeared to have greater internal consistency than lowercase characters (minuscules).[16] For example, there are at least four distinct markers for the lowercase of a typical font, whereas there are typically two markers for the uppercase.

15
Note that a character may have more than one marker. Further note that under this definition all of the tail of a "Q" is not considered a marker because its complete removal would result in an "O."

16
Ongoing research has indicated that this is not necessarily the case.

The set of strokes will be limited to at most two members; only a few type fonts have been found to date which use more than two different stroke styles. For ease of reference, when two distinct stroke styles are required, they will be given the generic titles of thick and thin. When the stroke styles do indeed come in two physically different thicknesses, the generic titles will take on their usual interpretation.[17] However, stroke combinations such as plain, decorated; single, combination; will also be assigned the appropriate **thick, thin** designation.

The set of markers will similarly be limited primarily, but not exclusively, to two members. A description of the members in this set is a bit more involved than the description of members of the stroke set. The discussion of the marker set will be included in the section below entitled Marker Placement Rules.

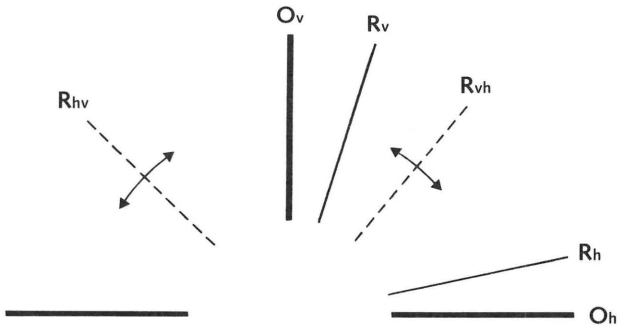
In the remainder of this paper we will deal with machine-printed, uppercase characters composed of at most two stroke styles and taken from the roman or sans-serif families. As the set of elements will be assumed given, the objectives will be to determine members of the set of relations, R. It was found convenient to express the required relations implicitly in the form of rules.

Stroke Style Rules

The rules for establishing the style of each stroke will use the coordinate system shown in Figure 4. The use of two sets of orientations provides the flexibility needed to deal with skewed type fonts, as is the case with italics. The orientations suggested by such large-scale phenomena as the outline of the page or the run of the type will be referred to as **objective orientations;** objective vertical, O_V, and objective horizontal, O_H, etc. The orientations defined by the individual characters themselves will be referred to as relative orientations; relative vertical, R_V, and relative horizontal, R_H, etc. As shown in the figure, lines oriented between R_V and R_H are assigned orientations R_{VH} or R_{HV}.

Since the relative orientations are tied directly to the characters and it is the character strokes that are of interest, it might seem that defining the objective orientations is superfluous. Indeed, the objective orientations need to be specified only if the identity of the characters is not available a priori. Without knowledge of either the character identity or the objective orientations, more than

17
This naming convention was adopted to make the rules more readily comprehensible. However, it will be seen that the rules themselves determine which of the strokes present are assigned which name. Hence, it is possible that in some type fonts the physically thick strokes will be referred to as thin in the rules, and vice versa.



one meaningful assignment of relative orientations may be made. Subsequently, then, more than one character stroke style assignment can arise. For example, suppose it is not known whether the character shown in Figure 5a is a "C" or a "U," nor are the objective orientations O_V and O_H known. Then, as shown in Figure 5b, two meaningful assignments of the relative orientations R_V and R_H are possible — depending on whether the character is interpreted as representing the letter "C" or the letter "U." For convenience, the two relative orientation assignments may be rotated so that they each line up with the objective orientations defined by the page, as has been done in Figure 5c. Finally, by stroke style rule 3 (which is presented below), the two distinct style assignments in Figure 5d are possible.

Figure 4
Orientation conventions for stroke style rules. Objective orientations are denoted by "O"; relative orientations are denoted by "R."

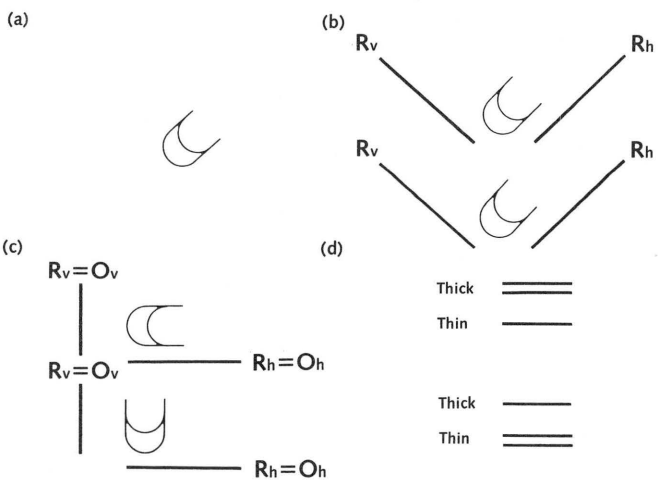


Figure 5
Example of a problem which can arise if neither the character identity nor the objective orientations are known: a) unknown character, b) two relative orientation assignments, c) assignment of relative orientation to objective orientations of this page, d) stroke assignments consistent with stroke rules.

In the rules below the terms "straight strokes" and "curved strokes" are used in a sense broader than those conventionally associated with these terms; hence, definitions are needed for these terms also. The necessary definitions may be based on the terms "orientation" and "thickness" already defined. A **curved stroke** is a stroke whose thickness along any portion of its extent depends upon the orientation of that portion. On the other hand, a **straight stroke** is a stroke with a single orientation along its entire extent, and hence it has a single thickness. Geometrically straight strokes readily fulfill this extended notion of straight. In addition, this definition allows strokes such as those shown in Figure 6 to be included in a category of straight strokes. Note also that a straight stroke may take on either one of the two styles — thick or thin — along its extent.

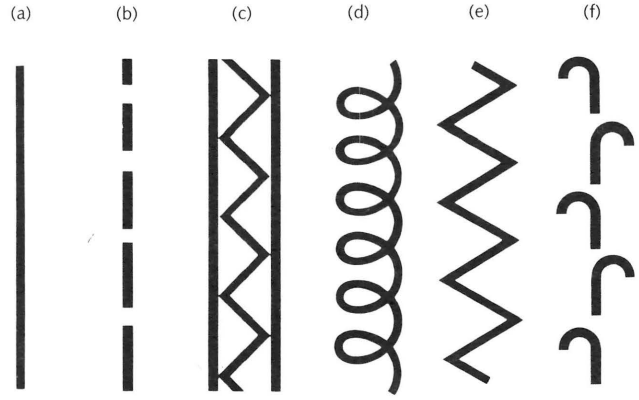


Figure 6
Typical straight strokes.

With the above background, the **stroke style rules** can be given; they are to be applied in the order listed.

Main Stroke Style Rules

1.
Every letter has at least one thick stroke.
2.
Two or more thick strokes never meet.
3.
Straight strokes with orientation R_H are always thin.
4. i.
Curved strokes are thin where they have orientation R_H.
ii.
Curved strokes are thick where they have orientation R_V.
5. i.
Straight strokes with orientation R_{HV} are always thick.
ii.
Straight strokes with orientation R_{VH} are thin (unless this would violate rule 1, in which case they are thick).
6.
Straight strokes with orientation R_V are thick (unless this would violate rule 2, in which case they are thin).

In addition, the following two conventions are adopted when applying the rules:
i.
The basic structure of the letter S is Σ.
ii.
The basic structure of the letter Y is Y.

which it is attached. There may be any number of secondary markers, although most frequently there will be only two of these. These secondary markers usually occur at one place in an entire font. Typically, one location of a secondary marker will be the bottom of a "J"; another secondary marker typically occurs on the bottom right leg of the "R." Should additional secondary markers be required, they may be added to the marker set—provided, of course, that rules appropriate for their use are added to the set of marker rules. Also, in some fonts, degeneracies may occur in which one or more of the distinct markers listed above take on the same design. Clearly, this causes no problems with the rules. Further, the rules have the ability to modify the appearance of a marker. For example, the most common modification will be the removal of a portion of a marker.

With the above as background the **marker placement rules** can now be given. As with the stroke style rules, it was found convenient to formulate the set of marker rules in terms of main and dialect rules. Also as before, when the dialect rules are used, they override conventions established by the main rules.

Main Marker Placement Rules

1.
All stroke ends have markers;
   i.
strokes with orientation R_H (including curve stroke ends)
receive a rounded marker;
   ii.
strokes with orientation R_V, R_{VH}, or R_{HV}
receive a square marker.
2.
All strokes with orientation R_V
terminating in a corner receive a square marker.
3.
Markers on the right leg of the "R" and the bottom of the "J" are secondary.

Dialect Marker Placement Rules

1.
Markers on horizontal stroke ends (including curve stroke ends) do not extend beyond the run of the type.
2.
Markers on corners composed of one R_{HV} (R_{VH}) stroke extend only to the left (right) of the vertical stroke.
3.
Markers on curve stroke ends extend only to the left (where left is determined by standing on the stroke and facing the end).
4.
Markers on all thin strokes are rounded markers.
5.
A marker on the lower end of the "C"
   i.
   extends only to the right
   ii.
   is not present.
6.
Of the markers on the corners of the "N"
   i.
   the one on the lower right corner is not present
   ii.
   neither marker is present.
7.
There is a secondary marker on the top of the "A."
8.
There is a secondary marker on the middle corner of the "W."

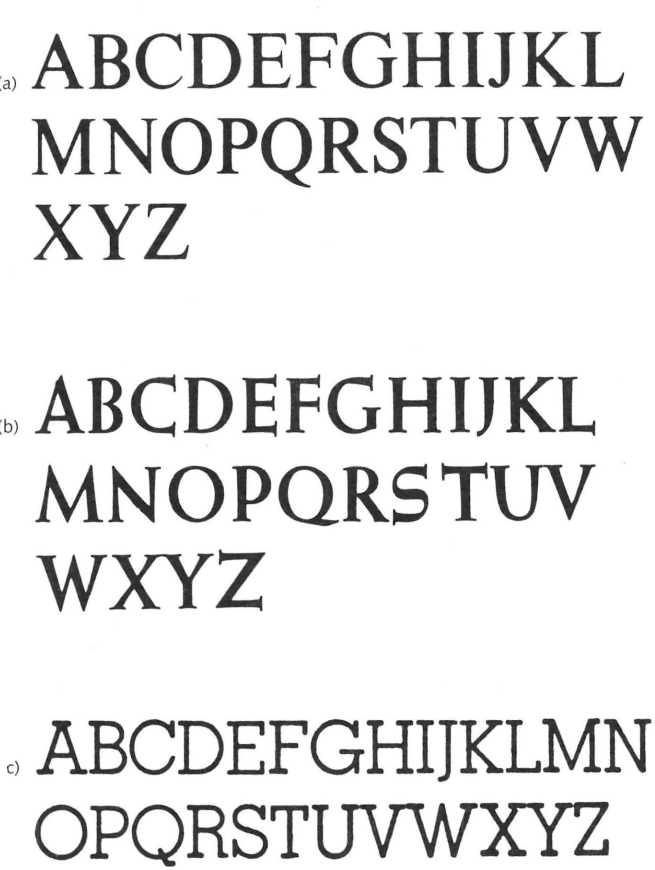


Figure 9
The type fonts a) Times New Roman, b) Weiss Initials Series III, and c) Linotype Memphis Light whose marker rules are given in the text.

For the type font shown in Figure 9a, in addition to the main rules, dialect rules 1, 2, 3, 5-ii, 6-i are in effect. In contrast, for the type font shown in Figure 9b, only dialect rule 6-ii is in effect. Finally, for the type font shown in Figure 9c, dialect rules 1, 2, 3, 4, 5-ii, 6-i are in effect.

After reading all the rules, the alert reader may speculate that there are "deeper" rules linking the two sets of rules given here. One such set might be: 1) Thin strokes take rounded markers, thick strokes take square markers; 2) where thick and thin strokes meet, the thick stroke determines the style of marker. Indeed, such rules may exist; however, a comparison of Figure 1-iii and 1-vi indicates that these deeper rules are more subtle than the example given here.

Conclusion

Two relatively compact sets of grammarlike rules have been developed for representing the graphical context of roman or sans-serif characters. The existence of these rules may yield some insight into the framework within which type designers have been working.

In order to appreciate this point, recall the large variety among type fonts resulting from the design/placement of strokes and serifs. These variations are describable via the appropriate combination of main and dialect rules. But what is the distinction between them? A main rule is one which pertains to all or a majority of the type fonts considered; a dialect rule describes a variation of the main rule which is brought into effect for specific type fonts. Consider now the number of rules in each set: there are seven main rules, together with one dialect rule for stroke placement; there are three main rules and eight dialect rules for marker placement. The large ratio of main to dialect rules in the case of stroke rules suggests that almost all fonts have the same relative arrangement of thick and thin strokes. On the other hand, the small ratio of main to dialect marker rules suggests than an appreciable variability exists among type fonts with respect to marker placement.

Let us return now to a consideration of the inferences about type design which can be drawn from this work. In the case of strokes, the rules suggest that when the type designer includes two stroke designs in his font he focuses on the creation of two stroke designs (generically referred to in this paper as thick and thin) but does not tamper with the relative arrangement[20] of the two stroke styles within a letter. For markers, the rules suggest that the designer feels himself free not only to design the markers themselves but, also, to prescribe their allowable placements. Note, however, that the number of main marker rules is not zero. Hence, the role of the type designer in marker placement is one of modifying a basic pattern — working within a basic set of rules to achieve an esthetically coherent whole.

20
"Arrangement" is used here, rather than "Placement," because the rules do not cover, for example, exactly where the center horizontal stroke on an "E" intersects the main vertical stroke. Instead, the rules point out the allowed combinations of thick and thin — in this "E" example both strokes cannot be thick, etc.

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Word Recognition Reconsidered: Toward a Multi-Context Model

Peter Mosenthal, Sean Walmsley, and Richard Allington

This paper first reviews the various models which have been proposed to explain word recognition. Several shortcomings of these models are discussed: for example, most word recognition models have described word processing almost exclusively in terms of linguistic variables and have overlooked several significant paralinguistic variables. A new model is proposed which describes word processing as a gestalt phenomenon, defined by the interaction of four types of context: linguistic, schematic, social, and strategic. The interaction of the variables within and between these contexts is explained in terms of the notions of context "transparency" and "opacity." The implications of previous word recognition models and the present word recognition model are also discussed in terms of defining good and poor readers. This paper argues that any definition of good and poor readers must be operationalized on the basis of paralinguistic as well as linguistic factors. It is further argued that good readers are those who are able to maximize the transparency within and between the four contexts for processing words.

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Word Recognition Reconsidered: Toward a Multi-Context Model

Peter Mosenthal, Sean Walmsley, and Richard Allington

A significant yet poorly understood question in the literature on reading research is what is meant by the process of "decoding" or "word recognition." Of particular interest are the differences between good and poor readers with respect to these skills.

Although much research has been conducted in an attempt to define "decoding" and "word recognition," this research has been quite fragmented. This stems partly from the fact that this research has focused usually on a few variables at a time — e.g., word frequency, word length, word meaningfulness, and word imagery — and has failed to control for the interaction between these variables. Another reason is that there has been little attempt to operationalize systematically what it means to say a word has been "decoded." Most operational definitions of decoding have emphasized identification or reproduction of physical aspects of a word; e.g., speed by which words can be pronounced, recognized, or compared under various tachistoscopic time-frame conditions.

In most of these experiments there has been little effort made to consider decoding as some type of process whereby one arrives at the meaning of a word. A third reason for the confusion in word-recognition research is that researchers have been more preoccupied with discovering data to support a given model rather than creating models which account for the disparate, often contradictory data. A final problem with word-recognition studies is that they have focused primarily on the question, "How is a word recognized?" and have overlooked the question, "Why is a word recognized?" In this regard, word recognition research has been preoccupied with investigating a means related to no well identified ends. Presumably the end is not merely recognition of a word as an orthographically pronounceable unit, but also the comprehension of a word as a semantic concept.

Further, these limitations carry over into the research which attempts to distinguish between good and poor readers' ability to recognize and comprehend words.

The purpose of this paper is to suggest several ways research in word recognition might overcome these limitations. These suggestions will then be extended to propose a possible framework for distinguishing between good and poor readers' ability to process words. The limitations of these models are discussed. A new model is proposed, which distinguishes between several types of contexts. Word recognition is viewed as a function of **transparency** and **opacity** within and between these contexts.

Transparency and opacity refer to one's understanding of how the parameters relate within and between given contexts. A context is transparent when the parameters are easily recognized and manipulated relative to a given end. A context is opaque if the parameters are difficult to recognize and/or manipulate. Examples of transparency and opacity are given relative to single and multiple encounters between a reader and text. It is noted that good readers are those who maximize transparency whereas poor readers are those who are subject to maximum opacity. Finally, a model of word recognition is described that demonstrates how a reader uses transparency of various contexts to process a word.

Models of Word Recognition

Three models of word recognition have been proposed: the bottom-up model, the top-down model, and the interactive model. The bottom-up model assumes that word recognition proceeds through a linear series of stages of analysis beginning with sensory representation and culminating in meaning (e.g., Gough, 1972; LaBerge & Samuels, 1974; Mattingly, 1972; Norman, 1972). In the top-down model it is assumed that the cognitive system directs the type and amount of information abstracted from the visual signal. The cognitive system is said to "select available cues" or "confirm expectancies." Under this approach, reading is viewed as a problem-solving task, with the visual signals simply being sampled, and only partially analyzed to confirm semantic hypotheses (e.g., Smith, 1971; Kolers, 1970). While some top-down systems are assumed to sample from several sources of information, including phonological sources (e.g., Goodman, 1970), others are assumed to specifically exclude some sources of information from word analysis (e.g., Smith, 1973).

A third type of model, descriptive of how words are recognized, is the interactive model. Interactive models may assume that processing is either bottom-up or top-down, but whatever the direction of the processing, the assumption is that processing occurs simultaneously at several levels of analysis. Under this approach word recognition is said to depend on information provided from all levels of processing (e.g., Norman & Bobrow, 1976; Rumelhart, 1977). Interactive models seem to differ from top-down systems largely in terms of the independence, yet interactiveness, of the various levels of analysis. This means that in the interactive system, each informational level (e.g., feature, letter, syntactic, semantic) attempts to solve the message input at its own level. Although each level's hypotheses are constrained by information from other levels, each level does its own job and is not simply a data source for the semantic system, which directs processing and decides where comprehension has occurred.

Unfortunately, even given these three models, there has been little consensus as to what is the basic unit of lexical processing and how this processing actually occurs relative to the different levels of a word. For example, even if one were to adopt the bottom-up model, one is still left with the problem of deciding whether the word is first recognized as a letter by letter event (e.g., Gough, 1972), as a series of spelling pattern units (e.g., Gibson, Pick, Osser, & Hammond, 1962; Gibson, Bishop, Schiff, & Smith, 1964; Gibson, 1970), or as a whole unit (e.g., Johnson, 1975, 1977).

Rather, comprehension is achieved when the message is understood at all levels of analysis (e.g., Rumelhart, 1977). Thus, instead of directing processing the cognitive system might constrain the hypotheses at "lower" levels of analysis, but is also itself constrained by lower level information (e.g., Hawkins, Reicher, Rogers, & Peterson, 1976; Marlsen-Wilson & Welsh, 1978).

Furthermore, even given the constraints of a bottom-up model, one further must decide among the following alternative interpretations of the lexical processing procedure. The first interpretation is that speech recoding does **not** occur as a mediating stage between visual and meaning analyses; this position maintains that there are direct pathways from the visual signals to meaning, making an intermediary phonemic strategy unnecessary (e.g., Baron, 1973; LaBerge, 1972; LaBerge & Samuels, 1974). The second interpretation is that recoding visual signals into a speech code is necessary in order to address those items in the mental lexicon (e.g., Gough, 1972; Rubenstein, Lewis, & Rubenstein, 1971). This view claims that the reader proceeds through the text in a letter-to-sound-to-meaning manner. The third interpretation is that the lexical access of each word occurs without speech recoding, but speech recoding then occurs in working or short-term memory in order to keep single items active long enough for semantic integration or message comprehension to occur (e.g., Johnson, 1977).

The basic problem posed by these different models and different positions is that although they suggest competing, often times contradictory hypotheses, they each can be supported empirically. In short, one can cite evidence in defense of any one of the three models outlined above, supporting any one of the positions that the letter, the multi-letter, or the word is the basic unit of word recognition, and supporting the positions that lexical recoding does take place — either directly or indirectly — or does not take place. (For substantial reviews of the evidence supporting these various positions, see LaBerge & Samuels, 1977; Levy, 1977; Marslen-Wilson & Welsh, 1978; Meyer, Schvaneveldt, & Ruddy, 1974.)

To account for this discrepant evidence, several reading researchers have argued that people process words differently because they possess different word recognition skills (e.g., Guthrie, 1973; Guthrie & Seifert, 1977; Jorm, 1977; Juel, 1978; Mason, 1976, 1977, 1978; Samuels, Begy, & Chen, 1975-1976). The basic shortcoming of this explanation is that it assumes that all children share the same purpose in processing a word — i.e., arriving at its semantic meaning. Such a view is expressed by Postman and Krusei (1977, p. 368) when they note that when subjects are given a levels-of-processing task:

It may be well to remember that subjects come to the experiment with a lifelong habit of processing words semantically. It may be a basic error to assume that instructions to attend to a nonsemantic property effectively shunt out this disposition. Rather, the imposition of a nonsemantic task may interfere to a greater or lesser degree with a persisting tendency to process words semantically. Thus, we see considerable merit in the recent suggestion of Arbuckle and Katz (1976) that nonsemantic orienting tasks may "simply provide a less efficient means of encoding semantic information" (1976, p. 362).

The typical view, then, is that good and poor readers both maintain the same goal when recognizing words — the goal of arriving at a word's semantic meaning.

It is traditionally assumed that because poor readers are less adept at achieving this goal than good readers, poor readers must have some type of developmental deficiency, strategy deficiency, linguistic deficiency, or sensory deficiency (cf. Cromer, 1970; Oaken, Wiener, & Cromer, 1971; Steiner, Wiener, & Cromer, 1971).

An alternative explanation of why people, especially good and poor readers, perform so differently in word recognition studies is because people have different goals (e.g., expectations or intentions) for processing words. Morris, Bransford, and Franks (1977) have demonstrated this point by noting that people attend first to the meaningfulness of a task before they attend to the meaning of a stimulus. In their study they showed that the semantic level of a word is not the most meaningful dimension of a word for a subject whose goal it is to recognize words which rhyme.

Several other studies have similarly presented evidence that people's intention to process determines how a stimulus is to be interpreted, even more than the semantic meaning inherent within the stimulus itself (e.g., Brewer, 1974; Flavell & Wellman, 1977; Mosenthal, 1977; Spiro, 1977).

That a person's goal determines the manner in which a person will process a word has been forcibly demonstrated in studies by Thompson, Massaro, and Estes. In a series of experiments Thompson and Massaro (1973) and Massaro (1973) demonstrated that subjects with a goal of processing words at a given level will make optimal use of this level, excluding or minimizing information from other levels. In particular, in their experiments Thompson and Massaro showed that if target letters are known in advance, then letters can be identified more accurately in isolation than in the context of a word or pronounceable nonword. On the other hand, when the target letters are not known in advance, letters can be identified more accurately in the context of a word. Similar results have been obtained by Bjork and Estes (1973) and Estes (1975, 1977).

A Preliminary Model of Word Recognition: The Variables

Most models define word recognition only in terms of a limited number of variables (typically linguistic). The above mentioned studies suggest that word recognition must be viewed as an interactive process. In this process both linguistic and non-linguistic variables must be considered. These include the following contexts: linguistic, social, schematic, and strategic (see Figure 1).

Linguistic Context. The linguistic context may be defined in terms of five levels of word processing: (1) orthographic, (2) phonetic, (3) syllabic, (4) morphemic, and (5) semantic. In the bottom-up model of word recognition, one starts at either levels (1), (2), or (3) and proceeds through (4) and (5). In the top-down processing model, one starts processing at either level (4) or (5) and proceeds through levels (3), (2), and (1). The interactive model allows readers to enter at any level, though processing occurs at all levels. The general scheme for such processing depends upon the relative opacity/transparency of a given level. Opacity/transparency refers to the ease by which a given level is accessed. For instance, "sight" words (e.g., **was, the, said, through**) are phonetically opaque but semantically transparent. This means that while one can easily access the semantic meaning of these words, ease of access via their phonetic features is relatively difficult. In contrast, the words **gig, bap** (Scottish for **loaf**), **cull,** and **sine** are phonetically transparent but semantically opaque.

Social Context. Social context can be defined as the co-operative interaction between a reader and the parameters of his environment (Garfinkel, 1967; Mehan, 1978; Mehan & Wood, 1975). Such parameters may include: (1) place of interaction, (2) person(s) with whom the reader is interacting, (3) time of interaction, and (4) task demands as defined by the context and the person for whom the reader is reading (e.g., teacher, experimenter, father). There are basically two general categories of social context—opaque and transparent. An opaque context is one in which the place, person(s), schedule, and/or task demands are unfamiliar to the reader; the maximally transparent context is one in which these parameters are all familiar

to the reader. For example, while the reader may be situated in a familiar classroom during the normally scheduled reading lesson (transparent parameters), he may be asked to perform an unfamiliar task (e.g., 50 msec. tachistoscopic identification task) by an unknown experimenter (opaque parameters).

Schematic Context. Schematic context in general refers to one's knowledge of the world (Anderson, 1977; Anderson & Pichert, 1978; Minsky, 1975; Winograd, 1977). The basic unit of a schematic context is a **schema,** which is defined in terms of "instantiating slots relative to a given frame." There are two types of frames — superordinate and subordinate. A subordinate frame represents some characteristic feature or example of a superordinate frame. Superordinate frames are said to have been instantiated by subordinate frames when possible interpretations (i.e., slots) of the superordinate frame are made specific. For example, the superordinate frame RESTAURANT would contain such possible "slots" as food preparation, food delivery, food consumption, and food type (in other words, food preparation, delivery, etc., are considered representative features of the concept RESTAURANT). Subordinate frames or features which may be used to instantiate the superordinate frame RESTAURANT are as follows: for food preparation, kitchen in full view vs. kitchen concealed; for food delivery, over the counter vs. via waitress; for food consumption, seated in an automobile vs. seated at a dining table; for food type, hamburger vs. Coquille St. Jacques. Instantiation occurs when a slot is filled by a specific feature or group of features. For example, one would instantiate the frame MCDONALDS by assigning to its slots the subordinate frames: kitchen in full view, over the counter food delivery, hamburger food type, etc.

The notions of opacity and transparency again apply to descriptions of schema types. An opaque schema is one in which the superordinate frame is difficult to instantiate due to lack of knowledge of subordinate frames. For example, the superordinate frame PIGGIN would be opaque either as an individual word or in a sentence context if one did not know its general subordinate frames for instantiating it. A **piggin** is, in fact, a small wooden pail with one long stave that serves as a handle. The subordinate frame STAVE would be opaque if one did not know its subordinate features such as "strip of wood," "thinness," "function to serve as the wall of a water container," and so on.

Strategic Context. The strategic context is defined by the range of strategies for reading behaviors (Newell & Simon, 1972). A strategy refers to "a pattern of decisions in the acquisition, retention, and utilization of information that serves to meet certain objectives, that is to insure certain forms of outcome and to insure against others" (Bruner, 1973, p. 135). Again, the notions of opacity and transparency can once more be applied. Strategic opacity may be a result of (a) a lack of knowledge specifying a pattern of decisions, or (b) having ill-defined objectives. One example of strategic opacity would be if the student has no knowledge of decision-making patterns for recognizing words, then he will be unable to acquire, retain, or use information relative to this end. An instance of this might be: if the reader has no visual analysis strategies for breaking polysyllabic words into manageable units, he will be unable to pronounce an entire polysyllabic word, if that is the desired end. Another would be if the student had no objective for recognizing a word, then no specific outcome could be insured.

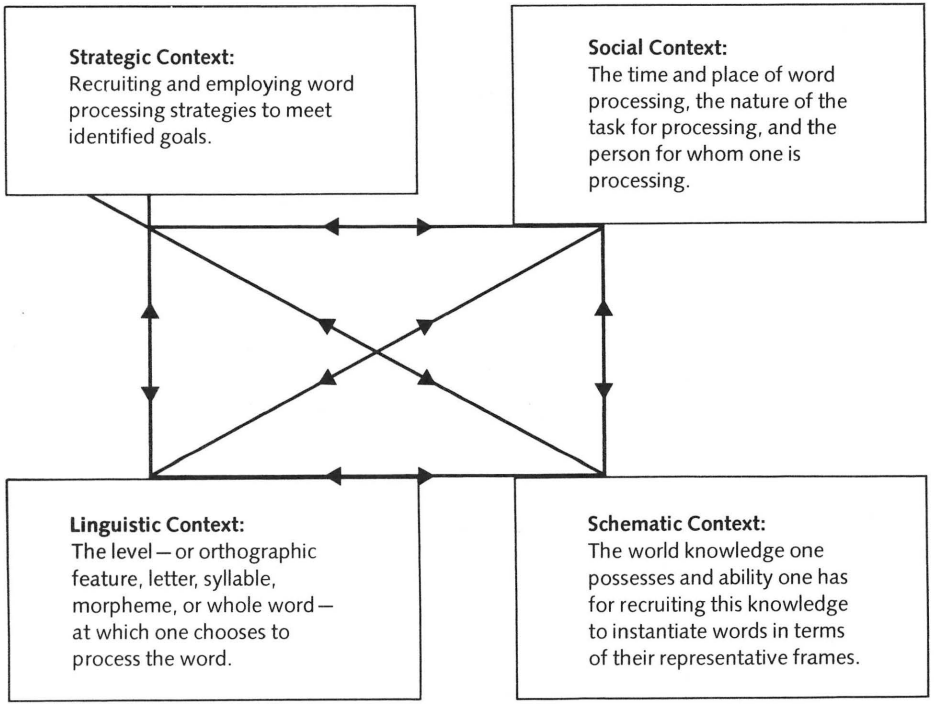

Figure 1.
Linguistic and paralinguistic factors influencing the manner in which a person recognizes a word.

Defining Good and Poor Readers as a Function of Contextual Transparency: Within a Single Episode of Word Processing

To present, the only context that has been considered in distinguishing between good and poor readers is the linguistic. In other words, independent variables in the research on good and poor readers appear invariably to have been linguistic, and they have been studied only in terms of absolute conditions in the social, schematic, and strategic contexts. Good and poor readers are typically distinguished in terms of their ability to process at a given linguistic level (i.e., orthographic, phonetic, semantic, etc.) within a formal social context (e.g., in a school testing situation), with one acceptable lexical instantiation (e.g., the teacher's definition), and with one strategic objective (e.g., meeting the teacher's expectations for processing the word).

According to the model presented here, good and poor readers would be defined quite differently. Given a single encounter with a text, an optimally good reader may be defined as one who is capable of maximizing transparency in the four contexts. For example, in the strategic context, the good reader might recognize the objective of, say, faithfully reproducing the phonetic representation of the word. This is in keeping with his understanding of the transparent social context in which, say, a reading teacher is using a formal oral reading test (e.g., Gray Oral) to assess his reading ability. In this circumstance, the schematic context is transparent, if the reader recognizes that the phonetic representation of a frame (lexical item) is to be instantiated independent of the semantic level. Finally, the linguistic context is considered transparent if the reader easily recognizes the phonetic patterns of the letters comprising the word.

Another example might be: in the strategic context, the good reader might recognize the objective of, say, reconstructing the meaning of a word. What this might mean is that given a word in context, the reader might have to infer the word's meaning from surrounding semantic context. This would be consonant with the transparency of the social context as perceived by the reader, as exemplified by the reader reading a passage for a teacher/experimenter using Goodman's (1970) miscue analysis, and substituting one synonym for another. The schematic context is transparent in this instance, given that the reader can instantiate the target word relative to the semantic context in which it occurs. The linguistic context is considered transparent if the reader's reconstructed meaning is semantically acceptable relative to its surrounding linguistic environment.

A final example is demonstrated by a good reader adopting, within the strategic context, an objective, say, of embellishing the meaning of a word. The objective here might be to make a passage more humorous or relevant (one might imagine a parent reading to a child, substituting the child's name for the name of the main character in the passage or story). This is congruent with a transparent social situation in which a parent informally reads to a child before bed time. The schematic context is transparent if the parent instantiates the word relative to the objective of making the child laugh, or pay atention. The linguistic context is transparent in the sense that the reader is capable of redefining the semantic function of the word in its linguistic context, even though the reader recognizes the real meaning of the target word.

On the other hand, the (theoretically) poorest reader, given a single encounter with text, is subject to maximum opacity in the four contexts. For instance, in the strategic context, this reader may have no idea of the objective of whether to reproduce, reconstruct, or embellish text at a given time — provided this reader understands these strategic objectives in the first place. In social context, this reader might have no understanding of the task demands, nor be aware of such parameters as the person for whom he reads, or the setting and time of the reading encounter. In the schematic context, this reader may be unable to instantiate a given frame due to his lack of world knowledge. Finally, this reader will find the linguistic context opaque if he lacks the ability to access a word at any given linguistic level.

Note that unlike previous descriptions of word processing, it is argued here that in any single encounter between reader and text, such as in the examples described above, all of the four contexts interact. Previous descriptions — even if they admitted to the legitimacy of paralinguistic contexts — have assumed that the interaction between levels (e.g., between semantic and phonetic, as in hierarchical models — cf. Rumelhart, 1977) is constant, and levels always interact in such a manner as an aprioristically identified objective (e.g., correct pronunciation of a word) is either achieved or not achieved.

What is important here is to understand that a single episode of word processing is a gestalt, defined by the interaction of these four contexts, and not merely a linguistic phenomenon disturbed or not disturbed by events occurring in the other contexts.

But even more important is to understand that reading is not a single-episode phenomenon; reading is a series of encounters between a reader and text that are defined by the interaction of the four contexts over time. The interaction within and between these contexts is obviously constantly shifting: transparency of linguistic levels shifts from word to word; transparency of social context shifts as a function of changes in task demands and time, as well as the people for whom the reading is done, and the setting in which reading occurs; transparency of schematic context shifts relative to the changes of lexical frames and one's ability to instantiate these frames; finally, strategic context shifts according to the reader's goals and strategies for attaining them. Such shifts suggest that word processing is a gestalt not only **within** these contexts but a gestalt **between** these contexts; any shift in one context over time may produce a dramatic shift in other contexts, as suggested by the interaction examples presented earlier. In short, this gestalt defines word recognition.

Defining Good and Poor Readers as a Function of Contextual Transparency: In a Series of Episodes of Word Processing

In a typical processing of words, contexts are rarely all transparent. The good reader is he who is capable of transforming opacity within and/or between contexts into transparency by drawing upon transparency in other domains — within and between contexts. The poor reader, on the other hand, lacks this ability. This accounts for the typical example whereby a reader having difficulty in decoding a word uses the transparency of, say, the semantic level to overcome the opacity of the phonetic level.

An example where the transparency of one context is used to resolve the opacity of another context is as follows: Imagine a reader presented with an unfamiliar text by an experimenter. If at the beginning of the experiment the strategic context for word processing is opaque, a good reader may use the transparency of the social context (i.e., an experimental situation) to overcome this opacity by inferring that the experimenter wants a reproductive interpretation of the words. A poor reader may have only one concept of how the contexts interact. What this means is that while in an experimental situation he may reproductively interpret the words, unlike the good reader when the formal experiment shifts to an informal reading, he persists in employing reproductive strategies whether appropriate or not in this latter context.

In brief, the significance of this model lies in its definition of word recognition as a relative, rather than an absolute phenomenon. In terms of testing word recognition ability, it is generally assumed that one operational definition of word processing is sufficient to distinguish between good and poor readers, be it reproduction of the phonetic level (i.e., words in context, as tested by the Gray Oral, words in isolation as tested by the Bryant Phonics Test or the Sipay Word Analysis Test) or reconstruction at the semantic level (Goodman, 1970), or reconstruction/reproduction at some other level. The assumption underlying these traditional definitions is that a good reader meets the criterion of a given operational procedure, while a poor reader does not. Consequently a reader who is capable of reconstructing at the semantic level but poor in consistently reproducing at the phonetic level is nevertheless considered a good reader according to the Goodman criteria; however, the same performance judged according to the Gray Oral criteria results in the reader being labeled as poor.

The model presented in this paper would argue that the good reader is one who is capable of meeting the differing demands of various contexts, be they linguistic, social, schematic, or strategic. In the above example, the good reader would be he who performs well under both operational criteria. But this does not mean that good readers are merely good test-takers under varying test conditions; they are capable of maximizing the transparency of contexts, be they teacher-defined or self-defined.

Toward a Multicontext Model of Word Recognition

Given these examples distinguishing good and poor readers and given the variable nature of how the above-mentioned contexts interact, the following model is proposed to demonstrate tentatively how a reader uses transparency of these contexts to process a word (see Figure 2).

The model posits that word recognition is basically an inference generating, inference confirming process which may lead to either reproductive, reconstructive, or embellished understanding of a word or words in context. Depending upon the strategic objective a person wishes to achieve and the person's disposition for processing at a given linguistic level (this may be reader-initiated or task-invoked), a person inputs the words as a new event.

Depending upon the level at which one is processing, a set of plausible inferences from this event are generated as a means for recognizing a given level of the word. The actual number of inferences generated, of course, depends upon the interrelationship between paralinguistic and linguistic variables previously identified. If there is a currently active frame or context which identifies the particulars of this word level, it is stored with its inferences. If this level matches the person's intended level of processing and if a person is willing to accept the certainty of his inference as to the meaningfulness of a given level, the person will discontinue further processing of the word.

It may be the case, however, that a person cannot find an active frame by which the particulars of a given word level can be identified. Or it may be that although a person begins to process the word at one level, he had the additional strategic objective of interpreting the word at another level. Or it may be that a person is uncertain about the amount of information he should use from the various linguistic levels to identify a word. Depending upon one or more of these cases, the reader will proceed to another level of the word and will generate a new plausible inference about the nature of this level. Again, if there is a currently active frame or context which identifies the particulars of this word level, this frame or context is stored with its inferences. If for the reasons cited above a person wishes to move to another level to generate and confirm additional inferences, newly generated and confirmed inferences and frames may or may not make use of the previously stored knowledge generated and confirmed at one or more of the levels previously processed.

An additional assumption of this model is that if a person is unable to generate a plausible inference or if he is uncertain as to the validity of his generated frame and inference, he may prefer not to adopt the strategy of proceeding to an additional level. On the other hand, he may simply generate new frames and inferences **within** the level he is presently processing, in order to account for the incoming event.

In sum, while previous models have focused almost exclusively on the linguistic context of word recognition, this paper has argued that word processing is more properly viewed as a gestalt, defined by the interaction of four principal contexts (linguistic, strategic, social, and schematic). Even in cases where previous models have acknowledged the legitimacy of contexts other than linguistic, these models have attempted to describe only single episodes of word processing. This has resulted in the belief that one operational definition is sufficient for defining word recognition and is also sufficient for distinguishing between good and poor readers.

This paper has presented a multicontext model that describes word recognition as a reader's attempt to maximize transparency within and between linguistic and paralinguistic contexts. The significance of this model is that it describes not only how the transparency shifts within and between contexts in a single encounter with text, but also how transparency shifts within and between contexts in multiple encounters with text. The implication of this model is that word recognition can only be defined in terms of multiple operational definitions (representing the varying interactions of contexts over time); similarly this model implies that good and poor readers can only be distinguished on the basis of several operational definitions representing the reader's ability to maximize transparency in various interacting contexts for processing words.

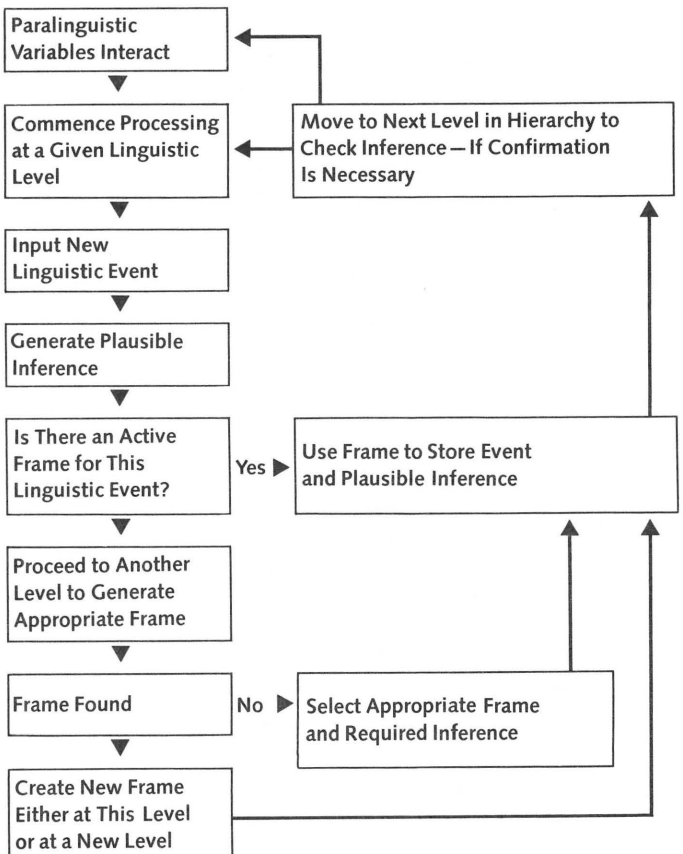

Figure 2.
Word recognition procedures within the domain of the linguistic context.

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Résumé des Articles

Traduction: Fernand Baudin

La lecture inconsciente: expériences faites sur des personnes qui lisent sans y prendre garde

par Tony Marcel.

L'article rend compte de quelques expériences qui consistent à projeter alternativement un mot et à la masquer. Elles démontrent que, dans les conditions voulues, le mot a été lu et a modifié le comportement de gens qui ne savent même pas que quelque chose a été projeté et masqué aussitôt. Il y a donc une distinction à faire entre (a) l'enregistrement d'un mot ou la réaction qu'il produit et (b) la lecture consciente et l'identification lexicographique et sémantique de ce mot. Outre son importance théorique et méthodologique, cette observation invite à ré-examiner les méthodes d'évaluation de la lecture. De plus, les mêmes techniques sont utilisables pour l'étude de la dyslexie acquise et pour examiner le fonctionnement du cerveau au cours de la lecture et de l'exercice de la parole.

Une stylistique visuelle, l'acquiescement et le refus chez Chaucer

par Spencer Cosmos.

Dans l'histoire d'une langue des détails infimes peuvent avoir une grande importance théorique. Par exemple, les principaux dictionnaires donnent des définitions différentes pour les variantes stylistique de locutions telles que **no, nay, yes** et **yea,** en moyen anglais et dans la langue des XVII[e] et XVIII[e] siècles. Ces variantes sont enregistrées dans le langage écrit. Cependant seules les personnes les plus cultivées font délibérement les distinctions dans leur oeuvre littéraire, lorsqu'elles exercent l'écriture et la lecture en tant qu'activités distinctes du langage parlé et de son audition. Ces distinctions sont fondées sur le processus mental de la composition et non sur les formes parlées ou écrites de ces locutions. Il ne s'agit pas seulement de recherche de précision grammaticale, de formalisme ou de qualité poétique. En effet dans la littérature du moyen-anglais, les oeuvres de Chaucer se distinguent par l'usage qu'il fait de ces variantes par rapport à tout ce qui est attribuable à la vogue de l'allitération qui était destinée au langage parlé et à l'audition. Pour Chaucer **no** et **yis** impliquent une élocution et une articulation spécifiques. Il se sert de ces formes pour souligner la manière d'interpréter une scène entre deux interlocuteurs en situation, comme, par exemple, la scène entre la prêtre, sa nonne et l'hôte ou encore celle entre le charpentier et sa femme dans le conte du Meunier.

Le contexte graphique des alphabets typographiques

par C.H. Cox III, B.A. Blesser, and M. Eden

Ces auteurs proposent d'utiliser pour l'étude de la communication visuelle des formes analogues aux instruments principaux — grammaticaux et contextuels — dont on se sert pour le communication verbale. Cette notion d'un context imagé, analogue au contexte linguistique est examinée selon une perspective bi- ou tri-dimensionnele. Un exemple type de contexte imagé est le contexte graphique; c'est le contexte incarné par les divers caractères d'un même alphabet typographique — lesquels sont tous dessinés en vue de rendre cohérents l'emplacement et le style des traits et des empattements. L'article propose une grammaire pour exprimer ces cohérences présentes dans tout caractère typographique. Elle comprend deux genres de règles: un pour les traits, un pour les empattements. Des exemples sont donnés. Pour terminer, les auteurs examinent le rapport de leurs travaux avec ceux des dessinateurs de caractères.

Du nouveau dans l'étude de la perception des mots: un modèle à plusieurs contextes

par P. Mosenthal, S. Wahmsley et R. Allington

L'auteur commence par passer en revue les différents modèles qui ont été proposés jusqu'ici pour expliquer la perception des mots. Puis il en fait la critique. Il observe par exemple que la plupart de ces modèles ne font appel qu'á des variables linguistiques et ne tiennent aucun compte de certaines variables paralinguistiques qui sont pourtant significatives. Il propose un nouveau modèle où le phénomène est considéré comme une "Gestalt" définissable par l'interaction de quatre contextes différents : linguistique, schématique, social et stratégique. Les interactions de ces variables à l'intérieur et à l'extérieur de ces contextes sont exprimées en termes de transparence ou d'opacité. Les conséquences logiques des modèles antérieurs et du modèle proposé sont envisagées en tant qu'ils permettent de distinguer les bons lecteurs des mauvais. L'article tant à conclure que cette distinction doit se faire elle aussi selon des critères à la fois linguistiques et paralinguistiques. De même il fait ressortir que les bons lecteurs sont ceux qui tirent le meilleur avantage de la "transparence" tant à l'intérieur qu'à l'extérieur des quatre contextes dans lesquels se fait la perception des mots.

Kurzfassung der Beiträge

Übersetzung: Dirk Wendt

Unbewußtes Lesen: Experimente mit Leuten, die nicht wissen, daß sie lesen

von Tony Marcel

Es werden einige Experimente zusammengefaßt, in denen ein Verfahren angewandt wurde, bei dem einem kurzfristig dargebotenen Wort ein maskierendes (überdeckendes) Muster folgte. Diese Untersuchungen zeigen, daß unter geeigneten Bedingungen die Bedeutung des Wortes erfaßt wird und das Verhalten beeinflußt, obwohl die Leute nicht in der Lage sind zu sagen, daß vor der Maske irgendetwas zu sehen gewesen ist. Daher unterscheidet man zwischen (a) der Verfügbarkeit eines Wortes im Bewußtsein oder als mündliche Reaktion, und (b) seinem Gelesenwerden im Sinne lexikalischer oder semantischer Erkennung. Zusätzlich zu seiner theoretischen und methodologischen Bedeutung legt dieses eine Neubetrachtung der Methoden zum Lesenlernen nahe. Außerdem sind diese Techniken bei der Untersuchung erworbener Leseschwäche und zum Verständnis der cerebralen Organisation des Lesens und des Sprachgebrauchs nützlich gewesen.

Zur visuellen Stilistik: Zustimmung und Ablehnung bei Chaucer

von Spencer Cosmos

Hinter kleinen Einzelheiten in der Geschichte einer Sprache stehen oft Fragen von großer theoretischer Bedeutung. Beispielsweise verzeichnen größere Wörterbücher widersprüchliche Angaben über stilistische Variationen zwischen den Wörtern **no, nay, yes** und **yea** im Mittleren und Frühen Modernen Englisch. Obwohl die Ausdrücke alle schriftlich festgehalten sind, sind die Unterschiede zwischen ihnen nur in den Werken hochliterarischer Geister erhalten, die sich besonders im Schreiben und Lesen (im Gegensatz zum Sprechen und Hören) hervorgetan haben. Die Grundlage der Unterscheidung liegt im geistigen Prozeß der Komposition, nicht in der geschriebenen oder gesprochenen Form des Ausdrucks. Unterscheidungen zwischen den beiden Arten von Formen sind nicht einfach das Ergebnis von Sorgfalt, grammatikalischer Genauigkeit, Formalismus oder dichterischer Überragendheit, denn im Mittelenglisch kann man die Werke Chaucers nach ihrem Gebrauch unterteilen in solche der reinen Dichtkunst und solche, die Alliterationen wecken und die zum Sprechen und Hören geschrieben wurden.

Bei Chaucer sind **no** und **yis** ausgesprochen Ausdrücke für die gesprochen Darstellung und Reaktion auf das Verhalten anderer Menschen. Sie treten nur in Antworten auf, in denen die Reaktion swischen Dialogpartnern klar verstanden werden muß, wie beispielsweise zwischen dem Priester der Nonne und dem Gast oder zwischen dem eifersüchtigen Zimmermann und seiner Frau in "The Miller's Tale".

Der graphische Kontext gedruckter Schriftzeichen

von C.H. Cox III, B.A. Blesser und M. Eden

Zur Untersuchung der visuellen Kommunikation werden Formen der wichtigsten Hilfsmittel vorgestellt, die den bei der Untersuchung der verbalen Kommunikation analog sind — grammatikalischer und kontextueller Art. Der Begriff eines Bild-Kontextes, analog zum linguistischen Kontext, wird für allgemeine zweioder dreidimensionale Szenen diskutiert. Ein spezielles Beispiel des Bild-Kontextes ist der graphische Kontext; es ist der Kontext, der in den Buchstaben einer Schriftart enthalten ist — die alle in vielfältiger Konsistenz hinsichtlich Stil und Anordnung der Striche und Serifen entworfen sind. Es wird eine Grammatik vorgestellt, welche diese Konsistenz zum Ausdruck bringt, die in jeder Schriftart vorhanden ist. Zwei Sätze von Regeln — einer für die Striche und einer für die Serifen — werden samt Anwendungsbeispielen gegeben. Schließlich wird die Beziehung dieser Arbeit zu der des Schriftentwerfers diskutiert.

Worterkennung neu betrachtet: Zu einem Vielfach-Kontext-Modell

von P. Mosenthal, S. Wamsley und R. Allington

Dieser Aufsatz gibt einen Überblick über die verschiedenen Modelle, die zur Erklärung der Worterkennung vorgeschlagen worden sind. Einige Nachteile dieser Modelle werden diskutiert: Beispielsweise haben die meisten Worterkennungsmodelle die Wortverarbeitung ausschließlich in linguistischen Begriffen beschrieben und dabei verschiedene bedeutsame paralinguistische Variablen übersehen. Es wird ein neues Modell vorgeschlagen, das die Wortverarbeitung als Gestaltphänomen beschreibt, das durch die Wechselwirkungen von vier Arten von Kontext definiert wird: linguistischen, schematischen, sozialen und strategischen. Die Wechselwirkung der Variablen innerhalb und zwischen diesen Kontexttypen wird mit den Begriffen der Kontext-"Transparenz" und der Kontext-"Undurchsichtigkeit" (Opazität). Die Folgerungen aus den früheren Worterkennungsmodellen und aus diesem neuen Worterkennungsmodell werden auch mit Hinblick auf die Unterscheidung guter und schlechter Leser diskutiert. In diesem Aufsatz wird die Auffassung vertreten, daß jede Definition guter und schlechter Leser sowohl auf der Grundlage linguistischer wie auch paralinguistischer Faktoren basieren muß. Es wird weiterhin behauptet, daß gute Leser solche sind, die zur Verarbeitung der Worte sowohl innerhalb der vier Kontext-Typen wie auch zwischen ihnen die Transparenz maximieren.

Resumen de los Artículos

Traducción: Ana Fisch

Lectura inconciente: experimentos sobre personas que no saben que están leyendo

por Tony Marcel

Se resumen algunos experimentos que utilizan el procedimiento de exponer brevemente una palabra seguida por un deseño disimulado. Estos estudios demuestran que en condiciones apropiadas mientras las personas son incapaces de notar que algo se descubre bajo lo encubierto se ha podido analizar el significado de la palabra y la influencia en el comportamiento. Hay así una distinción entre a) la obtenibilidad de la palabra en la conciencia y b) el haber sido leída con un sentido de identificación semántica y léxica. Además de su importancia teorética y metodológica esto sugiere una revaluación de los métodos de comprobación de la lectura. Más aún, las técnicas han sido de gran utilidad para investigar la dislexia adquirida y para entender la organización cerebral de la producción de la lectura y el lenguaje.

Hacia una estilística visual: consentimiento y negación en Chaucer

por Spencer Cosmos

Los detalles menores en la historia de una lengua encierran a veces asuntos de significación teorética. Por ejemplo, los diccionarios principales registran descripciones contradictorias de variaciones estilísticas entre las expresiones **no, nay, yes,** y **yea** en el inglés intermedio y comienzos del moderno. A pesar que las expresiones están registradas por escrito, las distinciones entre ellas están conservadas sistemáticamente sólo en las composiciones de mentes elevadamente literarias relacionadas específicamente con el escribir y el leer en oposición con el hablar y el oír. La base de la distinción yace en los procesos mentales de composición mas bien que en las formas de expresión escritas y habladas. Las distinciones entre los dos juegos de formas no son simplemente el producto del cuidado, la precisión gramatical, la formalidad o la excelencia poética. En el inglés intermedio se pueden distinguir las composiciones de Chaucer por su uso de las formas desde la poesía del renacimiento aliterativo compuesta para el habla y la audición. En Chaucer **no** y **yis** son marcadas expresiones para los actos del habla, a menudo especificamente 'behabitive.' Ocurren solo en reacciones en las que la participación 'behabitive' entre los interlocutores debe ser interpretada claramente como, por ejemplo, entre el sacerdote de la monja y el anfitrion o entre el carpintero celoso y su esposa en el cuento del molinero.

El contexto gráfico de caracteres impresos

por C.H. Cox III, B.A. Blesser y M. Eden

Formas análogas de los principales instrumentos — gramatical y conceptual utilizados en el estudio de la comunicación verbal se presentan para el estudio de la comunicación visible. Se discute la noción de una imagen de concepto análoga al contexto linguístico durante escenas de dos o tres dimensiones. Un ejemplo específico de imagen de concepto es el contexto gráfico, incorporado en las letras de un tipo originario — todos los cuales están diseñados con varias consistencias entre el estilo y la posición de guiones y rayas. Se presenta una gramática para expresar las consistencias que existen en cada carácter originario. Se dan dos grupos de reglas — una para giones y otra para serifs — junto con ejemplos de su uso. Finalmente se discuten las interrelaciones de este trabajo con el del diseñador de caracteres.

Reconsiderando el reconocimiento de la palabra: hacia un modelo de contexto multiple

por P. Mosenthal, S. Walmsley and R. Allington

Primero, este artículo hace la revisión de varios modelos que han sido propuestos para explicar el reconocimiento de la palabra. Se discuten varios inconvenientes de estos modelos: por ejemplo, la mayoría de los modelos de reconocimiento de palabras han descrito el procesamiento de la palabra casi exclusivamente en términos de variables linguísticas y han ignorado varias variables paralinguísticas significativas. Se propone un nuevo modelo que describe el procesamiento de la palabra como un fenómeno de gestalt definido por la interacción de cuatro tipos de contexto: linguístico, esquemático, social y estratégico. Se explica la interacción de las variables dentro y entre estos contextos en términos de las nociones de contexto "la transparencia" y "la opacidad." Las implicaciones de modelos de reconocimientos de palabras previos y el modelo actual de reconocimiento de la palabra son también discutidos en términos de definición de lectores buenos y lectores pobres. El argumento de este artículo es que cualquier definición de lectores buenos o lectores malos debe ser efectuada sobre una base de factores tanto paralinguísticos como linguísticos. Además se discute que los buenos lectores son aquellos que son capaces de maximar la transparencia en y entre los cuatro contextos para el procesamiento de palabras.

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