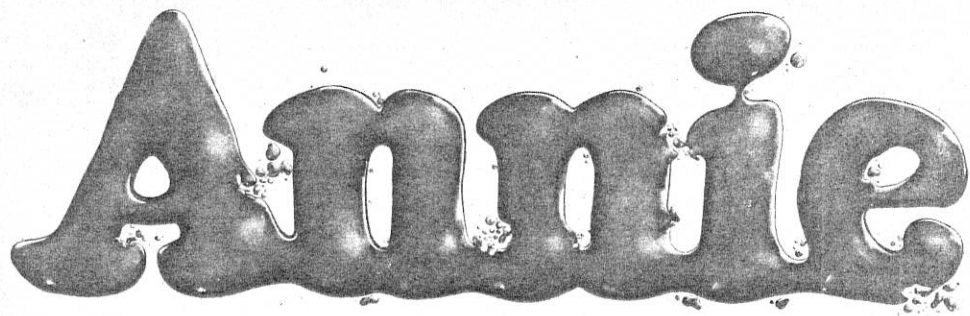


# VISIBLE LANGUAGE

The Journal for Research on the Visual Media of Language Expression

*Volume VI, Number 4, Autumn 1972*



Annie

VISIBLE LANGUAGE

Conception & Formation →		VISIBLE LANGUAGE FORMS ON A SURFACE	← Reception & Interpretation	
Generation of symbols	Application & Organization		Physical Response	Mental Response
Relation to language generation	Language medium and language structure	Neurophysiological (e.g., vocalism in reading)	Meaning/form dichotomy	
Origin & evolution of the alphabet	Comparative writing systems (e.g., phonetic/non-phonetic)	Reading/hearing relationships	Meaning—language organization and comprehension	
Post-typographic electronic generation	Writing/speech relationships; phonetism of the alphabet	Alphabetic efficiency; eye movements; fatigue; search	Form—non-verbal communication of letterforms	
Alphabetic prototypes	Typographic & electronic letterform display	Legibility & perception	Visible/oral language dichotomy; "primacy of speech"?	
Script and type design—hand or machine	Environmental "signing"	Initial visual discrimination training	Visual encoding of verbal materials	
Influence of tools	Paleography	Machine reading	Conscious & unconscious	
Augmented alphabets (e.g., ita); shorthands; "universal" scripts	Descriptive bibliography		Literacy	
Electronic representation of speech	Practice of the arts: calligraphy, concrete poetry, letterforms in plastic media (e.g., Paul Klee)			
Graphology	Comparative sight/sound media (e.g., musical notation)			

"Whenever social historians attempt to suggest the few most significant intellectual achievements of man, nearly always the one mentioned first is 'writing'—or some related reference to man's initial development of a visible language. This journal represents the first concerted effort to organize our investigation of every aspect of this visual medium of language expression."—from an editorial in the Winter 1971 number

VISIBLE LANGUAGE

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## One Second of Reading

Philip B. Gough

Two general topics are discussed: (1) the sequence of events that transpire in one second of reading, to suggest the nature of the processes that link them; and (2) the relation of this description to the acquisition of reading. Reading involves a rapid succession of intricate events—formation of a visual icon, letter-by-letter identification, and association with meaning through transposition into abstract phonemic representation—carried out with amazing rapidity and coordination in our complex information processing system. When first approaching reading, the child lacks the character recognition device (the scanner) and the device to convert the characters, once recognized, into systematic phonemic representations (the decoder). Specification of the mechanism by which letters are mapped onto entries in our mental lexicon is the fundamental problem of reading research.

Suppose the eye of a moderately skilled adult reader (henceforth, the Reader) were to fall on this sentence, and that he were to read it aloud. One second after his initial fixation, only the first word will have been uttered.<sup>1</sup> But during that second, a number of events will have transpired in the mind of the Reader, each the evident result of processes of amazing complexity. If we knew the train of events, we would know what the processes must accomplish and thus something of their

1. This estimate is based on my reading, as naturally as possible, 50 sentences drawn from *The Daily Texan* and presented tachistoscopically. The median interval between stimulus and response onset was just over 700 msec, and the average initial word required roughly 300 msec to produce.

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This article is to be published as a contribution to *Language by Ear and by Eye: The Relationships between Speech and Reading*, edited by James F. Kavanagh and Ignatius G. Mattingly (the proceedings of a conference on The Relationship between Speech and Learning to Read in a series, Communicating by Language, sponsored by the National Institute of Child Health and Human Development, National Institutes of Health). Cambridge, Mass. & London, England: The MIT Press, 1972; pages 331–358

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nature. If we knew this, we would know what the child must learn to become a Reader.

Accordingly, this paper is concerned with two topics. First, it tries to describe the sequence of events that transpire in one second of reading, in order to suggest the nature of the processes that link them. Second, it attempts to relate this description to some facts about the acquisition of reading. The description of the chain of events is intended to be exhaustive in the conviction that the complexity of the reading process cannot otherwise be fully appreciated. Thus it is detailed by choice, speculative by necessity, and almost certainly flawed. I hope these are virtues, for much of what is written about reading is either too vague to be tested or too banal to bother, and an analysis that can be attacked in detail can yield detailed knowledge. The consideration of research on reading in children, on the other hand, is anything but complete. Quite apart from the familiar methodological shortcomings which abound in this research, most of it is aimed at a level of description too gross to be of any use here. So rather than presenting an unavoidably dreary review of the literature. I have attempted to interpret the acquisition of reading in terms of the present model, and to fit selected experimental results into the resulting framework.

## THE READING PROCESS

Reading begins with an eye fixation. The Reader's eyes focus on a point slightly indented from the beginning of the line, and they remain in that fixation for some 250 msec [Tinker 1958]. Then they will sweep 1-4 degrees of visual angle (say 10-12 letter spaces) to the right, in a saccadic movement consuming 10-23 msec, and a new fixation will begin. Barring regressions, and ignoring return sweeps (which take 40-54 msec), this sequence will be repeated as long as reading continues (up to at least six hours according to Carmichael and Dearborn [1947]). When the initial fixation is achieved, a visual pattern is reflected onto the retina. This sets in motion an intricate sequence of activity in the visual system, culminating in the formation of an icon.

### *Iconic Representation*

The existence of the icon, a relatively direct representation of a visual stimulus that persists for a brief period after the stimulus vanishes, has

been amply demonstrated [Sperling 1960, 1963]. I take the icon to be a central event, presumably corresponding to neural activity in the striate cortex [cf. Haber and Standing 1969]. I further assume that the icon is an "unidentified" or "pre-categorical" visual image, a set of bars, slits, edges, curves, angles, and breaks, perhaps corresponding to the output of simple cells like those identified by Hubel and Wiesel [1962].

Whatever the form of its contents, the iconic buffer has a substantial capacity. Sperling [1963] has shown that it can hold at least 17 of 18 letters presented in three rows of six. In the case of ordinary reading matter, it can be estimated that the useful content of the icon will include everything in an oval roughly two inches wide and an inch high, or about 20 letter-spaces of the line under fixation.<sup>2</sup>

The decay of the icon has been intensively studied [cf. Haber 1968, 1969]. It is known to persist for several seconds if the stimulus is followed by darkness, but for less than half a second if in light [Sperling 1963]. It can be erased or masked by a following patterned stimulus [Liss 1968; Spencer 1969].

The *formation* of the icon, on the other hand, has scarcely been studied at all. One reason is that it is excruciatingly difficult to investigate; the question of how long it takes to form an icon is no less than the question of how long it takes us to sense something. Simple threshold data are uninformative, for they only indicate how much (i.e., what duration of) visual energy is necessary to initiate the train of events which results in the icon. Masked threshold data tell no more, for they are naturally interpreted as indicating how long one icon exists before it is replaced by another. As far as I can see, the only relevant published data are to be found in studies of visually evoked potentials [e.g., Dustman and Beck 1965]. If a flash of light is presented to the eye, it is reflected in detectable changes in electrical potential at the occipital cortex no less than 50 msec later;<sup>3</sup> Dustman

2. I am indebted to Kent Gummerman for this estimate. It is based on "(a) acuity data for viewing in the horizontal meridian [Feinberg 1949], (b) Wertheim's [1894, p. 185] 'iso-acuity' ellipses that show areas of equal acuity in all directions, and (c) the conservative assumption that a letter can be resolved if the thickness of its component lines can be resolved by the eye" (Gummerman, personal communication).

3. There is an early component of the wave at approximately 43 msec, but Dustman and Beck feel that it is not correlated with stimulus awareness.

and Beck [1965] have suggested that wave components with mean latencies of 57 and 75 msec are related to awareness of the light. Assuming that patterned visual information is processed no faster than a flash of light, we might infer (acknowledging the length of the leap) that the icon could not be formed in less than 50 msec, and that its full development may require closer to 100 msec.<sup>4</sup>

Given these assumptions, we are led to suppose that the Reader's initial fixation yields an icon containing materials corresponding to the first 15 to 20 letters and spaces of the sentence (e.g., "Suppose the eye of a"). This icon will become fully "legible" in something like 100 msec. It will last until it is replaced by the icon arising from the Reader's second fixation, some 250 msec later.

In the meantime, the lines, curves, and angles of the first icon will be recognized as familiar patterns. I assume they are identified as letters.

#### *Letter Identification*

Letter recognition is very rapid. There is striking evidence that even unrelated letters can be recovered from the icon at rates of 10–20 msec per letter.

One such datum was provided by Sperling [1963], who found that if a random matrix of letters was followed immediately by a patterned mask, the number of letters reported increased linearly with the duration of the matrix, one letter every 10 msec, up to a limit imposed by memory. Since premask stimulus duration is directly related to icon duration, this result presumably reflects the rate of readout of letters from the icon into a more durable register.

Given that simple recognition thresholds have been shown to be lower for words (and even pronounceable nonsense syllables; Gibson, Osser, et al. [1963]) than for random strings like Sperling's, it would be interesting to see if their letters can be read out even more rapidly. To my knowledge, the relevant experiment has not yet been conducted.<sup>5</sup>

4. Presumably the latency of the icon will vary with the intensity of the stimulus (and perhaps with its complexity).

5. Gilbert [1959] came close when he presented linguistic segments (words and phrases) of various lengths for various durations, and examined the amount recovered as a function of length of material and exposure duration. But his materials were presented by film, so that control over stimulus quality and duration was crude, and he presents only a rough general description of his materials.

But there are data that suggest a comparable rate of letter identification with meaningful materials.

First, Scharf, Zamansky, et al. [1966] found the masked recognition threshold (using Sperling's own mask) for familiar five-letter words to be roughly 90 msec (under high luminance). This fact provides little comfort for any assumption that read-out of letters from the icon is more efficient for meaningful or pronounceable materials than for random strings of letters; Sperling's results show that under the same circumstances, four or five unrelated letters can easily be registered.

Second, Michael Stewart, Carlton James, and I [Stewart, James, et al. 1969] found that visual recognition latency—the time between presentation of a word and the beginning of its pronunciation—increases steadily with word length in letters, from 615 msec for three-letter words to 693 msec for ten-letter words. The function is negatively accelerated; the increase in latency with length is greater with short words than long. But the data are compatible with the assumption that letters of words are read out of the icon at a rate of 10–20 msec per letter.

Third, W. C. Stewart and I [Gough and Stewart 1970] have measured how long it takes readers to decide that a given string of letters is a word or not. One of the variables we manipulated was word length. We found that four-letter words are acknowledged some 35 msec faster than six-letter words, again consistent with the assumption that each additional letter requires an additional 10–20 msec for readout from the icon.

These data, among others, suggest that letters are recovered from the icon *as* letters, that the evident effects of higher levels of organization (like spelling patterns, pronounceability, and meaningfulness) on word recognition and speed of reading should be assigned to higher, and later, levels of processing. It is worth noting that if this analysis is correct, then it can be, at best, a half-truth to say that we do not read letter by letter.

Suppose that letters are identified and read out of the icon at a rate of 10 to 20 msec per letter, starting the moment the icon is formed. Since the icon should endure for some 250 msec, between one and two dozen letters could be identified from it even if readout were strictly serial. With a conservative estimate of three fixations per second, and assuming the average word to contain seven letters, even the lower

value of letter transfer (i.e., 12 per fixation) would yield a reading speed in excess of 300 words per minute.

I see no reason, then, to reject the assumption that we do read letter by letter.<sup>6</sup> In fact, the weight of the evidence persuades me that we do so serially, from left to right [cf. White 1969]. Thus I will assume that the letters in the icon emerge serially, one every 10 or 20 msec into some form of character register.

How the letters get here and what form they take once they have arrived are intriguing questions. But more important is what is done with them. Clearly, letters are not the stuff of which sentences are made. They must be associated with meanings; they must be mapped onto entries in the mental lexicon. The specification of the mechanism by which this is accomplished is, as I see it, the fundamental problem of reading.

#### *The Mapping Problem*

There are two superficially appealing possibilities. First, one might assume that the lexicon is directly accessible from the character register, that the Reader goes “directly” from print to meaning. This possibility is appealing to some theorists [cf. Kollers 1970] at least in part because of the nonalphabetic (i.e., neither phonemic nor syllabic) character of many orthographies. Since readers of such orthographies have to learn thousands of arbitrary associations between printed and spoken words, they could as easily learn direct associations between the orthographic words and their meanings and circumvent the spoken word altogether. And if they can do it, so can we.

We can, indeed, but only at great (and quite unnecessary) expense. Every potential Reader has a lexicon that is accessible through phonological information; he can understand the spoken word. Presumably, then, each of his lexical entries contains a phonological representation, and he has a retrieval mechanism that can address the entry through that representation. If he learns to assign such a representation to the printed word, the mapping problem is solved, and he quickly becomes a Reader. If he does not, he must add an orthographic representation to each of the tens of thousands of lexical entries

6. Elsewhere [Gough 1968] I have tried to argue that the traditional arguments against this notion are without foundation.

(to say nothing of constructing a completely new retrieval mechanism to make use of them). The Reader of a nonalphabetic orthography might do this, for his is Hobson's choice. But we have a significant alternative, for while the orthography of English is complex and its rules are numerous, no one has seriously proposed that the number of these rules approaches within a factor of 100 the size of our lexicons. If there is any principle of cognitive economy, it surely must demand that we do not acquire tens of thousands of supererogatory associations, and we must not go straight from print to meaning.

The second possibility is, in this respect, appropriate: it is that we go from print to meaning by way of speech. On this view, the Reader applies orthographic rules to the contents of the character register, converting them to speech, and then listens to himself. All the Reader must add to his cognitive equipment are the orthographic rules. Nothing needs to be added to the lexicon; no new retrieval system needs to be constructed.

The advantages of this hypothesis are obvious. It is a venerable one, and it has prompted any number of studies of subvocal activity during reading (cf. Conrad's paper in this volume). But I find it untenable, for I do not believe that the device it proposes can work fast enough. Recall that M. Stewart, C. T. James, and I [1969] found that production latency for a three-letter word is in excess of 600 msec. A highly motivated and practiced subject can push this down to 500 msec. Subtracting the 32 msec our voice key consumes, the 10 msec or so it requires for a nervous impulse to travel from the mid-brain to the larynx [Ohala 1970], and another 5 or 10 for it to get to the mid-brain from the motor cortex, one is still left with well over 400 msec for an instruction to speak to be assembled. Even ignoring the additional time required for a circuit through some version (however abstract) of an auditory loop, a Reader would not understand a printed word for better than 400 msec after his eye fell on it.

Clearly, we do not know just how long it takes to understand a word. But what may be relevant evidence was obtained several years ago in a study by Rohrman and myself [Rohrman and Gough 1967]. We asked subjects to decide if pairs of words were synonymous or not, and measured the latencies of their decisions. On some trials, we announced that a pair would be presented in two seconds by saying “set”; on others, the warning signal was one member of the pair to be

judged. We found that giving the subject one member in advance reduced his decision latency by roughly 160 msec. If it is assumed that simultaneous presentation of the pair requires a serial search for the two meanings, and that giving one word in advance eliminates only the retrieval of its meaning from the total decision process, then this result indicates that the meaning of a printed word is located in something on the order of 160 msec. (This result is, in light of the present model, fascinating: if the icon of the word was formed in 100 msec, then it suggests that the meaning of a word is located as fast as its letters can be read out of the icon.) This interpretation is clearly open to question, but if the estimate is anywhere near the true value, then the Reader understands a word well before he can begin to utter it, and the speech-loop hypothesis cannot possibly hold.

In light of these considerations, I am led to a third hypothesis, one that claims the advantages of both (and the disadvantages of neither) at the small price of a charge of abstraction. Suppose it is assumed that the Reader maps characters, not onto speech, but rather onto a string of systematic phonemes, in the sense of Chomsky and Halle [1968]. Systematic phonemes are abstract entities that are related to the sounds of the language—the phonetic segments—only by means of a complex system of phonological rules. Thus it is easy to imagine that formation of a string of systematic phonemes would necessarily take place at some temporal distance from (i.e., some time before) the posting of motor commands, and the prohibitive cost of passage through the speech loop would be eliminated. Moreover, since lexical entries must contain, in addition to their semantic and syntactic features, a lexical representation in systematic phonemes, it seems reasonable to assume that the speaker of a language employs, in the comprehension of speech, retrieval mechanisms that access the lexical entries through these lexical representations. If characters are converted into comparable representations, then available retrieval mechanisms could be engaged, and the search for meaning in reading would require no costly new apparatus.

Obviously, this hypothesis is highly speculative, and I can offer no experimental evidence in support of it.<sup>7</sup> But Halle [1969] and N.

7. Since this paper was delivered, Herbert Rubenstein has reported that subjects take longer to decide that a nonsense word which is homophonic with some

Chomsky [1970] argue persuasively for a similar view, and I know of nothing to preclude it. More important, it provides the basis for a coherent account of a central problem in the acquisition of reading, as I will attempt to show later.

Thus, I will assume that the contents of the character register are somehow transposed into abstract phonemic representations. If, as Chomsky and Halle argue, the orthography of English directly reflects this level of representation, little processing will be required; otherwise, more complex transformations (e.g., the grapheme-phoneme correspondence rules of Venezky [1970]) will yield a string of systematic phonemes that can then be used to search the mental lexicon.

#### *Lexical Search*

Whether the preceding hypothesis is correct remains to be seen. But whether by this mechanism or by some other, lexical entries are ultimately reached; the Reader understands the words of the sentence. Too little is known about word comprehension to suggest how it is accomplished or even to constrain speculation in any serious way. So I will adopt what I take to be the simplest assumption: that the words of the sentence are understood serially, from left to right.

Apparent objections to this hypothesis lie in the prevalence of lexical ambiguity. First, if words are understood one at a time, then it seems likely that they will frequently be misunderstood, at least until context demands and receives assignment of a new reading. Second, it would seem that prior context would determine the course of lexical search, a procedure not incorporated in the present model. The first is no real objection, for words often are misunderstood momentarily, and the presence of lexical ambiguity in a sentence demonstrably increases the difficulty of processing the sentence. For example, Foss [1970] has found that if subjects are asked to monitor a sentence for the presence of a given phoneme, their reaction time to the target is increased if it follows an ambiguous item. As to the second point, several experiments in our laboratories have failed to find evidence

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English word is *not* a word than to make the same decision about nonsense items which are not homophonic with any English lexical item. This result is, in my view, persuasive evidence for the hypothesis that the printed word is mapped onto a phonemic representation by the Reader.

that the disruptive effect of ambiguity can be eliminated by prior context. Foss has found the same increase in phoneme monitor latency after an ambiguous word even when that word is preceded by a context that completely disambiguates it. In pilot studies, several of my students have found that it takes longer to decide if a pair of words are related when one is ambiguous than if it is not, even when the unambiguous word is presented first (e.g., *prison-cell* takes longer than *prison-jail*.) Thus we have (as yet) found no evidence that disambiguation takes place until *after* lexical search.

Such evidence suggests that the abstract phonemic representation is assigned the first lexical entry that can be found. This is consistent with the results of Rubenstein, Garfield, and Millikan [1970] and W. C. Stewart and myself [Gough and Stewart 1970], which show that words are acknowledged to be words more rapidly if they are ambiguous than if they are not (with form and frequency equated). This result suggests that the various readings of a polysemous word are stored separately in the mental dictionary, rather than under a single heading (as they are in Webster's). Interestingly, Rubenstein, Lewis, and Rubenstein [1971] have found that this result does not hold for systematically ambiguous items (i.e., items like *plow*, in which the ambiguity lies only in grammatical category); consistency demands the assumption that these constitute single entries with alternative syntactic features specified.

Thus, lexical search would appear to be a parallel process, with the race going to the swift. When the first entry is located, its contents are accepted as the reading of the word until it proves incompatible with subsequent data; in the case of a systematically ambiguous word, its grammatical category can remain unspecified until further information is provided. In either event, the contents of the lexical entry yielded by each successive word must be deposited somewhere to be organized into a sentence. Primary memory is a likely spot.

#### *Primary Memory*

A small-capacity buffer storage system where 4 to 5 verbal items are maintained for a matter of seconds is postulated in many current models of memory [cf. Norman 1970]. An item entering this primary memory (PM) [Waugh and Norman 1965] is generally thought to be subject to any of four fates. If it is ignored, it will simply (and rapidly)

decay; on the other hand, it can be renewed through rehearsal. When the PM is full, an item in residence must be displaced if a new item is to enter. Finally, it may be transferred or copied into a more permanent store, the secondary memory.

There is one impediment to the assumption that the PM is the temporary repository for the content of a lexical entry. It is widely assumed that the contents of the PM are primarily acoustic or articulatory or phonemic [e.g., Baddeley 1966; Conrad 1964], largely because it is readily shown that verbal items are easily confused on this basis in short-term memory. I find this argument shaky.

First, confusion based on supraphonological properties of items in short-term memory can be demonstrated quite easily. Cornbleth, Powitzky, and I have found that lists of six nouns are more easily remembered if all are singular or plural than if singulars and plurals are mixed in a list; a variety of controls show that the effect cannot be attributed to confusion at the phonological level. The same appears to be true of verbs and tense, *mutatis mutandis*. If confusion data suggest that phonological information is in the PM, then reasoning from appropriate data leads to the same conclusion regarding syntactic or semantic properties. Second, Craik [1968] has shown that the immediate memory span is virtually identical for words of one to four syllables. This clearly suggests that the capacity of the PM is not defined by acoustic, articulatory, or even phonemic parameters, for all of these surely must vary from one-syllable to four-syllable words.

These data, I think, justify the assumption that the contents of lexical entries—including phonological, syntactic, and semantic information—are deposited in the PM, presumably one entry to a cell. The PM thus would become the working memory for the mechanisms of sentence comprehension.

There are many observations consistent with the assumption that the PM and the comprehension device interact in some such fashion. Three might be noted. First, it is obvious that far more words may be retained in sentences than out of them; sentences are remembered better than lists. In the present model this would be explained by assuming that when words are processed into sentences, the resulting structure is allocated to a further storage system with a much greater capacity. I am inclined to identify it with the secondary memory of the memory theorists, and to propose that items pass into secondary

memory only when they are related to one another, or integrated in some fashion akin to comprehension. But that is another matter. For the present purpose, it suffices to assume that when a sentence is understood, it is deposited in the Place Where Sentences Go When They Are Understood (PWSGWTAU).

Second, when the contents of the PM are integrated, the PM can be cleared and new items entered. Support for this notion comes from a series of recent experiments by John Mastenbrook and myself (1971), in which we have found that if a subject is asked to recall a five-word sentence together with five unrelated words, his recall is significantly greater if the sentence is presented before the list than vice versa, independent of recall order. This is easily explained in the present model: if the list is registered first, PM is full when the sentence arrives, and it can be processed only at the cost of some items from the list, whereas if the sentence arrives first, it is quickly understood and the PM is cleared when the list arrives.

Third, the model predicts that any sentence whose initial words exceed the capacity of PM before they can be understood (i.e., before their grammatical relations can be discovered) will prove incomprehensible. This is just the case with sentences self-embedded to a degree of 2 or more.

The evidence, then, supports the assumption that the PM provides a buffer memory for the comprehension device. In my opinion, we have no good idea how that device works; the question is being studied and debated intensively [cf. Gough 1971]. For the present purpose, it suffices to assume that some wondrous mechanism (which we might dub *Merlin*) operating on the information in the PM, tries to discover the deep structure of the fragment, the grammatical relations among its parts. If Merlin succeeds, a semantic interpretation of the fragment is achieved and placed in the ultimate register, the PWSGWTAU. (If Merlin fails, we would assume that the fixation will be maintained to provide further processing time, or that a regressive eye movement would be called for. This is obviously consistent with the well-known facts about eye movements and difficulty of material [cf. Tinker 1958].)

Assuming success, the obtained deep structure provides the basis for the formation of a superficial structure containing the formatives from PM; application of phonological rules to this structure will yield

instructions for the pronunciation of the fragment, and the Reader will begin to speak.

At this moment, some 700 msec have passed since the Reader's eye fell on the sentence. By this time, he is probably into his third fixation, perhaps 30 spaces into the sentence. The material from the first fixation is in the ultimate register (the PWSGWTAU); that from the second fixation is crowding into the PM.

I have tried to summarize the history of the 700 msec in Table 1, where the contents of each of the proposed stages of processing are specified at 100-msec intervals. Obviously, most of the entries are little more than plausible guesses. But the table suggests just how much must have happened. Some 20 to 25 letters have been internalized as characters, and converted into abstract phonemes. Perhaps a half dozen lexical entries have been located, and their contents copied into PM. The grammatical relations between some portion of these have been discovered, and the construction of a deep structure has begun. The semantically interpreted items have been inserted into a surface phrase-marker, and that, in turn, has been translated into motor commands.

On the outside, the Reader has rotated his eyes a few millimeters and he has begun to move his mouth. But on the inside, there has been a rapid succession of intricate events. Clearly, this succession could only be the product of a complex information processing system. That which has been proposed herein is outlined in Figure 1. It contains components that are asked to perform amazing feats with amazing rapidity, and precisely in concert. It remains to be seen whether this model bears any resemblance to reality. But it does suggest the complexity of the system that must be assembled in the mind of the child who learns to read.

**Table 1**  
Level of Representation as a Function of Time

Msec	Material under Fixation	Level of Processing: Lines, Curves, Angles	Level of Processing: Letters	Level of Processing: Systematic Phonemes
000	Suppose the eye			
100	" " "	Suppose the eye	s	
200	" " "	" " "	... pose th ...	stib = p
300	ose the eye of a mod	" " "	... e the c ...	... = pɔz#ð ...
400	" " "	ose the eye of a mod	... e eye o ...	... z#ð#l ...
500	of a moderately skill	" " "	... ye of a ...	... i#uv#æ ...
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700	" " "	" " "	... oderate ...	... #made ...
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**Table 1** (Continued)

Msec	Level of Processing: Lexical Entries	Level of Processing: Semantic Representation	Level of Processing: Phonic Representation	Vocalization
000				
100				
200				
300	$\begin{bmatrix} +V_t \\ +ment \\ \cdot \\ \cdot \end{bmatrix}$			
400	$\begin{bmatrix} +V_t \\ +ment \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} +Art \\ +Def \\ \cdot \\ \cdot \end{bmatrix}$			
500	$\begin{bmatrix} +V_t \\ +ment \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} +Art \\ +Def \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} +N_e \\ +Conc \\ \cdot \\ \cdot \end{bmatrix}$	IMP <sub>6</sub> you will suppose [s		
600	$\begin{bmatrix} +Art \\ +Def \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} +N_e \\ +Conc \\ \cdot \\ \cdot \end{bmatrix} \begin{bmatrix} +Prep \\ +Poss \\ \cdot \\ \cdot \end{bmatrix}$	... suppose [s the eye (s	sɔp'ɔwz	

Table 1 (Continued)

Msec	Level of Processing: Lexical Entries	Level of Processing: Semantic Representation	Level of Processing: Phonetic Representation	Vocalization												
700	<table border="1"> <tr><td>+Prep</td><td>+Art</td></tr> <tr><td>+Poss</td><td>-Def</td></tr> <tr><td>.</td><td>.</td></tr> <tr><td>.</td><td>.</td></tr> </table>	+Prep	+Art	+Poss	-Def	.	.	.	.	... the eye (s X [s	öwzöjyáy	"Su . . ."				
+Prep	+Art															
+Poss	-Def															
.	.															
.	.															
800	<table border="1"> <tr><td>+Prep</td><td>+Art</td><td>+Adj</td></tr> <tr><td>+Poss</td><td>-Def</td><td>+Deg</td></tr> <tr><td>.</td><td>.</td><td>.</td></tr> <tr><td>.</td><td>.</td><td>.</td></tr> </table>	+Prep	+Art	+Adj	+Poss	-Def	+Deg	.	.	.	.	.	.	... eye (s X [s ] has eye	zöjyáyov	" . . . ppo . . ."
+Prep	+Art	+Adj														
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900	<table border="1"> <tr><td>+Prep</td><td>+Art</td><td>+Adv</td></tr> <tr><td>+Poss</td><td>-Def</td><td>+Deg</td></tr> <tr><td>.</td><td>.</td><td>.</td></tr> <tr><td>.</td><td>.</td><td>.</td></tr> </table>	+Prep	+Art	+Adv	+Poss	-Def	+Deg	.	.	.	.	.	.	... X [s X be Y (sY mod)	öjyáyov	" . . . se . . ."
+Prep	+Art	+Adv														
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1000	<table border="1"> <tr><td>+Art</td><td>+Adv</td><td>+Adj</td></tr> <tr><td>-Def</td><td>+Deg</td><td>+Anin</td></tr> <tr><td>.</td><td>.</td><td>.</td></tr> <tr><td>.</td><td>.</td><td>.</td></tr> </table>	+Art	+Adv	+Adj	-Def	+Deg	+Anin	.	.	.	.	.	.	... X be skilled (skil . . .	áyovv	" . . . se . . ."
+Art	+Adv	+Adj														
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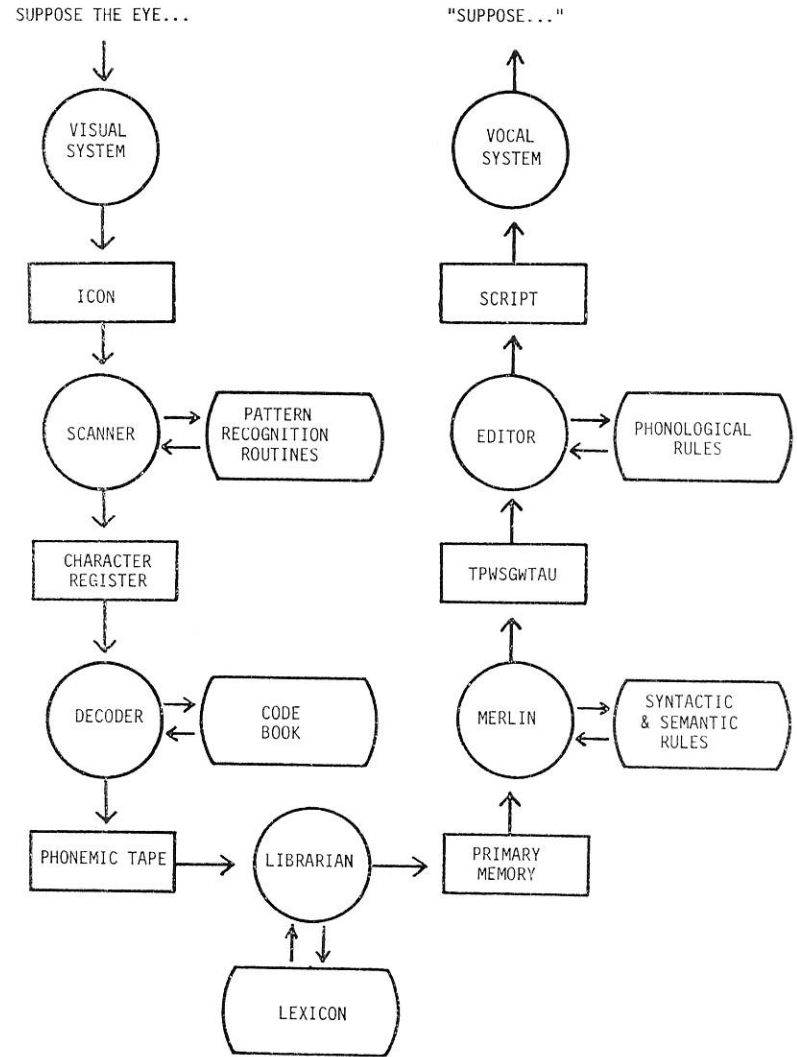


Figure 1. A model of reading.

## THE ACQUISITION OF READING

The child comes to the task of learning to read with several of the necessary components, or at least with crude versions of them.

Obviously, he comes with a visual system, and it produces an icon. Whether or not the child's visual image is comparable to the adult's is a fascinating question; so far as I know, we know too little of the quantity and quality of the child's icon to say. But there can be little doubt that he has one.

At the other extreme, the child clearly has the capacity to produce and understand sentences. He comes to school equipped with a lexicon, a comprehension device, and a phonological system; in terms of the present model, he incorporates a Librarian, a Merlin, and an Editor. None of these is as elaborate or extensive as they all will be when he reaches adulthood. His lexicon obviously contains fewer entries than it will, and there are indications that the entries it has are not as complete as they will be [cf. McNeill 1970, Chapter 8]. His comprehension device (or at least the grammar it draws upon) is not that of an adult; there are a variety of syntactic structures which he does not yet reliably process [Berko 1958; C. Chomsky 1969]. His phonological component, at least as it is engaged in speech production, is likely to show considerable deviation from the adult norm.

But at the same time, none of these shortcomings precludes the assembly of (at least) a primitive reading machine, for the child can readily make use of what he has. What is lacking is a character recognition device (the Scanner) and the device which will convert the characters it yields into systematic phonemic representations (the Decoder).

### *Character Recognition*

There is no doubt that character recognition poses a problem for the child. We know pitifully little about form perception in children [cf. Reese and Lipsitt 1970, Chapter 11]. But it seems clear that letters—"lank, stark, immovable, without form or comeliness, and as to signification, wholly void" [Mann 1841]—are not naturally identified. They can, of course, be discriminated [Caldwell and Hall 1969, 1970], but this is a far cry from the absolute identification demanded by the reading process. For example, while children will make relatively few mistakes in copying a pattern like a letter [Asso and Wyke 1971],

indicating that they are quite capable of simultaneous discrimination, they find the same distinction inordinately difficult in a successive discrimination task [Rudel and Teuber 1963].

The difficulties posed for the child by letters that are mirror images of one another (e.g., "b-d, p-q") and, to a lesser extent, by those that are inversions (e.g., "b-p") have long been noted [cf. Monroe 1932]. There have been a number of studies assessing methods of teaching children these distinctions [e.g., Hendrickson and Muehl 1962]. And almost as often, this problem has been taken as a symptom of reading disability [cf. Orton 1937].

In one sense, it must be such a symptom. An inability to reliably identify "b" cannot fail to be a handicap in reading. But as E. Gibson has pointed out, the discrimination our orthography demands of the child runs directly counter to virtually all of his perceptual experience, in which objects differing only in orientation are equivalent. Moreover, Corballis and Beale [1971] have argued persuasively that such equivalence is deeply rooted in the bilateral symmetry of our anatomy. Thus these distinctions must pose a problem for every child, and there is every indication that this is the case.

Aside from orientation, the features that distinguish (or fail to distinguish) one letter from another in the child's icon are little understood. Gibson's studies of letter confusions in early readers and adults [Gibson, Schapiro, et al. 1968] have suggested a set of features that may well be those used by the character recognition device. What remains to be disclosed, however, are the features by which the prereader will distinguish the same patterns. This knowledge would indicate which sub-components of the character recognition device are available in the prereader, and which are not, and we might get some idea of what it takes to assemble the complete device.

It would be comforting to think that character recognition (or better, the lack of it) was the chief impediment to learning to read, for it can be taught (at least with patience). The unwary might be tempted to find support for this in the infamous fact that knowledge of the alphabet is the single best predictor of reading achievement [Bond and Dykstra 1967]. But Samuels [1971] has reported the results of several studies that found no evidence that teaching the alphabet facilitates learning to read.

It remains to be seen, however, if the correlation is entirely spurious.

Teaching of the alphabet, the ABC's, dates at least to the time of Socrates [Mathews 1966], and I find it difficult to believe that a tradition that appears to serve no other purpose would survive if it did not serve this one. Whether by means of alphabet books, blocks, or soup, character recognition must be mastered. It is obviously a necessary component of reading; equally obvious, it is not a sufficient one. Given character recognition, the fundamental problem arises, that which is commonly referred to as *decoding*.

### *Decoding*

The Reader converts characters into systematic phonemes; the child must learn to do so. The Reader knows the rules that relate one set of abstract entities to another; the child does not. The Reader is a decoder; the child must become one. The decoding metaphor is familiar, and it would be difficult to argue that it is inappropriate. But if we take seriously the notion that characters are decoded to systematic phonemes, there is an interesting consequence. We can no longer think of the child as a clerk to whom we hand the code, for there is no direct way to display the rules constituting it. We cannot show him that this character goes with that systematic phoneme, for there is no way to isolate a systematic phoneme. We cannot tell him, "This goes with That," for we have no way of representing That.

In short, we cannot teach him the code. This is not to say that he cannot acquire it; every Reader before him has done so. But the child must master the code through a sort of cryptanalysis rather than through memorization. Viewed in this light, what is necessary for the child to learn to read is that he be provided with a set of pairs of messages known to be equivalent, one in ciphertext (writing) and one in plaintext (speech). They must be provided in sufficient quantity to enable him to arrive at a unique solution, and that is all.

A full solution of the code (i.e., one equivalent to that we ascribe to the Reader) can be achieved only if the child correctly identifies the alphabets of the plaintext and of the ciphertext. If we assume that the child has lexical representations in the form of systematic phonemes, the former should pose no special problem. (There is, however, some evidence to suggest that this may be a facile assumption; cf. Savin in this volume. It remains to be seen whether evidence of this sort is indicative of a different sort of phonological organization in the child, or the result of something much more superficial.)

If the child has mastered the character recognition problem as discussed above, then he has isolated the alphabet of the ciphertext, and his problem is reduced to a tractable one: that of searching for correspondences between the message pairs. But if, for some reason, he has not realized the unity of the letters, then he is faced with a cryptanalytic task of demonstrably greater difficulty, that of working out the cipher alphabet and the code simultaneously. In this connection, the Look-and-Say method obviously comes to mind. In light of the present analysis this method is not totally unreasonable. It provides the essential ingredients for the child's cryptanalysis (i.e., pairs of spoken and written messages). The trouble with it is that it does not appropriately define the problem for the child-cryptanalyst.

The Look-and-Say method confronts the child with a problem of paired-associate (PA) learning. We know that subjects confronted with the PA task will "solve" it as efficiently as they can; they will select some cue, some feature of each stimulus, and associate the defined response with that cue. That cue can be any feature or property of the stimulus item that distinguishes it from the others; in the case of visual material, it might be length, or area, or the presence of a curved line. I know of no reason to suppose that the child is different from the sophomore subject in this respect. Confronted with a word (the Look) to which he must associate a response (the Say), he should be likely to seize upon any feature of the word that differentiates it from the others he must master.

An egregious example of this can be found in a study reported by Coleman (1970) as part of his effort to collect a data base for a technology of reading. One of Coleman's concerns was to rank words that might be used in basic reading programs in order of the ease with which the child could learn to read them. So several hundred words were taught to different children by the look-say method, and the number of errors to criterion was taken as the basic datum. The words *kitten* and *o* were found to be the easiest of all. When it is noted that the words were presented in short lists, and that *kitten* is the only word as long as six letters, it is easy to see why these words were easy (and it is not that they are intrinsically so).

Given the manner in which lists are learned, it seems clear that the Look-and-Say method would not force the child to map characters onto phonemes until simpler strategies will no longer work, and that

will not happen until the list reaches a substantial length. At this point, we would expect that some children will tackle the cryptanalysis and learn to read, but we should not be surprised to see others resign in frustration. And that, of course, is what is known to happen with the Look-and-Say method.

It is clearly preferable to confront the child with the mapping problem from the start, and to suggest to him that it is solvable. One way is through phonics. In this method (or better, class of methods), the child is explicitly directed to the ciphertext alphabet, and conceivably to the plaintext as well. The method requires that he pair letters (and clusters of letters) with spoken syllables; to the extent that he segments those syllables, such learning might provide material for the necessary cryptanalysis.

It is important to realize, though, that phonics does not teach the mapping required to become a Reader. What the Reader knows is the mapping between characters and systematic phonemes; what the child is taught in phonics is to name a letter (or letter pair) with a syllable that contains the appropriate systematic phoneme. When a child "sounds out" a new word, it is apparent to any auditor that the child is not converting letters into underlying phonemic representations. Rather he is searching for something that he can hear as a word.

In the present analysis, phonics is not a method of teaching the child grapheme-phoneme correspondence rules. The rules he learns are not the rules he must master, but rather heuristics for locating words through the auditory modality. The lexical representations of those words then provide data for the induction of the real character-phoneme rules. Skill in phonics gives the child a means of naming a word *in loco parentis*; it provides him with a valuable means of data collection.

The crucial variable in the cryptanalytic problem is the character of the data: the nature and number of message pairs. Other things equal, the shorter the messages, the fewer the potential solutions; so cryptanalysis is facilitated if the shortest possible messages are provided first. Virtually every method takes advantage of this fact by beginning reading instruction with short words. (It is interesting to note that Jacotot, one of the intellectual ancestors of Gestalt psychology, advocated beginning with a book and gradually working back to the letter, whatever that means; Mathews [1966].) Cryptanalysis is

also facilitated if the messages are arranged such that covariation is apparent; if a change in a ciphertext is also accompanied by a change in the corresponding plaintext, the solution is obvious.

From this perspective, the various so-called Linguistic Methods (like those advocated by Bloomfield [1942] and Fries [1963]) appear to be optimal, for they offer the child a sequence of message pairs in which only one element is varied at a time. What is surprising, at least on first inspection, is that this method has not been shown to be superior. Indeed, there is no compelling evidence that any reasonable method of reading instruction yields results different from the others. This is encouraging, in one sense, for it means that children can manage to learn to read under any method, so long as they are provided the appropriate data, and the present hypothesis predicts just that. But it is also frustrating, for differential predictions are the stuff of which theories are made.

The trouble is, of course, that Methods are not methods. That is, a Method describes little more than an orientation on the part of a teacher, and perhaps the use of a particular basal reading series [Chall 1967]. What are desperately needed are experimental studies of reading acquisition in detail, where we know what was presented to the child, when, in what manner, and how often.

There have been very few, and they are not very revealing. The first (that I know of) was conducted by Bishop [1964], using adult subjects. It was intended to compare the transfer effects of word and letter training. One group of subjects was taught an eight-item paired-associate list, where each stimulus consisted of four Arabic characters (e.g., و | ن) drawn from a set of twelve, and each response was a disyllabic Arabic word (e.g., /faru/). A second group was taught to name each of the twelve characters with its appropriate phoneme (i.e., they were given instruction in Arabic phonics). A third learned an irrelevant task. When all groups were then asked to learn a new eight-item PA list (in which the characters were recombined to form novel words), the phonics group learned it most rapidly. This is scarcely surprising (though it may have been when the study was conducted), for it seems clear that the whole-word group had little reason to detect correspondences, since other strategies requiring no intellectual effort would suffice perfectly well. (In fact, we might have expected to see negative transfer in this group, save for the fact that training

and transfer stimuli had no initial characters in common.) What is more interesting is that the word group performed better than the control; some subjects evidently took on the cryptanalysis even though it was not necessary. But these subjects were college students, and it is not obvious that children would go to the same trouble.

A more promising study was conducted with kindergarteners by Jeffrey and Samuels [1967]. They employed an artificial alphabet of six nonsense figures. Three (call them A, B, C), were identified with the consonants /m, s, b/, three (X, Y, Z) with the vowels /e, i, o/. One group of subjects, the Word Group, was taught a four-item PA list: AX-/mo/, BX-/so/, CY-/be/, CZ-/bi/. A Letter Group was taught four isolated correspondences: A-/m/, B-/s/, Y-/e/, and Z-/i/. A control group was taught an unrelated task.

Prior to training, all groups were familiarized with the alphabet, and given practice on "blending" the sounds to be used in the ultimate transfer list, AZ, BZ, BY, and AY. Then each group was given its training. On the transfer list, the phonics group performed significantly better than the others, which did not differ. In this study, the Letter Group was given what amounts to phonics instruction, and the Word Group might be thought of as representing a linguistic method. If this were so, the phonics instruction would seem to be the superior method of (at least) initial instruction. But there is a serious flaw in this analogy, for the Word Group was mistreated.

The Letter Group was exposed to just those four elements that would be involved in the transfer; the Word Group, on the other hand, confronted items composed of six. But more important, the organization of those elements fell short of that which could be expected to yield successful cryptanalysis.

The message pairs which the Word Group was allowed to use may be arranged in a matrix, arrayed by initial and final ciphertext element:

	X	Y	Z
A	/mo/	—	—
B	/so/	—	—
C	—	/be/	/bi/

This display makes clear the structure of the correspondence rules, and it is conceivable that they might be induced by someone who

knew that CY can be decomposed to C and Y, and that /be/ consists of /b/ plus /e/. (In fact, the Word Group produced something like eight correct responses—of a possible 80—on the initial transfer trial, so more than one of the 20 must have induced something.) But there is nothing to demand it, for memorizing only four item-item correspondences will solve the problem. In fact, to achieve the solution of the code implicit in this matrix would require the identification of *six* rules. It is surely reasonable for the learner to prefer rote memory in this instance.

Such considerations lead to the hypothesis that the child would most readily learn the true system of correspondences when it provides the simplest solution to the cryptanalytic problem. For example, if, in a design like that of Jeffrey and Samuels, the child had been forced to learn not just four items, but all six lying outside a diagonal of this matrix, then the principled solution would be as simple as the associative one, and we would expect significantly greater transfer to novel items (i.e., the diagonal items).

This analysis suggests that the child's task bears a striking resemblance to those studied in adults under the rubric of miniature linguistic systems. Since the seminal experiments of Esper [1925, 1933] this literature has grown too large to review here (see Smith and Braine, in press). But it provides abundant evidence for the principle proposed here: the greater the advantage afforded by induction of structure (over rote memory), the more frequent the induction. In the present case, we should expect to see that if Jeffrey and Samuels had not only more completely filled the matrix but enlarged it (in either dimension), the Word Method would have yielded dramatically better results [cf. Foss 1968; Palermo and Parrish 1971]. And when one considers that the real task confronting the child involves a matrix in multiple dimensions, the consequences are even more apparent.

There have been other studies of teaching methods [e.g., Hartley 1970]—in this experimental sense—but they add little to this picture.

How the child solves the decoding problem is a mystery, but many do. If one does, he should be able to understand and produce any word that conforms to the rules he has mastered. Yet it has long been observed that there are children who can read and pronounce words, children who can decode, but yet do not seem to *read* connected discourse. They "bark at print"; they are "word-callers" or "parrot-

readers." Evidently, solving the decoding problem does not automatically make the child a Reader.

### *The Speed Problem*

There is a natural interpretation of this problem within the present model. To understand a sentence, it does not suffice to obtain lexical entries, place them in the PM, and pronounce them. If the words of a sentence are to be integrated into a semantic reading, they must be deployed in the PM together.

To be sure, we adults can tolerate substantial delays between words without apparent disruption of comprehension; if the delays are brief enough, as in hesitation pauses, we may not even be aware of them. This is to be expected if the PM is indeed the repository for material waiting to be understood, for it will hold that material for a short while. But Martin [1968] has shown that pauses of as little as two seconds interfere with our ability to perceive sentences in noise, and we have found some evidence in pilot studies that repetition of words within sentences reduces our capacity to remember them.

It seems reasonable to suppose that the child's ability to comprehend sentences is affected in the same way. Furthermore, if—as some evidence suggests [Haith, Morrison, et al. 1970]—the child's PM is much smaller than our own, then pauses between words will prove even more disruptive for the child's comprehension. There is an obvious source of pauses in reading sentences: if words are identified slowly, then pauses are inevitable. There is abundant evidence that children do not identify words as rapidly as adults, and that the poor reader does not identify words as rapidly as the good one.

The hypothesis that temporal word spacing will significantly diminish sentence comprehension in the child would be easy to test. But I think that naturalistic observation of children reading aloud suggests that temporal spacing is a ubiquitous problem in early reading. If it takes too long to read a given word, the content of the immediately preceding words will have been lost from the PM, and comprehension will be prevented. If the word in question is read aloud, it will necessarily be read as a citation form, and the child's oral reading will sound like a list just because he is, in fact, reading a list.

To prevent this, the child who would understand must try to read

rapidly, and if he cannot quickly identify a word, he must guess. The result will frequently be an oral reading error. These errors have been the subject of considerable study [Weber 1968], and seemingly contradictory conclusions have been drawn from them. On the one hand, it has been argued (e.g., by Goodman [1970] and elsewhere) that reading is normally a kind of guessing game, in which the reader uses the printed word for little more than hints as to whether he is thinking the right thoughts or not. In this view, oral reading errors are nothing but a manifestation of normal function, not a symptom of malfunction, and thus they should not be squelched. On the other hand, it has been argued (by Biemiller [1970]), that at least in the early stages of reading, oral reading errors are an indication that the child is avoiding the decoding problem, and thus a sign that he is unable to identify what lies before him.

From the present point of view, Biemiller is closer to the truth. A guess may be a good thing, for it may preserve the integrity of sentence comprehension. But rather than being a sign of normal reading, it indicates that the child did not decode the word in question rapidly enough to read normally. The good reader need not guess; the bad should not guess.

In the model I have outlined, the Reader is not a guesser. From the outside, he appears to go from print to meaning as if by magic. But I have contended that this is an illusion, that he really plods through the sentence, letter by letter, word by word. He may not do so; but to show that he does not, his trick will have to be exposed.

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## The Typographic Element in Cubism, 1911-1915: Its Formal and Semantic Implications

Susan Marcus

Between 1911 and 1915 Braque and Picasso experimented with formal considerations of the typographic element. The two-dimensional quality of alphabetical and numerical symbols complemented the artists' attempt to find a new means for depicting three-dimensional objects within the format of the canvas. The typographic element assisted in the evolution of collage by encouraging the replacement of painted symbols with actual objects pasted to the canvas. The idea of a letter-word-number form as a sign representing a concept to which the sign bears no physical resemblance also provided semantic implications that these artists explored. In working with the typographic element, the Cubists acknowledged a common interest shared with contemporaries in literature and science.

In 1911 when George Braque stencilled a few letters, numbers, and an ampersand on the painting, *Le Portugais*, he introduced into Cubism the typographic element that ultimately served as a catalyst for the discovery of collage and for the evolution of its corollaries: the concept of the autonomous, constructed work of art, and the notion of the communicative qualities of the medium itself (Fig. 1). Through the typographic element, Braque also aided himself and Pablo Picasso in solving certain formal and semantic problems they faced at the time.

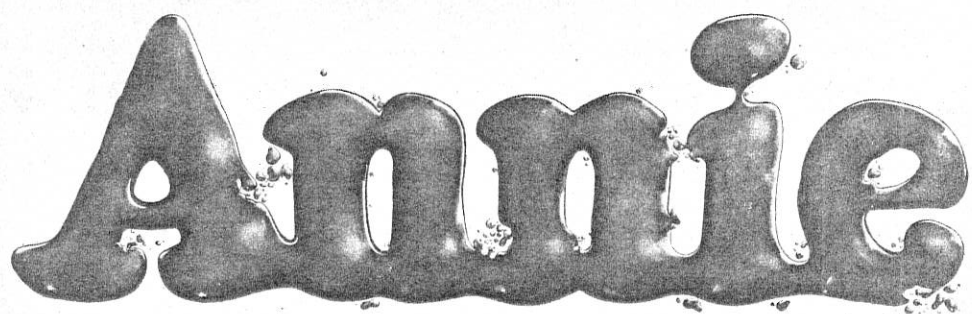
Typography is defined as the character and appearance of printed symbols. In Cubist paintings, the typographic element usually takes the form of letters, numerals, symbols, and printed material stencilled or painted free-hand on the canvas. With the medium of collage, printed material such as newspaper, bottle labels, musical scores, cigarette packages, and the like are pasted to the canvas. Whatever their form, these elements function within Cubist painting and collage of the years 1911 to 1915 as formal pictorial and compositional motifs, while also contributing to the iconographic or semantic program of Cubism.

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321 Marcus: *The Typographic Element in Cubism*

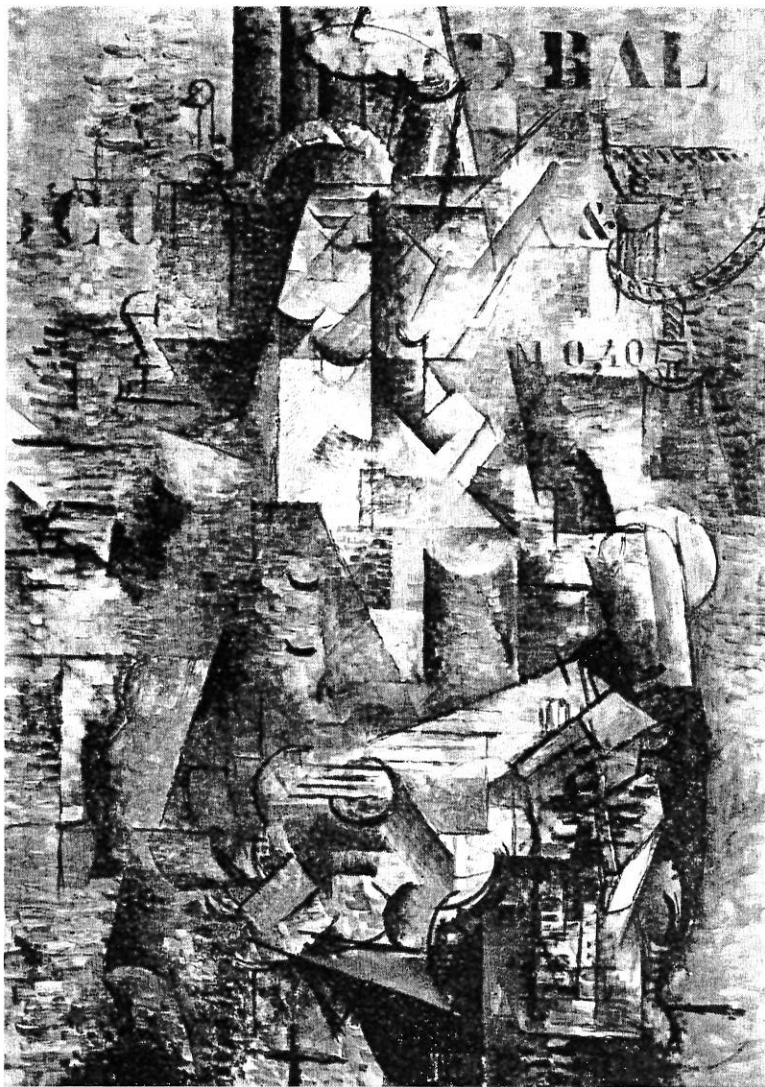


Figure 1. Georges Braque, *Le Portugais*. Spring 1911, oil on canvas. Kunstmuseum, Basel.

### *Formal Considerations*

The use of the typographic element by Picasso and Braque can be linked to several basic stylistic goals of Cubism. The canvasses of both artists by the winter of 1910–1911 were becoming progressively more abstract as the small, flat, many-faceted plane shaded at its edge became the means for depicting the three-dimensional object. The limitations of the two-dimensional canvas, both artists felt, should define the limits of the medium. With the painting's suggested space contracted to a depth of only a few inches to either side of the picture plane, a new visual language emerged which adjusted the volumetric object to the canvas while suggesting an immeasurable depth through the use of high-lights and shading. John Golding sees the introduction of the stencilled letters and numerals in *Le Portugais* as a solution to the fundamental problem of Analytic Cubism: the reconciliation of mass and space with the picture plane.<sup>1</sup>

Several years after the Cubist period, Braque said of the letters and numerals: "They were forms which could not be distorted because, being quite flat, the letters existed outside space and their presence in the painting, by contrast, enabled one to distinguish between objects situated in space and those outside it."<sup>2</sup> Gertrude Stein referred to the "rigid thing" which the painted surface could measure up against.<sup>3</sup> Both comments refer to the essential flatness of the letter form, but from that early stage on other formal possibilities of the letter were explored.

In 1911 "D BAL," "CO," "10," "40," and "&" appeared in *Le Portugais* and, in the winter of 1911–1912, Picasso incorporated the full words "MA JOLIE" into a painting with the same name (Fig. 2). Before *Le Portugais*, Braque had occasionally used complete words in his works. Following a still-life tradition several centuries old, the results of these inclusions had been decorative—the straightforward identification of objects and places. *Le Portugais* represents a departure from that decorative tradition.

Added to the system of overlapping planes in *Le Portugais*, the fragmented words composed of letters with blurred and irregular

1. J. Golding, *Cubism: A History and Analysis, 1907–1914*. New York, 1968, p. 93.

2. *Ibid.*

3. *Ibid.*, p. 93f.

Figure 2. Pablo Picasso. *Ma Jolie*. Winter 1911–1912, oil on canvas. The Museum of Modern Art, New York.

edges began to change places with each other in the narrow space of the painting. Clement Greenberg, in his article “Pasted Paper Revolution,” calls the effect an *optical* illusion which he feels more precisely defines what happens than *pictorial* illusion.<sup>4</sup> In *Ma Jolie* full letters and complete words more clearly define the surface plane. Two letters have slipped out of horizontal alignment with one another but remain on the picture plane. The two-dimensionality of the painted surface is articulated, and the existence of the canvas as an object is pointed out. The discovery of the medium of collage by which the surface can support actual objects allowed further exploration of both ideas.

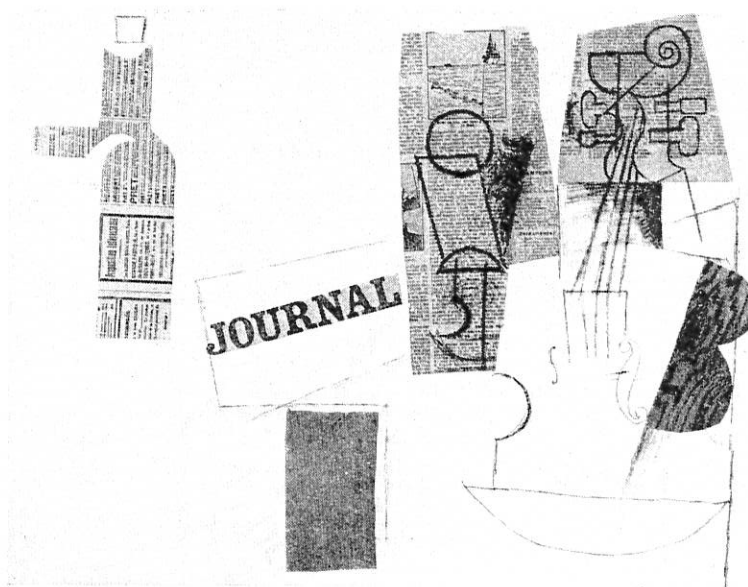
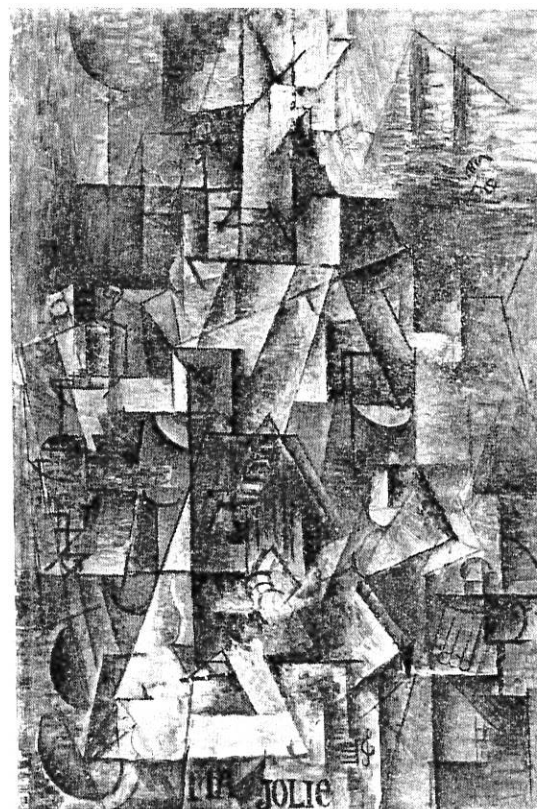
The stencilled letter defines and emphasizes the surface of the painting but, as in the case of *Le Portugais*, is not intended to sit immobile on that plane. The physicality of the picture plane is only suggested until the medium of collage explicitly demonstrates it by adhering actual material objects to it.

In 1913 when Picasso put together the collage *Bottle, Glass, Violin*, the compositional functions of the typographic elements became more complex than in either Braque’s or Picasso’s paintings just mentioned (Fig. 3). The typographic elements in this instance are cuttings from the body text of a newspaper and the word “JOURNAL” from the heading text. A seltzer bottle, a newspaper, a glass, and a violin relate undefinably to a table’s surface. On the left, newsprint becomes the body and the substance of the seltzer bottle. On the right, the surface on which a plan, section, and elevation of a glass and the head of a violin are drawn is irregularly cut newspaper. At other points, two pieces of *papier collé* without written material punctuate the large white space of the collage.

It is characteristic of the collages of both Picasso and Braque that

4. C. Greenberg, “Pasted Paper Revolution,” *Art News*, LVII (September, 1958), 48.

Figure 3. Pablo Picasso, *Bottle, Glass, Violin*. 1912–1913, charcoal and pasted papers. Moderna Museet, Stockholm.



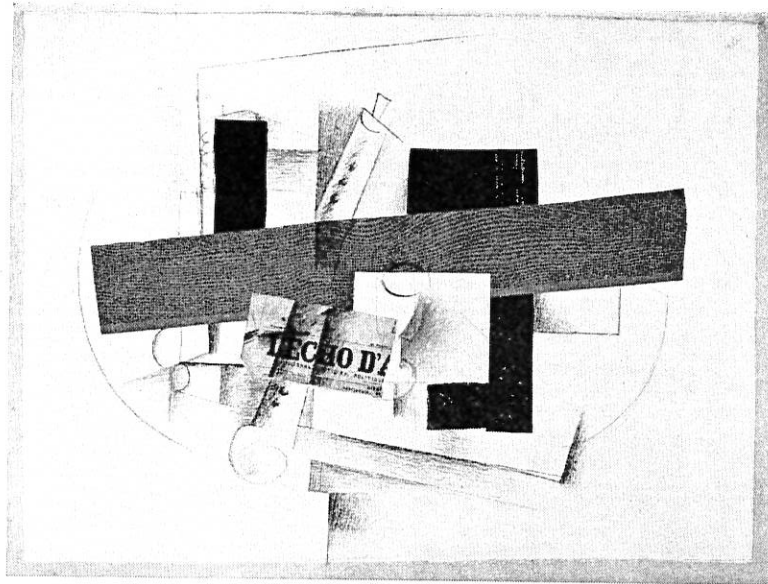


Figure 4. Georges Braque, *The Clarinet*. 1913, pasted paper, charcoal, chalk, and oil on canvas. Private Collection, New York.

the space is not totally limited to the surface of the canvas or the paper. In expanding the principles used in *Le Portugais*, each plane in the collage lies within, in front of, or in back of the picture plane and parallel to it. Each plane may potentially occupy every other plane.<sup>5</sup> When *Bottle, Glass, Violin* is seen in terms of planes, the bottle and the rectangle of paper in the center appear to lie on the picture plane. But the drawn shape on which the word “JOURNAL” rests appears to lean back in space slightly. The portion of the violin’s body described by a piece of solid colored paper overlaps the table’s edge, the position of which is indeterminable in relation to the surface of the collage. Although pasted to the work’s surface, the newsprint also lies behind the drawings of the glass and the head of the violin.

Braque’s collages tend to make fuller use of the kinesthetic potential than do Picasso’s. For example, in *The Clarinet* from 1913 Braque incorporates one piece of newspaper and several solid-colored or imitation wood-grain papers (Fig. 4). To emphasize the ambiguity of planar space and fragments of illusory depth, Braque draws the table’s edge and the clarinet with shading to give a feeling of space. The overlapped pieces of pasted paper cannot individually define the picture’s surface. The clarinet disappears momentarily behind the paper of wood-grain becoming visible again through the newspaper. The planes are simultaneously opaque and translucent. The clarinet is at once behind the wood-grained paper which is itself sometimes behind the newsprint, and then again above the newsprint but translucent.

Aside from these generally recognized functions in which the typographic material can both establish and violate the picture plane, material containing printed typography serves in several other compositional and pictorial roles.

Returning to Picasso’s *Bottle, Glass, Violin* (Fig. 3), the typographic

5. *Ibid.*

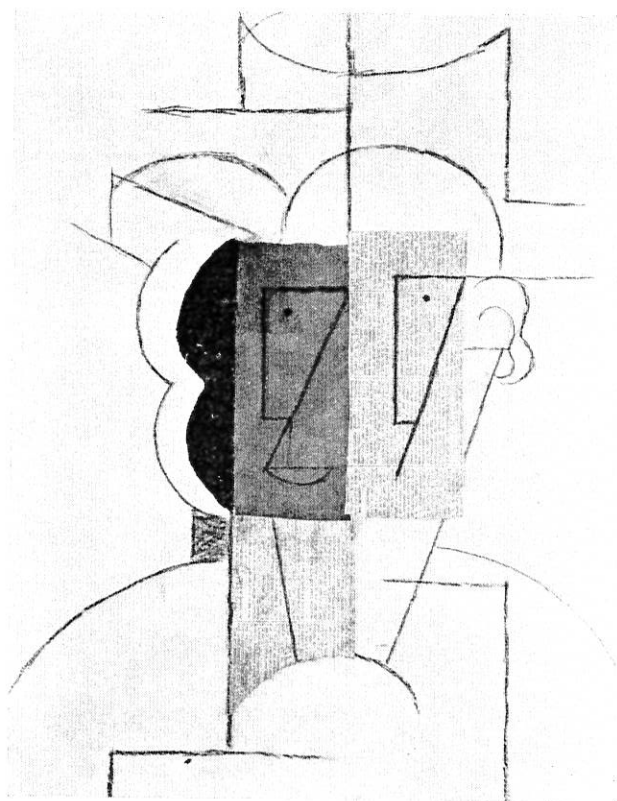
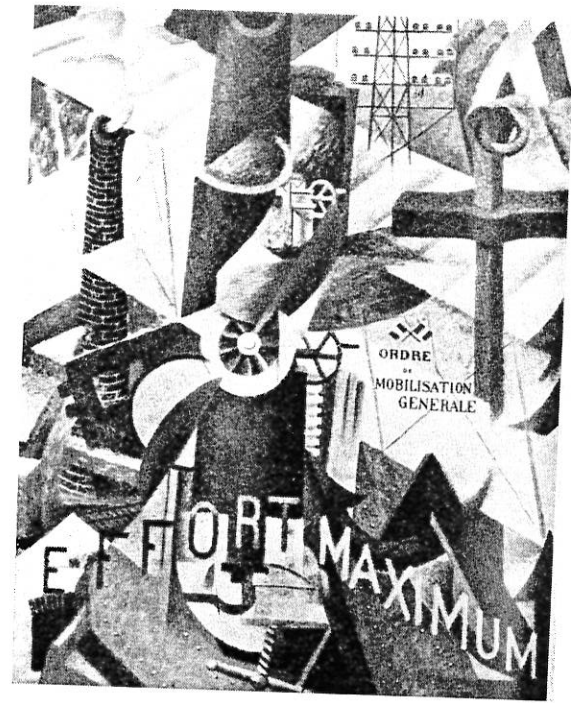
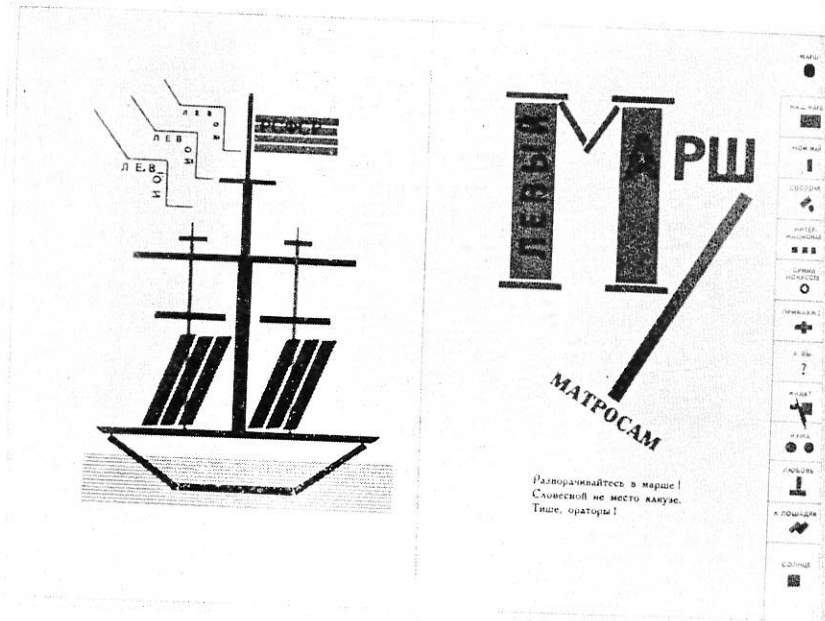


Figure 5. Pablo Picasso, *Man with a Hat*. December 1912, charcoal, ink, pasted paper. The Museum of Modern Art, New York.



Figures 6 and 7. El Lissitzky, *Left March* and *Our March* from Mayakovsky, *Dyla Golosa (For the Voice)*, 1923, RSFSR State Publishing House, Berlin. (Reproduced from *El Lissitzky* by Sophie Lissitsky-Kueppers, courtesy of New York Graphic Society.)

matter here acts as a directional force within the composition. The slant of the word “JOURNAL” provides a pivotal point in the center of the work, balancing on the left the vertical type of the seltzer bottle and on the right, the horizontal type of the randomly cut newspaper.

In Picasso’s *Man with a Hat* of December 1912, the body text of a newspaper turned ninety degrees from its normal reading position provides a gray value and texture in the face and neck of the man portrayed (Fig. 5). Less dense than the solid colored papers next to it, the newspaper becomes the partially lighted area of the face but creates the shadow in the neck.

Picasso and Braque never experimented with typography as an art in itself as did, for example, El Lissitzky in Russia (Figs. 6, 7). Neither did they exploit its propagandistic aspects as did the Dadaists and the Futurists (Fig. 8). Instead, the formal functions of the typographic elements in the Cubism of Picasso and Braque can be broadly categorized as planar, directional, coloristic (gray value), and textural. These areas indicate that both artists recognized and utilized the typographic element as pictorial motifs assisting in the evolution of their style.

*Semantic Implications*

The semantic and iconographic functions of the typographic element are also important. The semantic functions answer the question, to what does the art object as a sign refer? The iconographic analysis refers to the secondary or conventional subject matter.

The introduction of the letter and the word into painting asks that both the artists and the viewer respond to a new motif that is conventional, arbitrary, learned, and foreign to its role on the canvas. The letter form is doubly suited to the Cubists’ work. Not only is it a flat and dimensionless object, it is also a symbol standing for a concept, an event, or another object. It is a symbol recognized by all who

Figure 8. Gino Severini, *War*. 1915, oil on canvas. Whereabouts unknown.

Figure 9. Juan Gris, *The Sherry Bottle*. 1912, oil and pasted paper on canvas. Formerly Collection of G. David Thompson, Pittsburgh. Also called *The Watch*.

can read its language. It is a symbol which therefore requires a learning experience before it becomes intelligible. Finally, it is an abstract notation that bears no natural pictorial relationship to that for which it stands. The word “table” bears no resemblance to any of the physical forms that are tables.

Recognizing this, Robert Rosenblum draws the parallel between the traditional symbol of the word and the new visual symbols the Cubists invented for depicting three-dimensional objects on the two-dimensional canvas. He writes: “Confronted with these various alphabetical, numerical, and musical symbols, one realizes that the arcs and planes that surround them are also to be read as symbols, and that they are no more to be considered the visual counterpart of reality than a word is to be considered identical with the thing to which it refers.”<sup>6</sup>

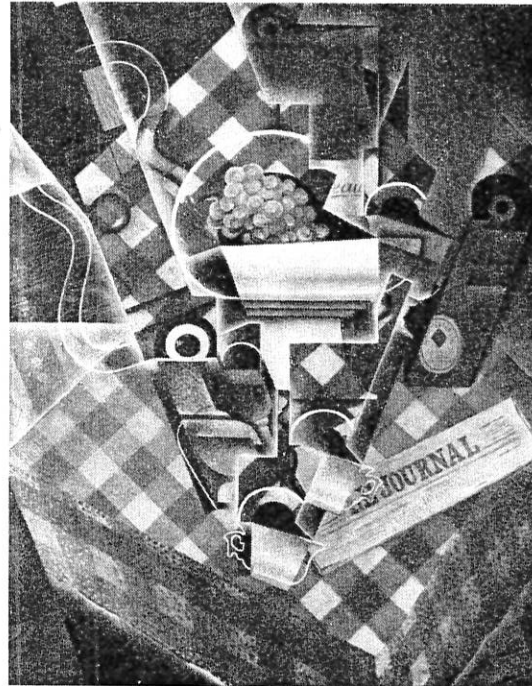
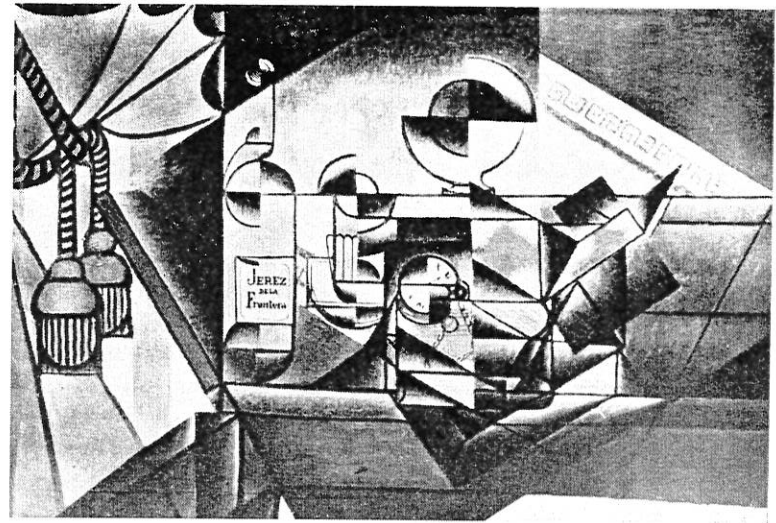
In its role as a sign, the word mirrors the painting that collectively is an object separate from what it represents. The capacity for communication in both cases is greater than the component parts.

Familiarity with a word may mean that only a portion of the letters may be sufficient to enable the reader to complete the word-idea. The principle is called closure by psychologists, but the Cubists need not have known of the principle to have made use of the phenomenon.

From the point of view of the literal meaning of the words, the Cubists began within the traditional approach. Certain genre and still-life paintings included readable information for the purpose of identification and greater reality as, for example, in a still-life painting showing a dead pheasant pegged to a barn wall on which is posted a legible hunting license. In *Le Portugais* the letters and numerals are taken from the posters and price lists on the walls of a bar, the setting for Braque’s musician. The Cubists eventually expanded the simple

6. R. Rosenblum. *Cubism and Twentieth-Century Art*, New York, 1966, p. 66.

Figure 10. Juan Gris, *The Check Table Cloth*. 1915, oil on canvas. Private Collection, Switzerland.





the typographic element to the same degree as Braque's *Le Portugais* (Fig. 1), it introduces into Cubism the potential of several stratifications of meaning inherent in the nature and use of typography as legible symbols.

The process of juxtaposing word and image goes beyond self-contained references and provides the opportunity to comment more generally, more philosophically, more ironically, and more humorously. With collage, typography of many kinds—body text, headlines, large type from labels and advertisements are employed to extend ambiguity, an essential element in the the Cubist aesthetic.

Picasso proved to be the master in this area. His versatility with the semantic gave him the range from a pun to a metaphysical comment on contemporary man. In *Student with a Newspaper* of 1912–1913, Picasso shortens “journal” to “urnal” making what Rosenblum terms a “slightly indecent pun.”<sup>8</sup> In *Bottle, Glass, Violin* (Fig. 3) the rendering of a glass lies over a cartoon with a boat and water, the head of the violin is drawn on the entertainment page, and the seltzer bottle is created from an advertisement for wines reading “*propositions interessantes.*” The newspaper, normally covered with type, is here described only by an outline and the word “JOURNAL.” The December 1912 *Man with a Hat* (Fig. 5) suggests another side of Picasso's sensitivity to the messages contained in the bits and pieces of printed matter he used. This collage is a comment on mankind. Part of the text, written in the first person relates this statement: “Et moi, j'ai honte, et je perds toute estime de moi-meme. . . .”

The use of incomplete words allows the artist to refer to objects which may be part of the composition and, at the same time, to suggest or allude to other objects not represented. Consider for instance, the word “journal” that occurs in whole or in part more frequently than any other word in Cubist collages and paintings. The word is often left incomplete because the artist must have assumed that his audience would automatically add the missing letters to complete the word. He could assume this because the generic term “journal” was commonplace, in fact, a major Parisian newspaper called itself *Le Journal*.

8. Rosenblum, p. 96.

However, when the word is incomplete, the onlooker is free to complete the word as he wishes. Rosenblum's comment quoted above and Gris' below both demonstrate that the Cubists understood that the interpretation of their works depended on the viewer. It is not unreasonable to suspect, for example, that the stencilled letters “JOU” in Picasso's *Still Life with Chair Caning* of May 1912 may alternately be finished as “jouer,” “jouir,” “jouter,” or left as “jou.” Each of the verbs and the noun fit the mood of Picasso's Cubism in the early teens. The noun “jou” may also refer to a specific game object within a still life. Dice are not uncommon in the table still lifes. They can be found in his *Still Life with Calling Card* and *Still Life, Ma Jolie*. The noun may also be a reflection of Picasso's idea of how the collage itself plays upon the nature of reality. If the latter is the case, it is not a solitary instance of the work of art making within itself a statement as to its function as an art object.

A 1914 collage by Juan Gris, *The Table* (Fig. 13), depicts among other things a drawer in a table with an illusionistic key in its lock. For all the pictorial deceptiveness of the key, the surface of the table lies in a plane parallel to the picture plane and at right angles to its drawer. A cigarette is seen twice, once in ghost form. A book, illusionistically drawn, aligns exactly with a printed page from a book, compounding and emphasizing the illusion. Rosenblum notes the tension created between the two-dimensional newspaper that possesses greater density than a pipe that appears as a shadow, without mass and volume.<sup>9</sup>

Underlying these and other visual ambiguities is the newspaper headline, “LE VRAI ET LE FAUX,” that verbalizes one of the primary ambiguities of the Cubist collage. Rosenblum writes: “An essential aspect of Cubism is to deny a single definition of reality and to replace it with a multiple reality.”<sup>10</sup> This collage masterfully juxtaposes fragments of reality within the context of another reality, namely that of the work of art.

Various kinds of typography expanded the referential possibilities of the collage. *Man with a Hat* (Fig. 5) illustrates this as do the portraits of Gleizes and Marcoussis. The semantic function of the typographic

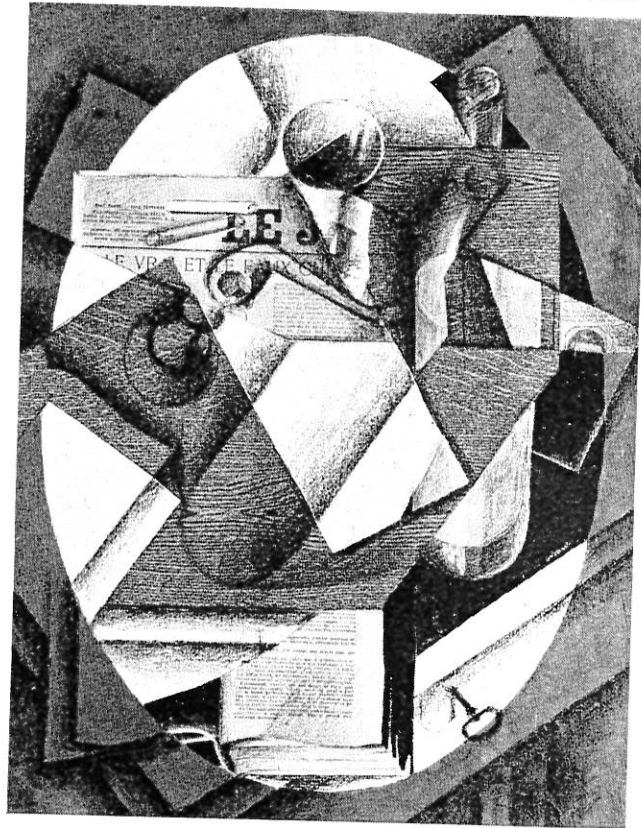
9. *Ibid.*, p. 121.

10. *Ibid.*, p. 69.

element takes meaning not only from this form of reference but also from its quality as a phonogram, i.e., a visual sign which refers to a sound. Braque's collage, *The Clarinet* (Fig. 4), acknowledges that a pictorial representation of a musical instrument is not necessarily sufficient encouragement to produce a sound in the mind of the onlooker. A newspaper heading from *L'Echo d'Alger* cut to an abbreviated form, "L'Echo d'A," stimulates a phonetic reference to the characteristic tone of the clarinet while also indicating the presence of a newspaper on the table.

As the dimensionless letter form suggested the road to a solution of the formal problems of Cubism in 1911, so the referential possibilities of typographic material offered Braque and Picasso a vehicle for augmenting several semantic aspects of the Cubist aesthetic.

Figure 13. Juan Gris, *Still Life (The Table)*. 1914, colored papers, printed matter, gouache on canvas. Philadelphia Museum of Art, The A. E. Gallatin Collection.



Many works of the 1911–1914 years connected the typographic element to the interplay of levels of reality—the parallels created between visual and verbal or non-visual ambiguities—and the self-consciousness and objectivity of the work of art that comments within itself, about itself, while defining the limits and goals of its medium and the necessity of viewer participation.

#### *The Philosophical Milieu*

In these ideas, the use of typographic elements in Cubism bears broad cultural relationships to the time. Two themes in particular emerge. The first is the growth in importance of the role of the medium for its own communicative nature. The second is the idea of relativity.

The typographic experiments of such mid-nineteenth and early twentieth-century poets as Stéphane Mallarmé and Guillaume Apollinaire, respectively, parallel the Cubists' need to re-evaluate the materials used and the final form appropriate for their works. For Mallarmé the printed word added to its reading function the potential of its form activating a spatial field. "The spatial field across which the poet casts his words is gratuitous, irrelevant in tradition verse; but [in Mallarmé's poetry] it must be understood to be an integral part of the poem itself, in the same way that silence forms an essential part of a musical composition," writes G. L. Burns.<sup>11</sup> While the image produced through writing and its relationship with other visual images have been investigated at other times over the centuries, Mallarmé worked with typography toward the creation of a medium that is itself legible. Mallarmé's interests led him to substitute the words' placement on the page for grammatical syntax (Fig. 14). His poetry gave impetus to later work, especially that of Apollinaire, e. e. cummings, the Dadaists ("Mots en liberte"), and Gris. Mallarmé demonstrated the flexibility of typography as well as attaching great importance to the medium, per se.

Apollinaire's *Calligrammes* (Fig. 15), written and published between the years 1913 and 1916, carry Mallarmé's experimentation to the point of bending letters and words into recognizable pictures such as hearts, mirrors, waterfalls, and rain patterns. "Quant aux

11. G. L. Burns, "Mallarmé: The Transcendence of Language and the Aesthetics of the Book." *The Journal of Typographic Research*, III (July, 1969), 230.



geometry, substitutes the principle that the position of one body can only be stated relative to another body and not to a fixed reference point.

Paul Laporte in "Cubism and Science" writes: "The best manner to explain the new concepts in [Cubist] painting is by correlating them to modern physics."<sup>14</sup> He juxtaposes the failure of traditional explanations to offer solutions in both fields, suggesting that the remedy lay only in the reversal of basic ideas germane to each. In physics, non-Euclidean geometry in the form of the "special Theory of Relativity" provided a solution. Of painting, Rosenblum writes: "For the traditional distinction between solid form and the space around it, Cubism substituted a radically new fusion of mass and void. In the place of earlier perspective systems, Cubism offered an unstable structure of dismembered planes in indeterminant spatial positions."<sup>15</sup>

In an essay from 1924, Juan Gris put the principle of relativity to use in his own realm. "The power of suggestion in every painting is considerable. Every spectator tends to ascribe his own subject to it. One must foresee, anticipate, and ratify this suggestion, which will inevitably occur, by transforming into a subject this abstraction, this architecture which is solely the result of pictorial technique."<sup>16</sup>

#### Conclusion

The development of the typographic element in Cubist painting began with the earliest use of such elements as a motif beyond their traditionally decorative role. It ended with the invention and exploration of a new medium: collage. The visual nature of the typographic element was such that it proved a valuable tool in solving formal problems that Cubism faced in its early stages. It terminated its career in Cubism when its users had investigated those formal and semantic possibilities of interest to them. The abstract, symbolic motif of the alphabetical and numerical forms by that time had served them well.

14. P. Laporte. "Cubism and Science," *Journal of Aesthetics and Art Criticism*, VII (March, 1949), 244.

15. Rosenblum, p. 9.

16. D. Kahnweiler. *Juan Gris, His Life, Work and Writings*. New York, 1947, p. 139.

## The Changing Responsibilities of the Typographic Designer

G. W. Ovink

At our present level of audio-visual output, we are faced with a sensory overload. The typographic designer must help cut this "mental pollution" by insisting on less and better-designed print. He must increase his understanding of both the readers' and the clients' attitudes and responses—while maintaining his unique contribution as a graphic designer. Primarily through broadened education and research awareness he must develop as a general "informatician." The typographic designer is not playing his rightful role in the development of new printing technology. He must assert leadership for flexible development of the new processes, based on his responsibility as the reader's representative and on the age-old traditions of graphic communication.

We know that the development of professional life moves—inexorably, it seems—towards ever greater specialization. Yet we know, too, that specialization got our society into its present mess. We see around us what happens when specialists proceed on their own, without due regard for those consequences of their work which they all too often consider to be outside their own province. We see scientists and technicians working without moral consciousness, but also moralists judging without scientific and technical knowledge; we see economists working without social consciousness, but also social idealists making plans without economic insight.

So the typographic designer hardly ever questions the content of the piece of print he has helped to make more penetrating. True, the designer would be in trouble *if* he questioned it! His principal would

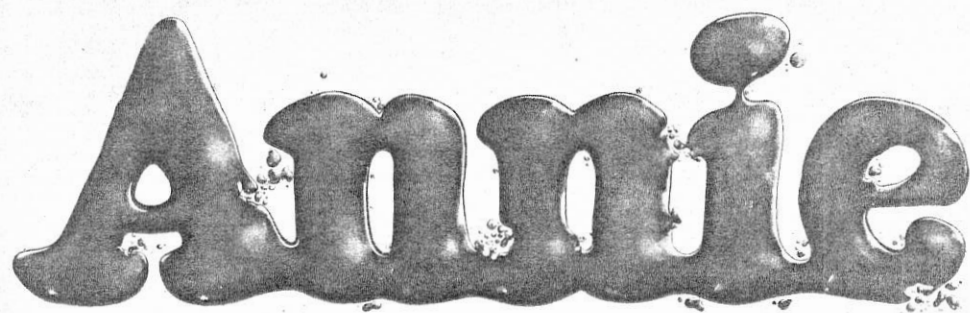
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This article has been adapted from Dr. Ovink's Beatrice Warde Lecture given in London, March 1972. The general purpose of the lecture series—instituted in 1971 by Dr. Bror Zachrisson—is to invite each year an authority of international standing to illuminate some aspect in the field of communications, particularly with regard to printing and typography.

# VISIBLE LANGUAGE

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Annie

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tell him: "Just make me a good piece of printing; don't bother over what's it about." The designer who *does* bother, is torn between two duties: he must earn a living, but he also feels that he ought to refuse making an effective job of a text which tells people worthless or even wrong things.

Nils Treving, the Swedish audio-visuals specialist of the Esselte-Bonniers Company, warned the printers and publishers of the world at last year's Comprint Congress in Geneva that we have already reached an audio-visual level of stimulation as bad as our overpopulation and environmental pollution. He called it "mental pollution." There is too much to see and too much to hear—"a sensory overload"—and too much of that is also lacking in credibility, decency, and efficiency. The victim of this mental pollution can do two things: he can stop reading and listening entirely; or he can go on, mixing up what he perceives. Either way, the message does not come across.

Clearly, we must reduce the total volume of audio-visual stimulation each individual receives. As far as our field is concerned, in other words, we must print less per capita, and then only true and useful things; and these so well presented that the reader will understand and recollect with a minimum of effort.

Less and better print. How do we set about this without committing economic suicide? Partly we will have to accept a loss of demand. That is the way in which the reading public can show that it has no use for a certain kind of print; either directly, by not buying books or periodicals, or indirectly, by not buying the products advertised through print.

Many wrong or worthless things are printed not because people are wicked or stupid or vain, but from high-minded hopes, or at least fair motives; only with wrong expectations about the reaction of the readership. If they had known beforehand that the public would not read their stuff, would not understand it, or would despise their originator for it, they would often have published it in a different way, or not at all. Scientific evidence about readers' attitudes can help the designer and publisher to turn out better work. It can help them to screen the material more effectively. I cannot go deeply into this, but I must frankly admit that we have not got very far with research yet, in spite of the great interest that producers of consumer goods, political parties, and public and private institutions also have in know-

ing how the public will react, and for which they spend large sums on research. Much of that research is on specific cases and the results remain private property, but the techniques of research are developed, and general results on human behaviour are published. But the difficulties are enormous, much greater than some research workers seem to realize.

Let me give you two examples. Both indicate how manifold and complicated influences render the reader's reaction almost unpredictable.

First: the largely passive attitude of the public. The reader does not judge consciously and deliberately. He accepts what is thrust upon him, if it does not differ much from what he expected. He simply undergoes what he gets—unless it is unusually poor, or unusually attractive. If he sees no alternative, he will even accept a definitely inferior product without a grudge against the producer. His ready acceptance of so much typewritten typography has surprised most of us. Alas, the same reader will also accept a very well produced piece without much positive effect, if he thinks that it is simply as it ought to be.

What makes the reader expect a certain quality? Clearly, a combination of what the reader has seen lately in the same kind of work from similar producers in his particular sphere of life, and his evaluation of what the producer could have done. The reader discounts poor quality from a man unable to spend more; he discounts good quality from a rich and powerful firm. All these influences are difficult to predict; the more so, now that new technology sets all the established kinds of printing adrift. Considering this passivity of the reader, and the chance element in his quality standards, it is understandable that the designer is inclined to make what he likes himself. Why should he speculate so much on what the public will like?

My second example of the intricacy of the reader's judgment: we all judge the aspect of a thing according to its price. We call a certain newspaper well set and printed, but call the same quality shoddy if found in a paperback; we admire the quality of a paperback, but would feel cheated if we got that quality in a \$15 book. We adjust our standards automatically to what we expect for that kind of product for that price, and what it means to us. A scientist may admire and gladly pay a high price for a typewritten congress report that reaches

him soon, but rage against a beautifully produced report at the same price, which he gets a year after the congress.

Though sceptical about the value of most research up to now, I am confident that, in the future, research can help publishers, printers, and designers considerably. The result should be less print, of better quality. The general trend of thought today is not unfavorable. The postwar generation everywhere shows a remarkable willingness to exercise self-restraint in economic growth. Hundreds of thousands of young people are prepared to live with less comfort than they could have, by renouncing lucrative work which goes against their conscience. And that conscience embraces a much wider concept of human decency than that of my generation at that age.

In the communication industry we will also have to apply a voluntary self-restraint. Refusal to cooperate in the printing of non-essential or misleading matter can be direct, by declining an order; more often it will work in a roundabout way which, though slower, will be deadlier. By withdrawing their talents from the production of undesirable matter, the typographers will cause the quality of that work to go down. Less-talented and less-principled colleagues will take over. In the course of time, readers will get fed-up with the hollowness and ugliness of that kind of printing, and will stop buying. We see this happening already in advertising. Many of you will look back with nostalgia to the advertising art of the Twenties and early Thirties, as recorded in Sir Francis Meynell's *Typography of Newspaper Advertisements* or in the first dozen or so *Modern Publicity* annuals. Those were the days! The wit, the sound approach of the problems, the virtuosity of typography and illustration of that period are rarely found today.

What happened?—a brain drain. Much of the talent that formerly found employment in advertising, has left in disgust. To other media, to social reform, or perhaps to the contemplative life in Ibiza or Nepal. They could not face the prospect of presenting cigarettes or soft drinks or whiskey as the condition for belonging to the respective “with-it” sets, or of presenting detergents as a means of beating your neighbor in the race for greater whiteness. As a result of that brain drain the advertising trade is left with a much higher proportion of unimaginative and pliable men. Eventually the public may come to mistrust and hate *all* advertising. That is regrettable, for advertising is indispens-

able for an efficient distribution of goods. A new confidence has then to be built up patiently and at great cost. You will understand my point, however. Producing an effective piece of communication—printed or otherwise—requires a great deal of craftsmanship. If many good craftsmen withdraw their talents from a group of publications, these publications will die from inner weakness.

Some predict even a prominent role for the designer in the improvement of society, namely on the grounds that he is particularly equipped to deal with problems involving mass behaviour. Creativity, they say, consists of the power to recognize, sooner than others, a certain structure or pattern of action. His imagination then enables him to devise a new approach, new solutions. With his vitality he dares to push these forward against the natural mistrust of non-creative people.

Developing the designer into a kind of universal handyman in problem situations is going too far, I think. He should be able to disengage himself from custom and from available patterns; that, however, does not make him the intrinsic revolutionary every artist is claimed to be. In this sense of “finding new ways,” every great man is a revolutionary, whether he be artist, scholar, businessman, statesman, teacher, or social worker. We must ask: should the ordinary designer in his daily work be as much of a renovator as only the great men can be in other professions?

I hasten to warn against the conception of the designer as the professional brainstormer, ideas man, the universal problem-unraveller. And against the whole idea of a free-floating creativity, to be taught in art schools and to be applied wherever new patterns of thought are required, in design or elsewhere. Originality is not enough. To be called “creative,” a person should have that originality combined with all the knowledge and skill required for a specific job—plus energy and willpower—if he is to perform what others could not think of. Training solely for creativity can be as one-sided as training strictly for professional knowledge and manual skill.

The present glorification of creativity, originality, and novelty rests on a curious paradox. The demand for creative designers derives from two opposite sources. One is idealistic. It hopes to make men who will *not* be integrated into the capitalistic system, who will not be “Fachdioten” (blind and dumb specialists), but who will use their fresh minds to help in making a better society. The other demand,

however, comes precisely from the capitalistic system with its logic of mass production through "built-in obsolescence," its need to create new demands continuously, its perpetual dissatisfaction, its exploitation of stupidity and lower instincts, its unscrupulous pushing of non-essentials presented as important inventions. Thus the training for creativity—for originality of mind and daring—*may* produce social reformers, if they are so motivated. It may also produce prolific inventors of sales-gimmicks.

It is natural that young people bring a fresh note into a profession. All right, liberate their minds, so that they come up with more new ideas. However, don't we all want a new society that is far more stable and natural than the present? We want quiet advertising that is reasonable, honest, informative. We want print containing no more than we need to have, presented so that we can easily understand, learn, or enjoy it. We want reference works to be clear, manageable, and complete. All this requires a high degree of typographic, editorial, and informational competence—old-fashioned professional skill, partly based on age-old experience. On the other hand, some of these skills have to be acquired in fields formerly alien to the trade.

Let me explain. We ask from the typographic designer an approach to his job as general "informatician," if I may introduce this term. Also we want him to consider the relevancy of his work. This may lead him to decide: "No, this novel should not be a book; it should rather be turned into a radio play." Or: "This catalogue should not be the book of 160 pages I'm asked to do, but a card file—or a micro-film." Or: "You ask me to design this for conventional printing by your ordinary printer, but it will be as effective, or more, if it is type-written and run off a small offset machine by yourself." Or vice versa: "You think that you can do this cheaply, but actually it requires color reproductions on a much larger format with a completely new text."

The typographic designer who has thus become a general "informatician" must have a much wider knowledge at his command than is usually taught to him. And he must have the authority to intervene in the management policy of his principal. Of course, some designers are already working along such lines today. But they are only pioneers of what will be a much more general practice tomorrow. It is understood of course, that many designers can go on in the traditional way,

designing jobs of which the relevancy and the best way of presentation have been established for a long time, or because their temperament or the scope of their talents make them stick to a single way of working. For many others, however, typography as the selection and display of types, selection of format, materials and lay-out will not be enough.

In the first place, the designer, trained to deal with texts as elements of visual design, will be expected to read texts with critical understanding. I venture to submit that too many designers do not read the texts they have to design, that they do not design according to the meaning of the text, and that they do not rewrite a text if that is necessary and possible. They think of themselves as visual *artists*, not informaticians. If they have no linguistic talents, then they should work together with an editor.

Writing is too serious a business to be left to the writers. That goes for writers in the field of technical and scientific reports, school-books, and manuals. The informatician, with his bag of typographic means of elucidation and suggestion, and his knowledge of the reader's powers of perception, can make things understood in a way that the straightforward, undesigned original text can not. Even more will be demanded from the designer: a knowledge of research methods and results regarding readers' attitudes and performances—legibility problems, aesthetic judgment, buying motivations. In short, a general knowledge of all sorts of human behaviour. Then: a considerable knowledge of printing technology and its costing; some knowledge of neighboring techniques.

Is this an unrealistic, vastly exaggerated demand? Yes, for all of it from all designers. No, for those designers who decide how huge sums will be spent to reach a certain public effectively, and who have a variety of means to choose from. It will be clear also, that in the present set-up of the information professions, all this is easier said than done. What the job needs, what the designer wants to do, is not how most customers see it today. The man who orders a piece of typographic design, does not regard that as an information problem. He does not ask and does not pay for a fresh evaluation of his job. He thinks that he knows himself what he needs; it is he who pays the piper and can call the tune.

Typographic design should be put on a profitable basis again. A

profitable basis means that the designer's fee is found to be a fair price for the designer's usefulness in the whole production.

Of course, many customers simply don't know what design involves, and are unfair when they accuse the designers of giving too little and asking too much. The final result looks so deceptively simple. But we must admit that there are designers—even famous ones—who do not know enough about techniques and costs, or don't care, and so ask without real necessity for things that can't be done easily and cheaply. The duty of the typographic designer to know about techniques and costs brings us to his responsibility as adviser on the design aspects of technology.

To take only the technique most important for graphic design: typesetting. Regrettably, most of the development and the discussion on future development has bypassed the designer. He was rarely asked to contribute, except on details of type design, and he has not offered many contributions. His art school training did not equip him to tackle these problems; he is afraid of them and all too soon declares them to be corruptions of quality standards he is determined to maintain. The designers may argue, "Why should we go into the technology of these machines? Of course they are primitive in the beginning, but if we insist on having our way, they will become simple, foolproof, and versatile. No need to study computer technology and all that now; we just tell the technicians what we want and they will comply."

This may indeed happen, in the long run, but at what price! I fear that we are about to repeat all the mistakes we made in the development of hot-metal composing machines—and more. It may come out all right in the end, but in the meantime a lot of work will go undesigned, and a lot will be designed but produced on new equipment at little or no profit, because the equipment couldn't handle it properly. Either way, the designer and the printer and the reader will suffer.

The need for active reorientation on new technology may not seem urgent when the designer finds that most of his regular customers and printers are as wary of the new inventions as he is. More and more, though, he will discover customers switching to different publishing or publicity policies, for which they have totally different suppliers. Or the designer, coming to his regular printer, will find a new machine there, with a new man in charge who isn't a designer, but who still tells the real designer what he can do and what he cannot.

The designer is about to lose many of his former liberties, too. Rightly so, inasmuch as many of these liberties consisted in satisfying personal whims. Let us be honest: it is easy for the designer to supply rough sketches and faulty originals, making his final adjustments in the proofs. It is easy, but it isn't right. The first blow against that kind of false liberty was struck when economists figured out what that took in craftsmen's wages and in idle equipment. The second blow comes now from new machines and processes, which cannot work from unclear specifications or faulty originals.

The curtailing of the designer is inadmissible, however, when engineers and other technicians want to have it easy in *their* turn. The trouble is, many designers don't realize how acute the danger to their profession has become, and don't raise their voices unitedly to make their requirements known. If the engineers and equipment manufacturers are allowed free reign, they will organize typesetting and reproduction so that it is most logical, efficient, and cheap according to *their* viewpoint. But their logical, convenient, and profitable methods are not always what the designer needs for ensuring reading comfort and appeal to the public.

Have we forgotten so soon the painful story of the development of the Linotype? The greatest demand for mechanical composition in the 1880's was from the newspapers, which needed vast amounts of simple, uniform matter set rapidly—American language, of course. The Linotype provided just that, and this saddled Europe with 90 channels and a corresponding keyboard, unfit for languages with many accents and for scholarly work. History repeated itself with the introduction of 6-channel teletypesetter tape, and again today with simple photocomposing machines, unable to cope with anything else than basic English, unless at great loss of speed and quality. Machines and processes are developed for the uses which are first in the greatest manifest demand. It is always thought possible to adjust or extend them for other demands, if such demands become profitable. So the Linotype advanced from single-character matrices to two-character matrices (providing an italic, or bold or special signs, but on the same width as the main figure) to pi matrices for special signs; from single magazines to four-deckers with side-magazines; there are now multiple-mould wheels, quadding and centering devices, saws, etc. *Makeshifts!* They do their work, but the machine could have been

constructed in a different way if the present demand had been manifest in the beginning.

What is a paying proposition in the long run? After 25 years of developing photocomposing machines we still don't know what is needed. Why are the cleverest minds in the industry unable to agree on this? Terrible losses have already been incurred by countless firms! Why is this problem so difficult? It is a fascinating question. I will focus only on the part of the designer in deciding which machines and processes we are going to use most in the future.

A really new machine or process is made not for an existing market, but for a potential market. The potential purchaser doesn't know what the operating costs will be, whether the new product will be acceptable to the public, nor whether his prices will cover cost and profit. The machine manufacturer asks the potential customer, "What do you prefer: cheapness? speed? quality? versatility?" The customer doesn't know; how can he? He is, in turn, dependent on his clients. Moreover, there are other manufacturers who make even more beautiful propositions. Perhaps one should wait a little; let other people lose their money first, and step in when the risk is gone. Meanwhile, manufacturers incur losses, and printers deprive themselves of benefits the new machine or process could have afforded them.

What has been the result?—photocomposing machines that were too fast, too versatile, and too expensive; machines with an output too small and deficient at any price. New compromises are now being sought involving quality, versatility, speed, and price. Their success will depend to a considerable extent on the contribution of the designer to new, efficient design and composition routines. Yet the voice of the designer is hardly heard in all the discussions on the future of printing, notwithstanding all he knows about the requirements of authors and readers. Author and reader are therefore not heard at all; neither directly, nor via the designer who could represent them.

With the designers and printbuyers largely passive the efficiency-minded engineers seem to have our future planning all to themselves. This is a danger. I'm all for efficiency, but *their* efficiency is so often one-sided and short-sighted! Today millions of dollars are spent on the development of information storage, retrieval, and dissemination systems. As with the Linotype, the decisions are being made by

interested groups which can make clear-cut demands—and pay for them, now: newspapers, the space industry, medical and pharmaceutical sciences, banking and stock markets, et al. Each has homogeneous material to be processed in bulk, rapidly, for people waiting eagerly for the information. Not so the humanities and the arts, nor even commercial publicity, for their material is not homogeneous, does not come in bulk, and is not needed in a hurry. My fear is that the needs of the sciences, etc., will be met by equipment and processes which seem to present so many advantages that they will have to be adapted for use by the humanities—again by means of unwieldy makeshift adaptations and extensions.

What do we do about it in the field of typographic design?

Most urgent are the problems of photocomposition. Representatives of the humanities should first decide—with the aid of typographic designers and legibility research workers—what their minimum requirements are; what is intrinsically important in present rules of composition and layout; and what, on the other hand, is nice to have if you can get it, but no more than that considering the adaptability of human nature. Then the printing technicians and economists should come in and explain what they need absolutely, and what they can do without, if need be. The two viewpoints should then be brought to a compromise. A few examples.

We all agree that text composition and page make-up will soon be done in one, integrated process, with nothing left to improvisation; and that, ideally, all keyboarding and actual character generation should not start before absolutely clean, final copy and design are in. No afterthoughts permitted. This means that both author and designer must visualize the final result before the typographic stage. Can we train authors and designers to renounce their deep-rooted habits, and to adopt difficult new routines—"for the printer's sake," as they will say? Partly they will comply, if the choice is between having the thing done so or not at all; partly they won't comply, whatever the lure or economic pressure. Fortunately, there are several escapes.

It should be emphasized, first, that these are *visual* problems, not merely technical ones. Any difference between original copy and printed result must be predictable through *seeing*. Calculating the number of characters and lines from typescript or tape is not

sufficient, because the typographic form affects the visual importance and balance among the parts. It will be necessary, as a rule, to run the tape twice through the photocompositor: once at high speed and low quality, sufficient for correction of proofs; and once, after correction, at reduced speed and high quality for final result—as many machines can do today. Once agreed on, rules for breaking-off, spacing, and capitals; for placing notes, captions, and illustrations can be programmed. Of course, agreement on proper breaking-off rules should be reached between all users of a language, and on proper rules of capital spacing, between all designers. Perhaps some characters in some typefaces should be redesigned to follow general rules, e.g., the notorious Bembo capital R. Professor C. J. Duncan was quite right in ridiculing the individualism and chauvinism which prevented such rules and conventions to be agreed on long ago.

In page make-up of complicated work it is possible to provide for eventualities by using a flexible layout system, with “play-room” so to speak; variations on the basic scheme need not hinder, because the whole style is based on variability and not on uniformity, as traditional typography is. There is the danger that the text done in such a flexible lay-out, being less compact, presents too few elements at a single glance; that it looks disjointed, vapid, rambling. Traditional typography gives a terse and succinct exposition of facts, because it concentrates these in the smallest possible area. But that requires a strictly individual treatment of every page, which a largely computerized, run-of-the-mill production does not allow for. However, the tape-driven visualizing screens or “terminals” used for editing and correcting tape may help us in this, though it will take some time before these visualizing contraptions can match the ease and accuracy of single-character correction in hand- and Monotype composition.

In all these matters the typographic designer should establish design models which exploit the specific possibilities of the machine, while neutralizing or compensating its specific limitations. Possibly the designer will find that even when he does his very best to meet the engineer’s wishes, there are still things left which the machine cannot

Figure 1 The headstone to the grave of Beatrice Warde in Epsom Cemetery, Surrey, England, to which Dr. Ovink refers at the conclusion of his article. The lettering was cut in Welsh slate by Will Carter.



produce at a profitable rate, though it should. Then such important reader's requirements should be urged upon the machine manufacturer or, *mutatis mutandis*, upon the process developer. Only then, when all the possibilities and limitations have been tried out and checked with the people most concerned, will the manufacturer take notice and consider improvements. Engineers and manufacturers will accept good advice from the designer, but only if the designer knows what he is talking about both in technical and in commercial respects.

How do we get designers who can thus act as typographic informaticians; who can cooperate effectively with engineers and salesmen; but who can also act as the loyal opposition? Fortunately, strict separation is lessening between our various educational programs between art schools, trade schools, commercial schools, technical colleges, universities, and the old apprentice system. Typographic design has always attracted people from different backgrounds, and it will do so even more in the future. Printing can offer much to all kinds of talents, and it will draw on all the gifts a person can muster. The future generation of typographic designers, therefore, should take to heart the line cut on Beatrice Warde's grave-stone: "Quantum potes, tantum aude"—which we may paraphrase, perhaps, as: "Whatever your talents are, dare to use them to the full."

## A Program for Developing Visual Symbols

Ed Bedno

A programed procedure involving discrete visual and verbal steps to simulate the creative processes involved in visual design is presented. The program was used by students in a design school as a guide to the design of visual symbols. The resulting level of performance was generally quite high. Results tend to indicate that this procedure is an accelerated and efficient method for extending the student's awareness of the possibility of conscious creativity.

One of the problems continually facing a professional designer is the need to devise clear graphic symbols for instructing, identifying, or motivating the viewer. The clarity and originality that is brought to the solution is most often credited to the individual designer's experience and intuitive abilities. Although this would appear to be the case on the surface, most designers tend to follow a more or less similar procedure without either knowing or being able to describe it. Many studies of the creative act recognize that it usually, or often, involves the steps of problem definition, analysis, generation, synthesis, development, refinement, and presentation.

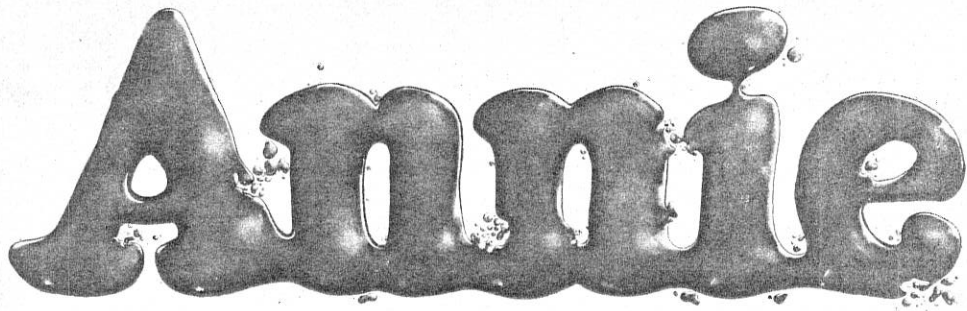
Proceeding from this assumption (and my own experience), I developed a structured procedure to guide the user through these steps. To test this procedure, I assigned a problem to two classes of sixteen students each, requiring the design of a visual identifier for a hypothetical institution. I avoided institutions concerned with specific products so that the student could not rely on a simple pictograph of an object but would be forced to represent symbolically a broad idea. All students were given the same procedure to follow; ten discrete steps in the verbal mode, followed by thirty discrete steps in the visual mode. The end result should be a simple, clear visual symbol representing the institution. The problem was given and the procedure described. The hypothetical institutions were assigned

355 *Bedno : A Program for Developing Visual Symbols*

# VISIBLE LANGUAGE

The Journal for Research on the Visual Media of Language Expression

*Volume VI, Number 4, Autumn 1972*



Annie

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randomly. No solutions were shown or discussed relating to the assigned problems. Basic guidelines were given for technical consideration, such as generally accepted line weights for legibility at a distance, the necessity for simple form that will reproduce in any process, etc. The students worked with this program for an average of 12 hours, including two one-hour class critiques. The classes were composed of a somewhat mixed group of Institute of Design students; twenty were in the visual design program, four were in the photography program, four were in the product design program, and four were in the art education program. None had worked in this area of design previously.

A summary of the program itself follows. Space does not permit a full description or example of each step. If sufficient interest warrants, I would hope to eventually publish this program as a workbook. The first ten steps require written responses and are concerned with the stages of problem definition, analysis, word and image generation, and preliminary synthesis.

1. Statement of Problem. For example, to design a visual identifier for The Museum of American History.
2. Description of the User. Who or what it is; what it does. The inexperienced designer at this stage usually oversimplifies, uses unexamined clichés, or just does not know (but describes anyhow).
3. Analysis of Description. Now that you have described it, do you know what you've said? Explain your description, including definitions for all terms used.
4. Sources of Information. Where you got your verbal and visual information about your problem. Because of time limitations, the information will usually be less than preferred; but it does demand some awareness of information needed and builds a vocabulary of possible verbal and visual symbols.
5. Implications of Subject. If an object, what it does or would do. If an organization, what it accomplishes or should accomplish. If an idea, how it would affect us. These descriptions take one beyond simple physical representation into potentially broader symbol possibilities.
6. Descriptive Words Relating to Subject. Reduce your subject title to its simplest form and generate as many words as possible that

relate to these words. For example: *Computers in Education*. Generate word lists for both *Computers* and *Education*. At this stage, precision is not essential. Write down any word association, no matter how absurd.

7. Descriptive Images Relating to Subject. Same as above, but visual images. You will find that images will suggest further words, and words will suggest further images. Be prepared to work back and forth in both areas.
8. Matrix. Select the twelve best (most appealing to you) word or image statements from your list and lay them out on a matrix: six horizontal and six vertical. At this stage it is important that your selections are concerned with things that can be visually represented. Hazy, unexplained, over-generalized words or images cannot be dealt with. One cannot easily visually represent "thinking," but one can certainly represent "brain", or "nerve network", or "spark" (Fig. 1).
9. Matrix List. From this matrix, 36 combinations will result. These combinations represent the synthesis stage, where seemingly unrelated elements, when combined, suggest new and unexpected entities (Fig. 2).

	CROSS OUT SIGN	TRASH CAN	FIRE	GRAVE STONE	SKULL AND CROSSED BONES	FRAGMENT
LETTER GRADE	✓	✓	✓	✓	✓	✓
NUMERICAL PERCENTAGE	✓	✓	✓	✓	✓	✓
REPORT CARD	✓	✓	✓	✓	✓	✓
DUNCE CAP	✓	✓	✓	✓	✓	✓
TEST PAPER	✓	✓	✓	✓	✓	✓
CHECK	✓	✓	✓	✓	✓	✓

Figure 1. Matrix for student selected images relating to *Elimination of the Grading System*. When all of these elements are matched, 36 combinations will result, each of them representing a potential visual metaphor.

## MATRIX LIST

Mushroom cloud/Dove with olive branch  
Mushroom cloud/Plowshare  
Mushroom cloud/Band-aid  
Mushroom cloud/Broken lance  
Mushroom cloud/Muzzle with flower  
Mushroom cloud/Open palm of hand

Fractured world/Dove with olive branch  
Fractured world/Plowshare  
Fractured world/Band-aid  
Fractured world/Broken lance  
Fractured world/Muzzle with flower  
Fractured world/Open palm of hand

Eagle with arrows/Dove with olive branch  
Eagle with arrows/Plowshare  
Eagle with arrows/Band-aid  
Eagle with arrows/Broken lance  
Eagle with arrows/Muzzle with flower  
Eagle with arrows/Open palm of hand

Barbed wire fence/Dove with olive branch  
Barbed wire fence/Plowshare  
Barbed wire fence/Band-aid  
Barbed wire fence/Broken lance  
Barbed wire fence/Muzzle with flower  
Barbed wire fence/Open palm of hand

Buildings skeletons/Dove with olive branch  
Buildings skeletons/Plowshare  
Buildings skeletons/Band-aid  
Buildings skeletons/Broken lance  
Buildings skeletons/Muzzle with flower  
Buildings skeletons/Open palm of hand

Cannon/Dove with olive branch  
Cannon/Plowshare  
Cannon/Band-aid  
Cannon/Broken lance  
Cannon/Muzzle with flower  
Cannon/Open palm of hand

Figure 2. Matrix list, showing 36 possible combinations relating to *Pacifists Against War*. From this list the student selects 12 to develop visually.

10. Selection from Matrix. From the list of 36 combinations, select 12 that present the most interesting potential. From this point on, the basic ideas can be visualized.
- 11 to 22. Synthesis Sketches (12). Each of the combinations should be drawn as a single, unified visual image for a total of 12 visualized ideas (Fig. 3). At this point the visual quality of the sketch is of no importance, only the variety.
- 23 to 28. Development Sketches (6). Select the most promising synthesis sketch and try for a diversity of form within the parameters of a single idea (Fig. 4).
- 29 to 34. Reduction Sketches (6). Select the best development sketch and make six sketches, starting with the idea as it was first indicated; then progressively eliminate unnecessary elements until you have reached the point where the image can no longer be simplified without losing its meaning (Fig. 5).
- 35 to 40. Reduction Sketches (6). Select the best reduction sketch and make six sketches that progressively refine your idea in terms of visual quality. A rational solution is not necessarily a beautiful solution, and it is at this point that subtle variations can take place involving personal aesthetic decisions (Fig. 6).

By the end of the program the resulting image should have combined the most interesting idea with the clearest meaning with the simplest form that is most pleasing to the eye. Obviously, theory and practice do not always coincide, but the examples shown do indicate a high level of performance considering the absence of an instructor, the unfamiliarity of the subject, and the small amount of time available. Some of these symbols are at about the same level as similar projects previously given that occupied weeks of effort (Fig. 7).

It would appear from this that the creative process can, to some extent, be analyzed and structured. I would be the first to point out, however, that procedures such as these are at their best when the instructor has a fairly clear idea of what the goal will be. Having designed symbols professionally, it is possible for me to work "backwards" from a goal to a set of procedures that will most likely lead up to the goal.

Perhaps the most rewarding aspect of this method is not that inexperienced students find themselves able to produce professional

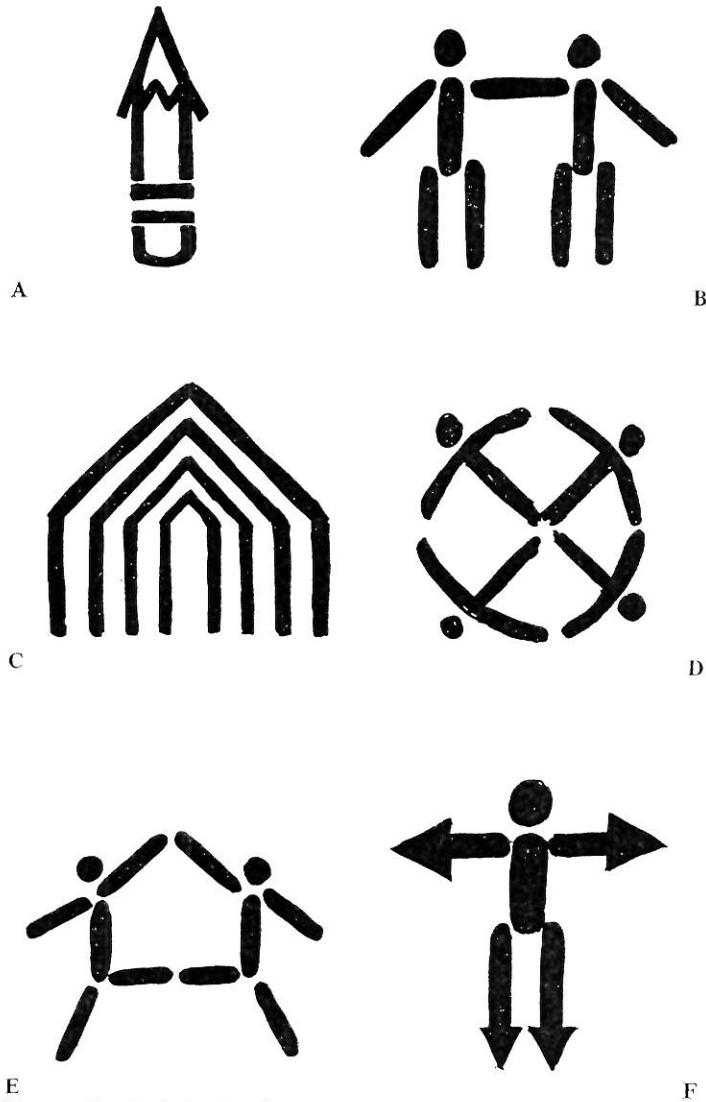


Figure 3. Synthesis sketches for *Free Schools Association*. Each of the 12 matrix selections is visualized. At this point, only the idea is important, and not the appearance. Shown here are syntheses of: A, Direction (arrow)/Pencil. B, Student/Holding hands. C, Schoolhouse/Growing. D, Student/Circle of hands. E, Student/Schoolhouse. F, Student/Multi-direction.

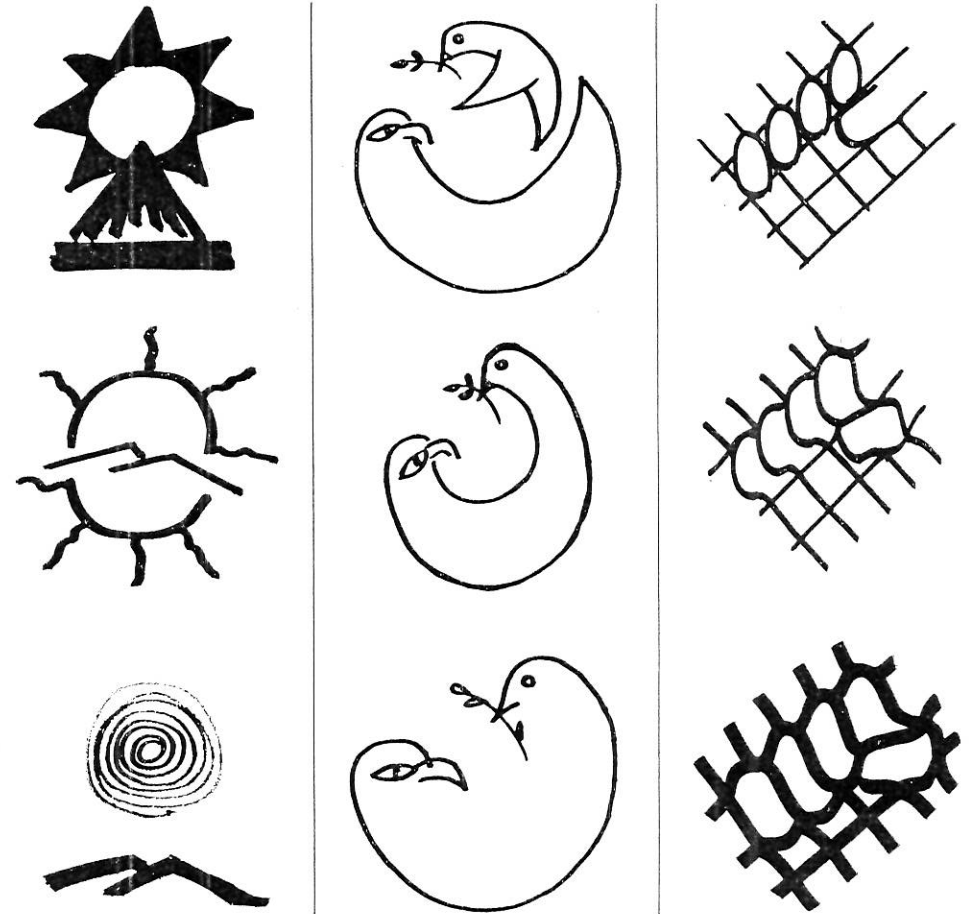
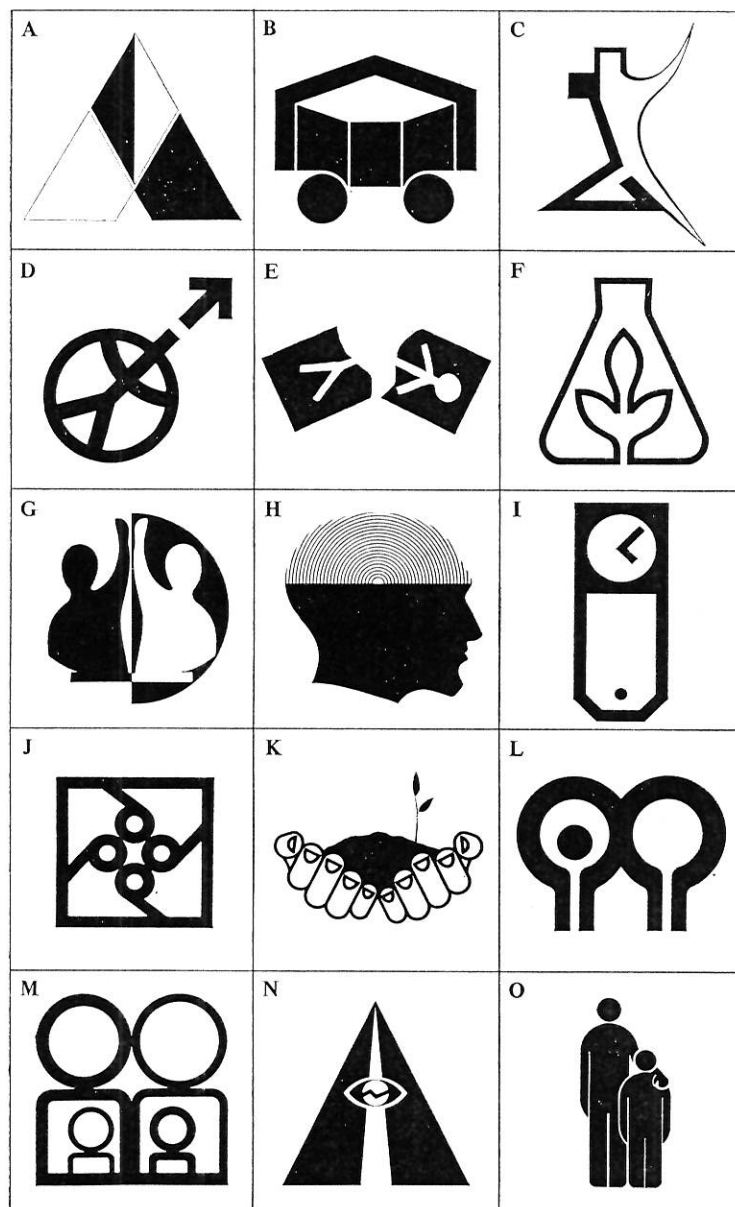


Figure 4. Development sketches for *Return the Land to the Indians*. Having selected one synthesis idea to pursue, the student experiments with form variations on the same idea.

Figure 5. Reduction sketches for *Pacifists Against War*. Having selected one form to pursue, the student attempts to reduce all visual elements to their simplest statements without losing the meaning.

Figure 6. Refinement sketches for *Release of Political Prisoners*. Having selected one reduction to pursue (a hand clutching a wire fence), the student progressively refines, blends, and makes aesthetic decisions. From this point the symbol is ready for a finished rendering, suitable for reproduction processes.



looking symbols, but that anyone involved in the method appears to gain insight into the creative process. Many of my students have since informed me that they have advantageously utilized aspects of this method in other problem solving situations. It is to this end that I would suggest further development and consideration.

*Overleaf*

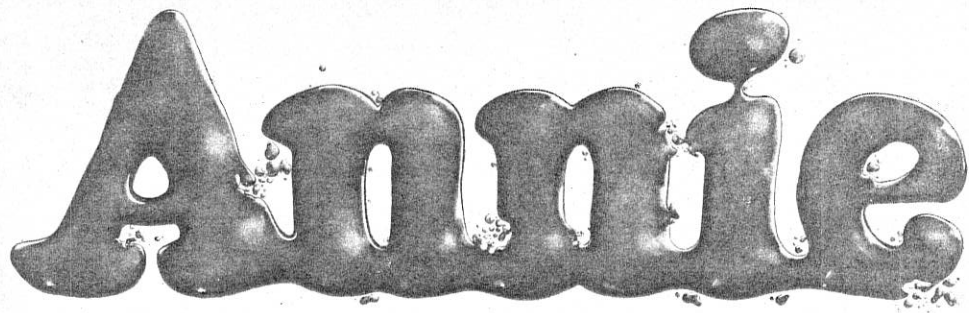
Readers are invited to try the Bedno system for developing visual symbols; some will be rewarded with subscriptions to *Visible Language*!

Figure 7. Representative selection from two classes. About 1/8 original size each. These symbols represent various hypothetical associations, institutions, firms, or ideas: A, Alloys, Inc. (fusing of two elements into one letterform). B, Museum of the American West. C, Contemporary Dance Association (both modern and classic forms are represented). D, Vasectomy Association. E, Suicides Anonymous. F, Farm Research Association. G, School Integration Association. H, Mental Health Association. I, The Junque Shop (early twentieth-century antiques). J, Devonshire Paper Distributors. K, Save the Land. L, Abortion Association. M, Family Planning Association. N, Abolish Highway Eyesores. O, Child Abuse Association.

# VISIBLE LANGUAGE

The Journal for Research on the Visual Media of Language Expression

*Volume VI, Number 4, Autumn 1972*



Annie

Design a visual symbol for 'visible language'—  
Win a ten-year subscription to *Visible Language*!

To encourage designers—and would-be designers—to try Ed Bedno's program for developing visual symbols, we invite you to design a symbol for 'visible language'.

*Important:* the symbol you design should NOT be for the journal *Visible Language*; rather, it should represent symbolically the concept 'visible language' which underlies the basic editorial policy of this journal. The concept is outlined on the inside front cover of this issue; in general terms, it encompasses the investigation of any expression of verbal language in visual form—calligraphy, typography, signing, et al.—in any visual language system devised by man. Any questions, write the editor!

Please save all of your preliminary sketches and work sheets. We plan to publish the creative development of some of the winning designs.

The designer of the symbol judged best to represent the concept 'visible language' for use in future publications, etc., will be given a ten-year subscription to *Visible Language* journal. A five-year subscription will be sent to the designer of the symbol judged second-best; one-year subscriptions will be sent to the five next runners-up.

*Deadline:* have your designs in the mail by February 1, 1973. If you want your entry returned, include a reply label and return postage.

## Cover: Words about Ed Ruscha

Reproduced on the cover is Ed Ruscha's oil painting *Annie, Poured from Maple Syrup*. The comments which follow have been excerpted from an article by David Bourdon in *Art International* XV/9 (November 20, 1971), pages 25–28, 38, and are reprinted here with kind permission.

Ed Ruscha is an engagingly eccentric Los Angeles artist who combines the obvious and forthright literalism of pop with the wry and incongruous juxtapositions of Surrealism. In both his work and personal manner, he appears to be a sort of cowboy Magritte gone Hollywood. He has produced a number of accomplished paintings, which are primarily fascinating for the unexpected morphological changes to which he subjects his otherwise commonplace images. But he is essentially a graphic artist who excels in matters of typography and layout. Consequently, much of his major work is in drawings, prints, and books. Among present-day artists, he has few peers at drawing. . . .

In most of his best work, typography is the subject matter. A single word is often the sole image, spelled out across the upper middle of the canvas. His involvement with words stems from a long-standing fascination with lettering and typography. His depicted words have unsystematically evolved from sign-like, literal renderings of existing type faces to imaginary letters, deceptively spelled out in ribbon-like strips of paper, or in illusionistic spurts of liquid. Typography, as it appears in newspaper headlines, magazine covers, ads, posters, billboards, traffic signs, film and TV titles, is among the most dominant features of the urban landscape, and plays such a large part in daily life as to go unnoticed. Since about 60 years ago, when the Cubist painters began providing large doses of reading matter through handpainted letters or collaged newsprint, countless artists have sought to extend the vocabulary of modern art by utilizing words in their work. But Ruscha's approach to the subject is extremely original. Unlike most artists who render their words flat Ruscha has given his words the illusion of three-dimensional physicality. And because of this he is closely related to Surrealism. . . .

Ruscha readily admits his Surrealist inclinations, but he points out that they stem from a shared sensibility and that he is not consciously imitative of the Surrealist masters, with whose work he was largely unfamiliar until after he had arrived at his present style. "It is the attitude that is similar," he says, "not the manifestation." Ruscha might never have suspected the myriad pictorial possibilities of words had he not seen the paintings with letters by Jasper Johns, whose early work he knew while still in school. "I went through a period of doing Jasper Johns paintings," says Ruscha. "Then when I got out of school, I refined it to almost pure typography. . . .

One of the attractions of working with letters is that they have no standard size. In the early '60s, when Ruscha was painting commonplace objects, such as food tins, comics books, and pencils, he frequently felt obliged to render them actual size, as if it were unethical to tamper with the specific dimensions of real objects. "I like to deal with objects," he says, "but I have to make them the same size that they are. I can't change their size. Words are the only thing that do not have a recognizable size, so I can operate in that world of 'no size'."

It was considered something of an esthetic coup in the early '60s that Johns had the ingenuity to paint an initially flat image, such as a letter or numeral, on a flat surface. Actually, Johns's use of words is not so unique, as practically every 20th-century artist, since Picasso and Braque, has rendered words flat. Considering all the metamorphoses that letters go through in everyday printing, from Times New Roman to Bodoni and Futura, it is surprising how little variety there is in the bulk of 20th-century art. Oddly enough, almost none of the many artists who used words—among them, Magritte, Miró, Motherwell, Dine, Rivers, Rauschenberg and Lichtenstein—thought of rendering them as three-dimensional physical objects. Ruscha is nearly unique in treating words as something other than flat symbols drawn on a flat surface. The only other artist who comes to mind who has given words a palpable physicality is Claes Oldenburg, who transformed flat letters into three-dimensional bas-reliefs in his *C-E-L-I-N-E, Backwards* (1959), in which the letters are shaped by painted newspapers over a wire frame, and *Soft Calendar for the Month of August* (1962), in which the painted canvas letters and numerals have been stuffed. Oldenburg's pieces are, of course, literally three-dimensional, while Ruscha's words are only illusionistically three-dimensional. But both artists are equally perverse in their treatment. Ruscha chooses particular words for their appearance, sound, or spelling. He claims no interest in their dictionary definitions, or the kinds of images and referential associations the words might suggest. There is no evident connection with concrete poetry, which seldom transcends arty layout. Ruscha's words are not conceptually provocative, as are the one-word

drawings of Walter De Maria, nor are they a vehicle for "pure" information, as Joseph Kosuth intended his photostated canvases of dictionary definitions to be. "I separate myself from the English definition of the word," says Ruscha. "Some of the words come out as though they are puns, but I am not interested in punning the word, or illustrating the word, although some of the things happen to feel or look that way." Ruscha generally prefers short words with a blunt or brusque sound, such as "chop," "egg," "honk," or "hey." He favors vivid nouns, adjectives and expletives, and he would probably choose "squirt" over "square." A knowledge of the English language is not a prerequisite to the enjoyment of Ruscha's work, because his words are designed primarily to be looked at, rather than read. His work is more visual than conceptual, because he obviously is more interested in the transformation of words into pictorial images than he is in making literary or intellectual allusions. . . .

[In the mid-sixties] Ruscha discovered an even more bizarre way to objectify words by spelling them out in illusionistic splashes of liquid. Exercising a dual perversity, he transforms words into three-dimensional physical objects—in this case, glistening splashes of cursive script—but in a state of such liquidity that they are apparently dissolving before our eyes. It is as if the spilled and still quivering liquid had miraculously half-gelled in the form of a word, and now threatened to evaporate in an equally strange fashion. One of the earliest examples of this series, *Annie, Poured from Maple Syrup* (1966), shows the word "Annie" in a rounded, fat-face type (similar to a comic strip logotype), with small bursting bubbles breaking away from the frayed edges of the letters, suggesting that the entire word is a syrupy bubble with a most extraordinary shape. The later words are "written" in a cursive script, in a liquid that is either clear, revealing the background color, or opaque, in a color that contrasts with the background. The *trompe-l'œil* liquids range from the viscous-looking to the thin and watery; but all the letters hold their shape, some in higher relief than others. . . . The liquid words give every appearance of having been spilled on a horizontal surface, because they have obviously been formed with the aid of gravity. By presenting them on a vertical plane, Ruscha makes it appear that, once formed, they are capable of defying gravity. At first, the words also appear to lie directly on the surface plane. But Ruscha deliberately shades the monochrome background to a darker value along the upper quarter of the canvas to break up and complicate the surface; so the surrounding field is really not being treated as a flat plane. Consequently, the words seem to be situated on a specific plane, but hovering before an atmospheric background. To counteract the impression of a sunset sky, Ruscha customarily selects background colors that do not evoke natural landscapes. . . .

Ruscha is a prolific printmaker and has produced a number of fine screenprints and lithographs. To my mind, his best prints rival in quality those of Johns, Lichtenstein, and sometimes Warhol. However, his most ambitious undertaking, a portfolio of six "organic" screenprints, titled *News, Mews, Pews, Brews, Stews & Dues* (1970), is anything but a howling success. Invited to make some prints for Editions Alecto, Ruscha went to London without any definite ideas but with "strong feelings for color substances." He was not sure he could print such substances with silkscreen, but, he says, "when I found out I could do it with silkscreen, I still wanted to maintain a definite quality control. The edges had to keep their sharpness, and some substances would not allow it." Some of the unlikely substances that he experimented with turned out to be unusable: cream left a slimy deposit, while tomato paste and mustard dried to gray dust. "I could not print carnations," he says, "because when we broke them up, they just turned to water. It was a nice color, but it squeezed right out on the silkscreen press. Iodine is beautiful but it creeps out all over the paper. The substance has to have either an oily base or a pasty kind of base that keeps hold of itself and is not too runny." Some of the substances that he found fit to print: red raspberries, canned baked beans, black caviar, chocolate syrup, axle grease, chutney, and daffodil stalks. The result of this eccentric research is six screenprints, each showing a single word in Old English type. As no color preservatives were added, some of the prints may eventually fade and decompose. "They may be a mess in some conditions," Ruscha concedes. Some of the colors have already changed. In "News", where the background was originally a pinkish color (red salmon roe), it is now bright yellow. And in "Mews", the red pasta sauce background has turned a rich creamy color, providing a paler background for the mauve letters (printed in blackcurrant pie filling over cherry pie filling over raw egg). "But I eliminated a lot of substances that would mould," he adds. "I set limitations for myself." . . .

Ruscha, it seems to me, is one of the very few artists of the pop school who approaches the inventiveness and wit of Lichtenstein, Oldenburg, and Warhol. His work does not properly belong to the mainstream of pop, but it helps establish and define an important aspect of the pop sensibility, that borderline area where pop merges into neo-Surrealism. Despite his eccentric experiments with unorthodox materials, he is essentially interesting for his original iconography, particularly for the highly imaginative way he pictorializes three-dimensional words. Ruscha's art is rich with unsuspected and often humorous images that, once he has brought them into existence, look as if they should have been there all along.

## Book Reviews

Frank Smith, *Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read*. New York: Holt, Rinehart & Winston, 1971. xiv + 239 pages. \$4.95 paper.

Scientific research into the ergonomics of visual communication investigates the effectiveness of information display by assessing the performance of the human "receiver," and there are available hundreds of experimental reports describing comparisons of letterforms, textual layouts, symbol designs, map typographies, etc. Psychologists, ergonomists, designers, communications engineers, and lighting specialists are among those who have contributed to this field of enquiry. However, summaries of the research—such as those of Tinker (1963), Spencer (1968), or Foster (1971, 1972)—leave one questioning how far the results of any study can be generalized to other situations, and a feeling that the various experiments do not fit together to form an integrated system of knowledge. Recently, Donald Broadbent of the (British) Medical Research Council's Applied Psychology Research Unit has commented that "the best contribution to practical problems is to produce a general theory, which avoids the need for experiment in each specific situation" (1971, p. 16). Unfortunately, there is as yet no theory to account for the relationship between the printed stimulus and the human "receiver's" performance, no theory of legibility.

Before such a theory can be developed, we need as a basis a theoretical account of the reading process. It is, therefore, a pleasure to welcome Frank Smith's *Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read*, which attempts to give an account of the reading process in the adult, and which has—at least potentially—considerable relevance for the designer, the ergonomist, the reading teacher, and all who are concerned with reading.

Smith provides a wide-ranging survey of topics relevant to an understanding of the adult's reading, including such areas as speech perception, linguistics, the anatomy of the visual system, eye movements, and information theory. The integration of seemingly disparate subjects is one of the most impressive aspects of the book.

To the present reviewer there are four major points that stand out in Smith's book. First, there are the distinctions drawn between the identification of letters, of words, and of meanings. Second, there is an account of the differences between skilled and unskilled reading, which is related to a consideration of the nature of learning to read. Third, there is the use of the concept of uncertainty reduction to integrate the many other topics discussed. Finally, there is an analysis of the relationship between speech and reading.

The first of these is particularly important. An assumption which underlies many discussions on printed communication concerns the relationship between letter-identification and word-identification, and between these and the reading of text. The problem of how these functions are related is particularly acute when one considers the teaching of reading. It often used to be assumed that the beginner must learn the names of the individual letters, and then learn to combine them to form words. This notion was strongly opposed by other writers, who maintained that since skilled readers do not read by a process of spelling out words, this cannot be the correct way to teach beginners to read. The problem is still relevant when designing material for skilled readers. Will it be easier to read text if the letters that make up the text are made highly discriminable? Or should the design concentrate on the word, rather than the letter? Or perhaps phrase-units should be the basic unit of text design? Some of the novel alphabet designs illustrated in Herbert Spencer's *The Visible Word* (1968) seem to assume that the letter is the basic unit; but systems such as "square span" typography use the phrase as their basis.

A large part of *Understanding Reading* is concerned with analyzing this problem. Smith proposes that we identify letters by analyzing the visual display and detecting critical features. We also identify words by testing the visual display to see if it contains certain critical features. In fluent reading, a similar process is carried out. The visual display is constant, whichever process the percipient is engaged in. What distinguishes letter, word, and meaning identification is the battery of tests carried out on the visual display. One of the major points that Smith makes is that words are not identified by a process of successively identifying constituent letters, and that reading is not dependent on successively identifying the words that make up the text.

Unfortunately, Smith is unable to specify the critical features of the visual display which are used in identifying letters, words, or meanings. He writes that "the features of particular letters must be in the actual ink marks on paper", but "it is a convenient fiction to regard them as properties of letters such as circles and lines and angles which are actually part of the

response" (p. 76). Later he asserts that "nobody knows what the distinctive features of letters are" (p. 120). Since it is the same visual information that is used in all three processes, it follows that the critical visual features utilized in reading cannot be specified. The fact that HORSE, horse, and HoRsE are identified as the "same" word shows that there is some flexibility in the system that tests for the presence of critical features. Smith emphasises that for fluent readers word identification does not necessitate letter identification, and meaning identification does not depend upon identifying all the words.

It is here that the difference between the skilled and unskilled reader lies, for the unskilled reader does have to "build up" words from their letters, and "build up" meanings by successively identifying all the words. The skilled reader is able to short-circuit these processes and go directly from the printed display to meaning without having to pass through any intermediate stages. He can do this because he has a store of knowledge—gained from his previous reading experience—of the orthographic, grammatic, and semantic conventions of language. As reading skill develops, the reader comes to rely less and less upon the printed visual display, more and more on his own knowledge and experience of what is likely to be there. Some of Smith's comments upon this point are somewhat startling: "reading should not be regarded primarily as a visual process" (p. 82), and "The amount of visual information required to identify a letter has relatively little to do with the physical characteristics of the actual stimulus but depends much more upon the reader's skill and the context in which the letter occurs. And precisely the same kind of argument applies to words" (pp. 141–2).

Smith describes letter, word, and meaning identification as processes of uncertainty reduction; the reader's uncertainty is lessened when he identifies a letter, word, or meaning. For the skilled reader there is less uncertainty when he is reading, because of his familiarity with the language. Consequently, he does not have to extract so much information from the visual display in order to understand it.

In discussing the similarities between speech and reading, Smith notes that the child learning the aural language is faced with discovering the significant differences between sounds, just as the child learning visual language is faced with discovering the significant differences between words. Listening involves acoustic feature analysis just as reading involves visual feature analysis. The fluent listener uses his knowledge of language in understanding what he hears in the same way that the fluent reader uses his knowledge of language in understanding what he sees. But, Smith emphasises, reading is not dependent upon speech—one does not have to translate the printed marks into "silent speech" in order to read. Indeed,

"spoken words in their physical manifestation are just as far removed from meaning as the marks on a printed page" (p. 207).

Like any stimulating discussion, Smith's model raises rather than solves problems. We want to know what *are* the critical visual features used in identification, how are they different for the skilled and unskilled reader, how does the beginner come to learn them? How independent of the visual display does the skilled reader become, and how can the designer adjust the visual display so as to match the process the reader is employing? The model seems to devalue the role of the designer (if it is true that reading is not primarily a visual process), but it may be that we have here the beginning of a theory which will provide a rationale for questioning the use of horizontal lines of words in advanced reading.

Smith discusses many topics of interest to those concerned with language, particularly visible language. For example, there is a consideration of the studies which show that a greater number of letters can be identified after being flashed briefly when they form words than when they do not. This has sometimes been interpreted as indicating that words are identified by their outline or form. Smith argues strongly against such a view, maintaining that the experiment shows first that word identification is not made up of successive letter identifications, and secondly that the perceiver uses his existing knowledge of language to process the information in larger meaning units.

He suggests that proposals for modifying the alphabet are misguided, as a modified alphabet would lessen the amount of information available to the reader and a modified spelling system would be unable to deal with different dialects.

*Understanding Reading* is a readable and exciting book, describing a wide range of experimental work. In it, the author lays the basis for a clarification of many issues which were previously confused. In many ways, it demonstrates thinking similar to that underlying this journal, *Visible Language*; e.g., in the wide range of topics considered, the emphasis upon the integration of topics, the significance attached to the relationship

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between speaking/listening and writing/reading. *Understanding Reading* provides at least the foundation for a theory of legibility. It is to be hoped that investigators researching into aspects of visual language and communication will give it serious attention.

Jeremy J. Foster

Jeremy J. Foster is lecturer in psychology at the Institute of Technology, Bolton, Lancashire, England. As a research fellow in the Department of Social Studies at Manchester Polytechnic he has conducted a program of research into the legibility of print. He is editor of *Legibility Research Abstracts*, the second volume of which is in press.

John Gilliland, *Readability*. London: University of London Press, 1972. 127 pages. 80p.

This is one of a series of monographs sponsored by the United Kingdom Reading Association, and intended for teachers of reading. Gilliland interprets readability in a very wide sense, as the matching of the text to the reader. Consequently he includes under "readability" the style of the written text, the way it is presented in print (legibility), and the reader's interest in the content of the text.

The greater part of the text is concerned with such matters as the relationship between the spoken and visual forms of language, and the influence of reader's interest in reading. Gilliland also provides a brief summary of legibility research. He relies heavily on Miles A. Tinker's work, but does direct the reader to more modern sources. A critical survey of techniques for measuring readability and an annotated bibliography of 16 items complete the volume. Although one might like to see a fuller coverage of some of these topics, one must be grateful to Gilliland for drawing the subject of legibility of print to the attention of teachers. One is pleased to see him suggesting that teachers should become more aware of the typography of children's books, and—acting through their professional associations—"influence and improve the quality and suitability of the typefaces which children encounter" (p. 30).

J. J. Foster

## The Training Embodied in Written Language

We are led to the hypothesis that school affects grouping operations through the training embodied in the written language. This hypothesis has a good theoretical basis. The written language, as Lev S. Vygotskii points out, forces one to use language out of the immediate context of reference. The writer cannot use simple pointing, nor can he count on labeling that depends on the present context. Writing, then, is training in the use of linguistic contexts that are independent of immediate referents. Indeed, the linguistic independence of context achieved by certain grammatical modes appears to favor the development of the more self-contained superordinate structure used by the school children.

Note the recurrent theme that has been running through all our results: it is always schooling that makes qualitative differences in directions of growth. Wolof [Senegal's dominant ethnic group] children who have been to school are more different intellectually from unschooled children living in the same bush village than they are from city children in Mexico City or Brookline, Mass. Similar results demonstrating the huge impact of school have emerged from the Belgian Congo and from South Africa.

How, then, do school and language interrelate? We may hypothesize that French is a powerful factor in the cognitive growth of the children we have studied because it is a written language. All the languages features that we have discussed in relation to concept formation become necessary when one must communicate away from the context of immediate reference. And it is precisely in this respect that written language differs from spoken. . . .

When names—or symbols in general—no longer inhere in their referents, they must go somewhere; and the logical place is the psyche of the language user. Thus, the separation of word and thing demands a notion that words are in a person's head, not in his referents. Meaning varies with the particular speaker, and the notion of psychological relativity is born. Implicit in this notion is the distinctness of oneself and one's own point of view. Thus, the individual must conceptually separate himself from the group; he must become self-conscious, aware of having a particular slant on things, a certain individuality.

From "Work with the Wolof" by Patricia M. Greenfield & Jerome S. Bruner in *Psychology Today* (July 1971), pages 78-79.

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## Résumé des Articles

Traduction : Fernand Baudin

Lu en un clin d'œil *par Philip B. Gough*

L'article porte sur deux points: (1) la série de faits perçus en une seconde de lecture et (2) sa relation avec l'apprentissage de la lecture. Lire implique la succession rapide d'opérations complexes: formation d'une "icône" visuelle, identification des lettres individuelles, rattachement au sens par transposition en phonèmes abstraits. Le tout avec une rapidité surprenante dans la coordination. Au premier abord l'enfant est dépourvu de tout "dispositif de lecture optique" (scanner) aussi bien que de "dispositif de "décodage" pour traduire systématiquement les signes en sons. Connaître le mécanisme qui guide les lettres vers les mots de notre dictionnaire mental, tel est le problème fondamental qui fait l'objet des recherches sur la lecture.

L'élément typographique dans le cubisme, 1911–1915, et les conséquences formelles et sémantiques *par Susan Marcus*

De 1911 à 1915, Braque et Picasso ont exploré les aspects formels de l'élément typographique. Ils faisaient intervenir les signes à deux dimensions que sont les lettres et les chiffres dans leur tentative en vue de rénover l'évocation d'objets à trois dimensions. C'est ainsi que l'élément typographique a contribué à l'évolution du collage en favorisant la substitution sur la toile d'objets réels à la place de symboles peints. L'idée de recourir à des formes typographiques pour représenter une notion parfaitement étrangère à ce signe entraîna des conséquences sémantiques qui furent examinées par les peintres. En utilisant des éléments typographiques, les cubistes montraient leur intérêt réel, qu'ils partageaient avec leurs contemporains, pour la littérature et les sciences.

Les nouvelles responsabilités du typographe *par G. W. Ovinck*

Au rythme actuel de la production audiovisuelle, nous allons dépasser le point de saturation. Le typographe doit aider à freiner la "pollution mentale". Il doit élargir sa compréhension à la fois des attitudes et réactions de ses lecteurs et de ses clients—tout en conservant sa part essentielle de typographe. Il doit devenir un informaticien, principalement en acquérant une formation plus générale et en développant son goût de la recherche. Le typographe ne remplit pas le rôle qui lui revient de droit dans l'évolution des techniques d'impression. Il doit assumer l'initiative dans le développement des nouveaux procédés en se fondant sur ses responsabilités en tant que représentant des lecteurs et de traditions immémoriales dans la communication.

La création programmée de symboles visuels *par Ed Bedno*

L'article décrit les étapes visuelles et verbales d'un programme qui permet de simuler les cheminements de la création graphique. Ce programme a guidé les élèves d'une école d'art dans l'élaboration de symboles visuels. Les résultats furent généralement de haute qualité. Ils donnent à penser que ce programme est une méthode efficace et rapide pour amener les élèves à prendre conscience des ressources de la création systématique.

## Kurzfassung der Beiträge

Übersetzung: Dirk Wendt

Eine Sekunde Lesen von *Philip B. Gough*

Zwei allgemeine Themen werden diskutiert: (1) die Folge von Ereignissen, die in einer Sekunde Lesen ablaufen, wobei Vermutungen angestellt werden über die Natur der Vorgänge, die sie miteinander verbinden, und (2) die Bedeutung dieser Beschreibung für das Lesen-Lernen. Zum Lesen gehört eine rasche Folge von verwickelten Ereignissen: Bildung eines visuellen Sinnbildes, buchstabenweises Erkennen und Verbindung mit der Bedeutung durch Umsetzung in eine abstrakte phonemische Darstellung—durchgeführt mit erstaunlicher Geschwindigkeit und Koordination mit unserem komplexen Informationsverarbeitungssystem. Bei den ersten Leseversuchen fehlen dem Kind die Buchstaben-Erkennungshilfen (die Abtastung) und Hilfsmittel, den einmal erkannten Buchstaben in eine systematische phonemische Repräsentation abzubilden (die Entschlüsselung). Die Spezifikation von Mechanismen, durch welche Buchstaben in Stichwörter für unser geistiges Lexikon abgebildet werden, sind das grundlegende Problem der Lese-Forschung.

Das typographische Element im Kubismus, 1911–1915: Seine formalen und semantischen Implikationen von *Susan Marcus*

Zwischen 1911 und 1915 experimentierten Braque und Picasso an formalen Bedeutungsgeladenen typographischen Elementen. Die zweidimensionale Eigenschaft der alphabetischen und numerischen Symbole kommen dem Versuch der Künstler entgegen, neue Wege der Abbildung dreidimensionaler Gegenstände in den Grenzen der Leinwand zu finden. Das typographische Element half bei der Entwicklung der Collage, indem es dazu anregte, gemalte Symbole durch tatsächlich auf die Leinwand geklebte Objekte zu ersetzen. Der Gedanke an eine Buchstaben-, Worte- und Zahlen-Form als ein Zeichen, das einen Begriff darstellt, zu dem das Zeichen keine physische Ähnlichkeit hat, führte auch zu semantischen Folgerungen, die diese Künstler untersuchten.

Bei ihrer Arbeit mit typographischen Elementen zeigten die Kubisten ein allgemeines Interesse, das sie mit ihren Zeitgenossen in Literatur und Wissenschaft teilten.

Die Verantwortung des typographischen Entwerfers im Wandel von *G. W. Ovinik*

Bei unserem gegenwärtigen audio-visuellen Angebot sind unsere Sinnesorgane reizüberflutet. Der typographische Entwerfer muß helfen, die "geistige Umweltverschmutzung" einzudämmen, indem er auf weniger und besser gestaltete Drucksachen hin arbeitet. Er muß sein Verständnis erweitern, sowohl für die Haltung und Reaktion des Lesers wie des Auftraggebers—wobei er gleichzeitig einen eigenständigen Beitrag als graphischer Entwerfer beisteuern muß. Er muß sich zu einem allgemeinen "Informator" entwickeln, hauptsächlich durch erweiterte Ausbildung und Kenntnis und Anwendung von Forschungsergebnissen. Der typographische Entwerfer spielt nicht die ihm angemessene Rolle in der Entwicklung der neuen Drucktechniken. Aufgrund seines Verantwortungsbewußtseins muß er als Interessenvertreter des Lesers und aufgrund der uralten Tradition der graphischen Kommunikation die Führung bei einer anpassungsfähigen Entwicklung der neuen Techniken gewinnen.

Ein Programm zur Entwicklung visueller Symbole von *Ed Bedno*

Es wird eine programmierte Prozedur aus einzelnen visuellen und verbalen Schritten vorgestellt, welche die schöpferischen Vorgänge beim visuellen Entwerfen simulieren soll. Das Programm wurde von Studenten einer Kunstschule als Leitschnur zum Entwerfen von visuellen Symbolen benutzt. Das resultierende Niveau der Leistung war allgemein ziemlich hoch. Die Ergebnisse deuten an, daß dieses Programm eine beschleunigte und wirksame Methode ist, um die Studenten auf die Möglichkeit bewußter Kreativität aufmerksam zu machen.

## Resumen de los Artículos

Traducción: Tony Evora

Un Segundo de Lectura por *Philip B. Gough*

Dos tópicos generales son discutidos: (1) la secuencia de eventos que acontecen durante un segundo de lectura, sugiriendo la naturaleza de los procesos que los unen, y (2) la relación de esta descripción con el aprendizaje de la lectura. La acción de leer implica una rápida sucesión de intrincados procesos en la formación de la imagen visual, en la identificación letra por letra, y en la asociación con su significado a través de la transposición en representación abstracta del fonema, llevada a cabo con inaudita rapidez y coordinación por nuestro complejo sistema de procesamiento de la información. Al abordar la lectura por vez primera, el niño carece de un plan para el reconocimiento de los caracteres (*scanner*), así como del equipo para convertir dichos caracteres, una vez identificados, en un sistema de representaciones fonéticas (*decoder*). Los mecanismos mediante los cuales las letras son proyectadas como entradas en nuestro vocabulario mental constituyen los problemas fundamentales en la investigación de la lectura.

El Elemento Tipográfico en el Cubismo, 1911–1915: Implicaciones Formales y Semánticas por *Susan Marcus*

Entre 1911 y 1915 Braque y Picasso experimentaron con consideraciones formales de elementos tipográficos. La calidad bidimensional de los símbolos alfabéticos y numéricos se tornaron en complemento de los intentos de estos artistas por tratar de hallar nuevos medios de representar objetos tridimensionales dentro del formato del lienzo. El elemento tipográfico contribuyó en la evolución del *collage* al alentar la suplantación de símbolos pictóricos por objetos reales pegados al lienzo. La idea de letras, palabras y números como signos representativos de un concepto con el cual dichos signos no guardan relación física alguna, también presenta implicaciones semánticas que estos artistas exploraron. Al trabajar con ele-

mentos tipográficos, los Cubistas reconocieron un interés común compartido por sus contemporáneos en la literatura y en las ciencias.

Las Cambiantes Responsabilidades del Diseñador Tipográfico por *G. W. Ovinik*

Con el actual nivel de producción audiovisual nos estamos enfrentando ya a una sobrecarga sensorial. El diseñador tipográfico debe contribuir a reducir esta 'contaminación mental', insistiendo en menos y mejor diseñados impresos. Debe ampliar su comprensión tanto de las actitudes y reacciones de sus lectores como de sus clientes, manteniendo a la vez su propia contribución como diseñador gráfico. Debe desarrollarse como un 'informador', mediante la ampliación de su propia educación, así como plantearse una exigente actitud investigativa. El diseñador tipográfico no está jugando su verdadero papel en el desarrollo de la nueva tecnología de las artes gráficas. Debe alcanzar una posición orientadora a fin de lograr un desarrollo más flexible de los nuevos procesos, basándose en su responsabilidad como representante del lector, así como en las viejas tradiciones de la comunicación visual.

Un Programa para Desarrollar Símbolos Visuales por *Ed Bedno*

Un procedimiento programado con discretos aspectos verbales y visuales fue empleado para simular los procesos creativos involucrados en el diseño visual. El programa fue usado por estudiantes de una escuela de diseño como guía para la creación de símbolos visuales. El nivel de ejecución fue, en general, bastante alto. Los resultados obtenidos tienden a indicar que este procedimiento es un método acelerado y eficiente para ampliar la conciencia del alumno en cuanto a las posibilidades de una creatividad consciente.

## The Authors

Philip B. Gough is professor of psychology at the University of Texas (Austin, Texas 78712). Since receiving his Ph.D. from the University of Minnesota, he has taught psycholinguistics at Minnesota, UCLA, and Indiana University. Dr. Gough's research on comprehension is supported by the National Science Foundation; currently, he is trying to find out how long it takes to understand a word.

Susan Marcus (5y Magic Apartments, Faculty Road, Princeton, N.J. 08540) recently received her Master's degree from the Institute of Fine Arts of New York University. Her article on the capital frieze at Chartres Cathedral and its theological ramifications will appear in *Recherches de théologie ancienne et médiévale*. She also served as researcher for the major exhibition *European and American Painting and Sculpture: from Princeton Alumni Collections* at the Princeton University Art Museum, and contributed an essay on American artists between the two World Wars to the catalogue.

G. W. Ovink (Cliostraat 3, Amsterdam Zuid, Holland) is art consultant for Tetterode-Nederland and extra-ordinary professor at the University of Amsterdam in history and aesthetics of the art of printing and allied trades. He has published many articles and several books on the theory and history of types and typography; he has lectured widely in Europe, in the United States, and in South Africa. Dr. Ovink is a board member of the Association Typographique Internationale and is on the advisory board of this journal.

Ed Bedno is chairman of the Department of Communication Arts and Design at Virginia Commonwealth University (Richmond, Va. 23220). He was formerly assistant professor in visual design at the Institute of Design, Chicago, and has been a design consultant to many major publishing and pharmaceutical houses. He is currently involved in the research and design of educational materials and has been represented in most regional and national design exhibits and publications.

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