VISIBLE LANGUAGE

The Journal for Research on the Visual Media of Language Expression
Volume X, Number 2, Spring 1976 *ISSN 0022-2224*

Cover: *America to Her Mistaken Mother* (England. Engraving. 1778. 13-3/4 x 9-3/4 inches. London, The Trustees of the British Museum). The print is on view as part of the special Bicentennial exhibition, The European Vision of America, organized by The Cleveland Museum of Art and shown also at The National Gallery of Art, Washington, and The Grand Palais, Paris. The rebus is deciphered on the inside back cover.

VISIBLE LANGUAGE, Volume X, Number 2, Spring 1976. Published quarterly (Winter, Spring, Summer, and Autumn) by Visible Language, c/o The Cleveland Museum of Art, Cleveland, OH 44106. Second-class postage paid at Cleveland, Ohio.

Merald E. Wrolstad, Ph.D., Editor and Publisher
c/o The Cleveland Museum of Art, Cleveland, Ohio, USA 44106.

General Information

VISIBLE LANGUAGE is concerned with research and ideas that help define the unique role and properties of written language. It is a basic premise of the Journal that writing/reading form a distinct system of language expression which must be defined and developed on its own terms. Published quarterly since 1967, *Visible Language* has no formal organizational affiliation.

Address
All communication with *Visible Language*—both editorial and business correspondence—should be addressed to:

Visible Language
c/o The Cleveland Museum of Art
Cleveland, OH 44106 USA
Telephone 216/421-7340

Subscription Rates

	One Year	*Two Years*	*Three Years*
Individual	$13.00	$23.00	$30.00
Institutional	18.50	33.00	45.00

All orders must be prepaid.

Back Copies
A limited quantity of all back numbers of *Visible Language* are available at $3.00 to individuals and $4.50 to institutions. Copies should be ordered directly from the Journal's address given above. A folder listing the contents of all past Journal issues is available on request.

Reprints of Specific Articles. Readers interested in securing copies of any of the articles published in *Visible Language* should send for the appropriate number of the Journal. Individual reprints are not available.

General Information
Claims. To be honored free of charge, claims for missing issues must be made immediately upon receipt of the next published issue.

Manuscripts

All manuscripts and inquiries about research articles and other contributions to the Journal should be addressed to the Editor. An Author's Guide for the organization, preparation, and submission of manuscripts is also available and includes special instructions for designers in preparing research reports. Authors are strongly advised to follow the general editorial style—headings, references, tables, captions—as shown in this and past copies of the Journal.

All copy must be double-spaced, including all references and long quotations in the text. All manuscripts should be submitted in *triplicate*, one of which should be an original typed copy. Authors are cautioned to retain a copy of their manuscript to guard against loss in the mail.

Abstracts. Manuscripts should be accompanied by an abstract of 100-200 words, typed on a separate sheet of paper. An abstract of *a research paper* should contain statements of (a) the problem, (b) the methods, (c) the results, and (d) conclusions. Results are most important, and every abstract should contain at least the trend of results. An abstract of *a discussion article* should state the topics covered and the central thesis of the article. Only complete sentences should be used in abstracts.

Letters to the Editor

The editors welcome comments on articles, reviews, and letters that have appeared in the Journal. Communications should be addressed to the Editor. The Editor will also relay to the author your questions or comments on any article. Your response—and the author's comment in reply—will not be published without your permission and your approval of any editing.

Advertising

	Advertising Rates	*Type-page Size*	*Overall Page Size*
Full page	$100	26 x 41 picas	6 x 9 inches
Half page	$60	26 x 20 picas	6 x 4½ inches

For inside covers, add 25%. Minimum space is a half page.
Bleed pages and color accepted; write for additional information.
Cost of composition and artwork charged to advertiser at cost.
Agency commission 15%. No cash discount.
Advertising content subject to approval of the publisher.
Advertising copy should be received *two months* prior to quarterly publication on 1 January, 1 April, 1 July, and 1 October.

Advertisers should contact *Visible Language* at the address given above.

Reading Readiness

Stanley F. Wanat

The nature and assessment of reading readiness are considered through an examination of factors in reading readiness, and through an examination of purposes and principles in reading readiness assessment. Skills in extant reading readiness tests are identified, and subskill categories derived from research on reading readiness, reading acquisition, and reading achievement are considered. These skills include attention and automaticity; linguistic awareness; understanding of the task; letter, letter-sequence, word, and word-sequence skills; and flexibility in reading. Effects of instructional factors on reading readiness are also considered. The providing of information for instructional decision-making is identified as the major purpose of reading readiness assessment. Twelve principles for the design and use of reading readiness tests are developed, and twelve major categories of factors that should be considered in an assessment of reading readiness are identified. It is argued that reading readiness should be conceptualized and assessed in terms of the specific reading skill or skills demanded by the task confronting the learner.

J. Downing and D. Thackray (1971, p. 72) define "readiness activities" as "a means of narrowing the gap between the state of the human individual and the conditions of the task to be mastered." A reading readiness test, then, is a means of measuring the gap between the state of an individual and the conditions involved in learning to read. The nature of reading readiness and trends in assessing reading readiness are the subject of this paper.

Factors in Reading Readiness

There is a variety of viewpoints about the nature of the skills that make up reading. Also, there is a variety of viewpoints about the nature of the skills that are prerequisites for learning to read. R. Rude (1973, p. 575) notes that "There is lack of consensus among test authors as to which [reading readiness] skills should be assessed as well as the techniques employed to assess them. The

Visible Language, X 2 (Spring 1976), 101-127.

Author's address: Stanley Wanat, Department of Psychology, SUNY, Stony Brook, NY 11790.

Gates-MacGinitie Reading Test—Readiness Skills for example, includes seven separate subtests while the Murphy-Durrell Reading Readiness Analysis consists of only three subtests." This lack of consensus suggests that it would be preferable to consider initially a broad range of factors potentially involved in reading readiness, rather than trying to define reading readiness in terms of an extremely limited set of factors, or indeed, in terms of just one factor—a dominant approach in the past.

A detailed historical analysis of the concept of reading readiness, and how it has been assessed, can be found in D. Durkin (1968, 1970). She states that "Traditionally, readiness has been viewed as a product; for instance, in the beginning, readiness to read was assumed to be the product of maturation (1970, p. 38)." The criterion was either chronological age or mental age. If the child had reached a certain chronological (or mental) age, then he was ready to learn to read; if he had not reached that age, then he was not yet ready to learn to read. In this case, the prescription would be that the teacher wait until the child was ready to learn to read.

The question "At what age is a child ready to learn to read?" continues to ignite debate between those who feel that the earlier instruction is begun, the better (see, e.g., Doman, 1963), and those who feel that it is better to wait until the child is older and closer to being ready (see, e.g., Biemiller, 1974). Durkin (1974, p. 229) provides the background for use of a single-factor criterion for determining reading readiness: "What about mental age? And, especially, what about the frequently reported idea—even in current texts—that a mental age of 6.5 years is necessary for success with reading? This particular notion . . . is closely associated with a study of first grade reading described by Morphett and Washburne in a 1931 article, 'When should children begin to read?' Central to their research was a particular kind of first grade reading instruction given in a particular kind of setting; and for success the combination appeared to require a mental age of about 6.5." H. Singer (1970, p. 29) refers to the Morphett and Washburne article as "a study which had a significant and long-lasting effect, but shouldn't have. . . . Even though the Morphett and Washburne recommendation was based upon a particular

test of intelligence and a particular method of instruction, 'conventional wisdom' overgeneralized their recommendation to all tests of intelligence, programs of instruction, and evaluation instruments."

W. MacGinitie (1969, p. 398), like Durkin, rejects the use of any single-factor criterion to gauge reading readiness: "The child is in school to learn—what and how is he ready to learn? The notion of readiness is no more than that." In accord with this definition, reading readiness assessment is a process of gauging the match between learner characteristics and task characteristics. For the most part, MacGinitie's concern for the question of "how is the child ready to learn?" has not been incorporated in readiness assessment procedures, for, as Rude (1973, p. 579) notes, "Attention span, cognitive learning style, and experiential background are only three important factors which are not measured in the five batteries [reading readiness tests] examined."

S. Weintraub (1967, p. 551) provides a further comment on the usefulness of reading readiness assessment procedures: "The most commonly used predictive measures of success in learning to read have been readiness and intelligence tests. . . . Readiness tests tend to correlate somewhere between .4 and .6 with later measures of reading achievement, while intelligence tests, for the most part, show an even lower relationship at the lower reading levels. The readiness tests do an adequate job of identifying the extremes on the normal curve, those who will probably succeed and those who will probably fail. However, the large group of children in the middle may go in either direction when placed in a reading program." E. Gibson and H. Levin (1975) take the same position on the usefulness of current reading readiness assessment procedures.

Skills in Extant Reading Readiness Tests

Downing and Thackray (1971, p. 90) discuss an analysis of eight reading readiness tests used in the U.S. "All use a test of visual discrimination, six use tests of vocabulary, three use motor tests, two use tests of the reproduction of patterns and shapes from memory, and two make use of tests of relationship. Other tests used include: ability to recall a story, ability to remember ideas in sequence, pronunciation, rhyming of words, auditory discrimination, and handedness and eyedness."

In an analysis of five reading readiness tests (Clymer-Barrett Prereading Battery, Gates-MacGinitie Reading Test—Readiness Skills, Harrison-Stroud Reading Readiness Profiles, Metropolitan Readiness Tests, and Murphy-Durrell Reading Readiness Analysis), Rude (1973) identified twelve subskill categories comprising reading readiness:

1. Vocabulary knowledge (the child's store of verbal concepts).
2. Listening comprehension.
3. Letter recognition.
4. Numerical concepts and operations. Rude (p. 576) comments that "this test is not a reading assessment, per se. . . ." Yet, it is part of a test used to assess reading readiness. Thus, in evaluating procedures for testing reading readiness, one cannot just consider the test, but one must also take into account how a particular assessment tool is used. Rude goes on to point out that "the numbers subtest in earlier versions of the [Metropolitan Readiness] test proved repeatedly to be the most powerful single predictive subtest of later academic achievement."
5. Visual-motor coordination. One of the readiness tests requires the child to make copies of different geometric shapes. A second readiness test has one subtest in which the child has to complete partially drawn geometric shapes so that they match a stimulus, and another subtest in which he has to copy a sentence. A third readiness test requires the child to supply the remaining strokes to incomplete letters so that they will match the stimuli. The copy-a-sentence subtest is different from the other subtests in that copying a sentence would appear to require more effort, and perhaps a different kind of effort, than copying or adding a missing line to a geometric shape or individual letter. If, however, the skills required to perform the copy-a-sentence task are not different from those required to add missing lines to partially completed geometric shapes so that they match the stimulus, then it is not clear why these two subtests are included in the same reading readiness test. If the skills are different, then Rude's procedure of classifying both of these subtests under visual-motor coordination is questionable. Rude (p. 576) does introduce the section on visual-motor coordination in the following way: "Three batteries include a subtest measuring visual-motor coordination. Each measure is unique, however."

6. Determination of whether or not two words rhyme.

7. Phoneme correspondence. Rude (p. 577) expresses surprise that only three out of the five readiness tests he analyzed included a subtest dealing with this subskill category. In one of the three tests, the child is taught the sound for each of the consonant letters being tested; then, the child "marks two of the four choices which begin with the same sound." In the second test, the phoneme correspondence section is entitled "Discrimination of Beginning Sounds in Words," and in it, the child selects "from a three item picture array the response matching the consonant stimulus." The third subtest is like the second, for the child must "identify which of a two choice picture array begins with the same initial consonant as the stimulus."

8. Rate of learning. Only one of the five readiness tests considered by Rude contains this subtest. It provides an indication of how easy it is for a child to learn to read a sample set of words. Presumably, the child for whom this task is easy is "more ready" to learn to read than the child for whom this task is hard.

9. Sound discrimination. This subskill category deals with whether or not the child can discriminate between words that sound alike. It differs from subskill category #2 (listening comprehension), since listening comprehension subtests in reading readiness tests generally ask the child to select from a set of pictures the one that "depicts the sentence or paragraph read by the teacher."

10. Blending individual sounds together.

11. Word reading. Marking the written word in the set that was read by the teacher.

12. Selecting from a visual array the visual form that matches a sample.

Factors in Reading Readiness Identified in Research Studies

J. Mackworth's (1974b, pp. 1-2) analysis of skills involved in reading readiness is quoted at length, since her appraisal provides information on skills involved in the process of reading acquisition, as well as a listing of skills necessary for reading readiness. "The necessary pre-reading skills involve adequate sensory discrimination, particularly in the visual and auditory areas. But in addition,

the child needs a good spoken vocabulary, which is consistent with the kinds of reading material that will be presented to him, and a good knowledge of grammar together with an understanding of word order, as well as good comprehension. All this depends greatly on his early environment. . . . [Another] prerequisite is a good knowledge of his letters. . . . In addition to the prereading skills of language and letter naming, the young reader has to learn a whole new series of skills, involving visual memory, parallel processing, and the recognition of left-to-right order of letters and words. Beyond these visual skills, he must learn the sounds made by the written symbols, and how a wide range of written groups of symbols can have the same sound. Finally, he needs to master his visual behavior, moving his eyes from left to right along the type, and fixating on the important words within each sentence. He must master a reasonable speed of reading, because if he is too slow, he will have few words in his visual store, and he will read like a caterpillar, humping from word to word. His comprehension span will be too short for him to gain an understanding of the whole story, and his ability to predict what word comes next will be impaired."

Rude (p. 579) identifies four prereading skills, based on his appraisal of a sample of research on reading readiness:

1. Grapheme perception.
2. Left-to-right visual scan.
3. Grapheme-phoneme relationships.
4. Phoneme blending.

In a "how-to" list for parents, providing suggestions on how parents can help their child develop readiness for reading, the following subskill categories are mentioned (Nelson, 1972, pp. 139-140):

1. Visual discrimination.
2. Visual memory.
3. Auditory discrimination.
4. Auditory memory.
5. General knowledge.
6. Verbal expression.
7. Muscular control.
8. Sense of responsibility.

The suggestions for parents following each of these subskill categories are practical and "do-able." Whether or not following the suggestions in the list provided by J. Nelson will develop a child's reading readiness is open to question.

Examination of W. Eller and R. Farr's (1974a) position paper on consumer awareness in test reviews indicates the following kinds of skills to be considered in an assessment of reading readiness:

1. Reading ability (if the child already knows how to read, there is no reason to assess his reading readiness).
2. Ability to follow directions.
3. Background of experiences ("primarily oral vocabulary or concept development").
4. Visual discrimination ("ability to see likenesses and differences in words and letters when those are presented in isolation and in context").
5. Auditory discrimination.
6. Language development.
7. "Attention span and readiness to attend to the kind of instruction that will be provided."

Perusal of the Downing and Thackray and the Rude lists of subskill categories in extant reading readiness tests, and the J. Mackworth, Rude, Nelson, and Eller and Farr lists of subskill categories derived from research on reading readiness, acquisition, and achievement should provide convincing evidence that there is lack of overall consensus on what skills should be tested in assessing reading readiness. Yet, there are important points of agreement. Following are brief discussions of six major sets of skills that research studies indicate are particularly important in reading readiness.

Attention and Automaticity

In a task testing children's and adult's viewing of pictures, N. Mackworth and J. Bruner (1970, p. 174) speak of "selective viewing as the essential category for recognition." They also observe (p. 172) that "Children could not place their gaze so skillfully [as adults]. . . . Apparently some of the 6-year-old children lacked an effective program for visual search. . . ."

In a study of the role of attention in the development of reading skill, J. Heiman, M. Fischer, and A. Ross (1973) provided a group of problem readers with a supplementary training program that averaged a *total* of 4¼ hours (spread over a seven-week period). The members of both the experimental and control groups were participants in a remedial reading tutoring program. The training program was aimed at getting the children to attend to the reading task: "By making attention necessary to complete the task successfully, the experimental subjects were 'trained' to attend (p. 397)." At the end of the six-month tutoring program, the group that had received the 4¼-hour-long attention-training program was more than a full year ahead of the matched control group.

In another study of the role of attention in reading, J. Samuels and J. Turnure (1974) found that "girls were significantly superior to boys in word recognition, as had been previously reported, and significantly superior in classroom attentiveness as well. . . . The sex difference favoring girls frequently found in reading achievement seems to be mediated by an attentional variable (p. 31)." Whether one looks at attention at the macro level (as in the case of Samuels and Turnure, and Heiman, et al.) or whether one looks at attention at the micro level (as in the case of J. Mackworth, and N. Mackworth and Bruner), attention appears to be a very important factor in learning to read.

D. LaBerge and Samuels (1976) shed more light on the role of attention, and on a complementary factor, automaticity: "All readers must go through similar stages of learning to read but do so at different rates. . . . In consideration of each stage, for example learning to sound letter patterns, it would appear that there are two criteria of achievement, accuracy and automaticity. During the achievement of accuracy we assume the student should have his attention focused on the task at hand to code the association between the visual letters and their sounds. . . . Once he has learned the letter-sound correspondences, he may or may not be ready to attack the next stage, namely to 'blend' these sounds into syllables or words. To ascertain his readiness to move ahead, we must consider a further criterion, namely automaticity. If a good deal of attention is required for him to be accurate in

sounding letter-patterns, then 'blending' will be more difficult to perform owing to the total number of things he must attend to and hold in short-term memory. . . . In short, accuracy is not a sufficient criterion for readiness to advance to skills which build on the subskills at hand. One should take into account the amount of attention required by these subskills as part of the readiness criterion."

Linguistic Awareness

Reading involves both linguistic and visual skills; there is debate about their relative importance. P. Kolers (1972, p. 8) takes the position that "reading is only incidentally visual" because of research showing "how little reading may depend upon the visual component." On the basis of a series of studies, L. Gleitman (1974) and Gleitman and P. Rozin (1973) have concluded that "the ability to reflect on phonological properties of language distinguishes among those who will find reading hard or easy to learn (Gleitman, 1974, p. 6)." This ability is part of linguistic awareness. Gleitman (1974, p. 7) states that "As fluency increases, the speaker becomes successively capable of reflecting on more and more 'trivial' (surface) aspects of his own language behavior. . . . The methodological prerequisites for linguistic analysis require informant judgments concerning language structure, at many levels."

Gleitman enumerates the following components of linguistic awareness that might reasonably be discerned in a child ready to learn to read:

"(1) The ability to conceive of language 'as an object' as evidenced by awareness that the relation between an object and its name is arbitrary, or by the ability to provide judgments of [grammatical] acceptability.

"(2) Aptitude for learning pig-Latin, and related phonological rules.

"(3) More primitively, tendency to profit from rhyme as a mnemonic in learning tasks (p. 4)."

In research on one of these components R. Calfee, R. Chapman, and R. Venezky (1972) tested the rhyming abilities of kindergartners and found that the children's performance did not exceed

chance level. E. Savin (1972, p. 319), in considering another component of linguistic awareness, points out that most discussions of learning to read "assume that the child already perceives speech as a sequence of phonemes. . . ." As G. Miller (1974), T. Sticht (1974), and many others point out, the beginning stages of reading require the child to decode to speech. Therefore, if the child who is learning to read does not already perceive speech as a sequence of phonemes, then it is virtually impossible for him to translate from visible language to speech, since he is not conscious of the "building blocks" that make up speech.

Understanding of the Task

The preceding discussion raises other questions: Does the child understand what reading is? Does the child understand what he is supposed to do when he is learning one of the component skills of reading—for example, when the teacher tells the child to "blend the sounds," does the child know what is required? And, in tests—whether they be achievement, diagnostic, or readiness tests—does the child understand what is being required of him? As Eller and Farr (1974b) point out, it seems reasonable to expect that a reading readiness test would, at the very outset, test whether or not the child already can read. Eller and Farr also argue that a readiness test, at its outset, should test the child's ability to follow the kinds of directions that he will encounter in the actual assessment of his reading readiness and in his reading instruction. While these two points may seem obvious, there are commercially available reading readiness tests that fail to include such measures, or neglect to put them at the beginning of the test, where they belong.

Letter, Letter-Sequence, Word, and Word-Sequence Skills

J. Mackworth (1974b, p. 2) points out that "However true it is that the individual letter is not always examined in fluent reading, the basic steps in learning to read must be built upon individual letters." Gibson and Levin (1975), and Calfee, Chapman, and Venezky (1972) note that young prereaders generally do not have problems in discriminating individual letters; far more problems occur with letter-sequences. The important role of word-level units in reading is clear from research into the process and pedagogy of

reading. For example, P. Gough's (1972) model of the reading process is essentially a word-perception model of reading. The whole-word method of teaching reading stresses the word as the critical unit in early reading instruction (Grimes & Allinsmith, 1961). Also, strategies for reading development and remediation emphasize word perception (Fry, 1974). Singer (1974, p. 3) provides the following comment on the need to work with units beyond the level of the individual word: "Some children can identify words in isolation, but have not yet learned how to organize semantically and syntactically their responses to printed words so that they can gain information from the printed page. Integration of word recognition, semantic, and syntactic systems also has to be learned." Samuels (1973) and N. Mackworth (1973) also point to the phenomenon of children who can "bark" at words but who are not successful in integrating word meanings in a sequence of words.

Instructional Factors

Rather than ask "Is this child ready for the reading classroom?" one might better ask "Is the reading classroom ready for this child?" A State of New York (1974, p. 21) study indicates that "no single factor could account for school effectiveness, but that a number of factors are important." Pupil reading achievement was higher in a school where "the principal and his assistant principals were able to run an orderly, peaceful, and efficient school. . . ." Calfee, Chapman, and Venezky (1972, p. 140) report that "The most relevant variable in determining the success of any remedial program would appear to be *time*—the amount of time a teacher spends in one-to-one contact with the individual child. . . ." It should be noted that Calfee, et al., point both to the *amount* of instructional contact and to the *kind* of instructional contact—one-to-one.

One-to-one contact enables instruction to be tailored to the individual characteristics of each child, and it maximizes the amount of "feedback" given to the child in his efforts to "crack the code" and to make sense in reading. In an examination (Wanat, 1974) of experimental instructional programs dealing with reading readiness and the initial stages of reading acquisition,

it was found that there was wide variation in the extent to which these programs advocated individual instruction. Components of each of these programs were in various stages of conceptualization, pilot-testing, and larger-scale implementation. One program had as its goal an instructional system in which each child worked almost exclusively on an individual basis. Another program was designed for group instruction; it is claimed that the whole class could work as one group. However, the program that made the strongest claim that learning should take place on an individual basis provided for individual learning only to the extent that a child could go through the activities at his own rate, and could have a certain amount of freedom in sequencing the skills that had to be practiced.

Consistent with Calfee, et al.'s analysis, an instructional factor which needs to be considered is whether or not instruction is actually being delivered to a given child. R. McDermott (1976) cites evidence that "more than 90% of the majority-culture children of the nineteen twenties had their eyes fixed on their teachers or their work at any given time (Jackson, 1968). This contrasts considerably with estimates obtained from the contemporary classrooms that share in the early century style of the teacher directing all attention in the classroom. M. Deutsch (1963) has found that teachers in Harlem elementary schools spent more than half their day calling children to attention." In one of these settings, the children are attending to instruction about 90% of the time; in the other setting, less than 50% of the time. McDermott (1976) advances the hypothesis that minority group children who feel alienated develop patterns of selective *in*attention —they learn not to learn. This learning not to learn syndrome is related to Lecky's (1951) hypothesis for explaining why some boys do not learn to read: They do not learn to read because they do not want to learn to read, and they don't want to learn to read because the reading materials presented to them are too feminine (see Athey, 1976).

Another of Durkin's (1974, p. 189) conclusions is that "The assessment question posed by both educators and researchers has been, 'Is the child ready?' Unfortunately, such a question is the wrong one to ask because it is incomplete. It focuses only on the

child, thus omitting attention to an equally important variable: namely, the reading instruction that will be available."

Flexibility in Reading

Assessment procedures have generally not differentiated among different kinds of reading. If one accepts the view that there are many different purposes for reading, and that these different purposes require modifications in the nature of the reading process, then one is led to the view that there are many different kinds of reading readiness. The student may be ready to read for one kind of purpose, but not for another.

Reading readiness is a continuous process that takes into account numerous task and learner characteristics, including characteristics of the learner's cognitive style. Farr (1969, p. 222) defines a readiness test as "a test that measures the extent to which an individual has achieved a degree of maturity or acquired certain skills or information needed for beginning some new learning activity." Considering the diversity of viewpoints about which factors comprise reading readiness, it must be concluded that any single-factor approach to readiness assessment is inadequate. Durkin's (1974, p. 228) approach provides an appropriate foundation for readiness assessment: "Reading readiness *is not one thing*. That is, it is not a single package of certain kinds and amounts of abilities. Consequently when we talk about readiness for reading, we are referring to different things in different children. We are really talking about readiness*es*—a rather awkward word—not *a* readiness."

Purposes and Principles in Reading Readiness Assessment

Eller and Farr's view (1974b, p. 3) that the purpose of testing is to provide information for instructional decision-making is the broadest purpose for testing. They strongly object to testing procedures that are not related to instructional decision-making. Eller and Farr (1974a, 1974b) argue that current approaches to evaluating reading readiness tests (and other reading tests) fail to consider adequately the purposes for assessing reading readiness; evaluation of a reading readiness test should not start with the

question "What does this test tell us?" but with the question:

(a) "What kinds of decisions do I make as a parent (or taxpayer, or teacher, or administrator, or teacher-trainer, or researcher)?" This question leads to

(b) "In making each of these decisions, what kinds of alternatives do I have to choose among?" This leads to

(c) "What kinds of information do I need to select the best alternative?" This leads to

(d) "What is the best way of getting the information I need?"

Just as there is no single all-purpose test, there is no single all-purpose evaluation of a given reading readiness test. Consequently, test reviews such as those published in O. Buros (1968, 1972), Farr and N. Anastasiow (1969), W. Blanton, Farr, and J. Tuinman (1972), and other sources need to be looked at critically in terms of the specific decision-making situation that the test will have to serve.

M. Hoover's view (1974, p. 1) that one purpose of reading achievement tests is to make the schools accountable to the parents fits under the broad purpose put forth by Eller and Farr. Thus, tests enable parents and other members of the community to determine how well their children are learning in relation to children in other schools and communities. The appropriateness of holding the "educational delivery system" accountable needs to be considered with respect to teacher-training programs as well as for teachers and the schools (Wanat, 1972b). Related to the accountability function of tests, reading readiness testing may serve the purpose of providing an "outside opinion" about a child's progress or potential, thus providing some protection from a situation in which the teacher may have misjudged a child.

Given the significant effect that teacher expectations can have on the child's level of success (Brookover, LePere, Hamachek, Thomas, & Erickson, 1965; Henderson & Long, 1971; Palardy, 1969; Purkey, 1970), the availability of an outside appraisal of a child's achievement and potential should be an asset. Teacher expectations about a child's future level of academic success are often made very early in the teacher's contact with the child, and are often based upon minimal information. In a study of classroom organization, R. Rist (1970) found that, by the eighth day of

school, teacher expectations for children's success or failure became the basis for the organization of the kindergarten classroom. This organization was maintained for the rest of the year. McDermott (1976, research in progress) has observed different patterns of teacher attention to, and interaction with, groups of children who differ in their expected levels of success.

The goal of accountability is served by the group-comparison function of tests mentioned by J. Mackworth (1974b, p. 1). It should be noted that Hoover sees this as a purpose of reading *achievement* tests; she is not in favor of reading *readiness* tests. One of her objections is that readiness tests tend to "sort" children, yet this is one of the purposes for tests enumerated by Tuinman (1974, p. 3). Since economic constraints usually rule out individual instruction, instruction is carried out on a group basis. The closeness of the match between the instruction and the needs of the children depends upon the homogeneity of the children in the instructional group. Grouping children for instruction is a central purpose of reading readiness testing.

Another purpose for reading readiness testing is to identify the children who may need extra assistance. In practice, this identification would result in a particular kind of instructional grouping. N. Mackworth (1974, p. 2) believes that available paper-and-pencil readiness tests can be used to screen "the 15% of the school population who are reading disordered. . . ." J. Mackworth (1974b, p. 1) assigns a somewhat broader purpose for testing—determining whether a particular child needs extra help. Although J. Mackworth is opposed to reading *readiness* tests, reading readiness tests can be used to perform this sorting task, but it is important to bear in mind their limitations.

The purpose for reading readiness testing that is least satisfactorily served by currently available tests is determining *where* a particular child's difficulties lie. In other words, some currently available tests may be able to predict, to a certain extent, how well a child will do in later reading achievement. However, reading readiness tests generally lack diagnostic power—they cannot isolate specific areas of weakness whose remediation would then increase the child's reading achievement.

Very broadly, then, the major purposes for reading readiness assessment include:

(1) Comparing the performance of one group of children with other groups of children.
(2) Assigning a student to a particular instructional group.
(3) Identifying a child's specific difficulties.

One point needs special emphasis: one should not decide upon a strategy for reading readiness assessment by looking at a given test and unearthing the purposes it serves. Rather, one must examine one's own role in the instructional process and determine the instructional options that are open. One then determines the kinds of information that are needed to select the best option. Only then should one examine each available assessment procedure to see if the purposes that it serves match the particular instructional decision-situation. In order for this approach to reading readiness assessment to be used productively, Eller and Farr (1974b) note that educators must be aware of decision possibilities, they must be aware of alternative instructional practices, and they must be able to delineate information that will help make these decisions.

As has already been mentioned, both Hoover and J. Mackworth oppose reading readiness tests. J. Mackworth (1974a, p. 2) argues that "The whole concept of reading readiness is absurd. The child should be exposed to letters as early as possible in his life. If he is delayed a year or so he can only be the loser, whatever his potential learning ability may be. . . . The only criterion should be the progress made during the year. If the child is unable to keep up with his peers, then he needs extra help. . . ." In other words, try to teach the child some reading skill; if the child has difficulty learning that skill, modify the task so that he can master it, or else try to teach him another reading skill that is easier for him to master. In this context, readiness assessment is an inseparable part of the instructional process.

Hoover (1974, pp. 1-2) is also opposed to readiness testing. She believes that "Readiness tests should be eliminated. They are not particularly diagnostic and lend themselves to being used to 'sort' children." The sorting of children into groups is harmful if these groups are inflexible. The instructional effectiveness of a given "sorting" needs to be looked at again after a short interval of time to assure the best possible match between the child's needs and the activities of different instructional groups.

The observations and criticisms of Hoover and J. Mackworth on current approaches to reading readiness assessment lead to the following principles for the design and use of reading readiness tests:

1. Reading readiness assessment is a means for answering the question "What and how is the student ready to learn now in the area of reading skills?"

2. Try to teach the student a particular reading skill. If the student experiences success in working with this task, then he is ready to learn it. If the student has difficulty working with the task, then the task should be reformulated so that the student can approach mastery of it.

3. If the child's performance (either in learning to read, or on a reading readiness test) falls behind the performance of his peers, then he needs extra help.

4. Poor performance by a child on a reading readiness test is not a call to delay instruction, but rather a call to design and deliver instruction tailored to the needs of the child.

5. The instructional groups formed on the basis of a reading readiness assessment should be kept flexible, since children's learning rates differ, since reading readiness tests often provide undependable information, and since test scores are only estimates. (Farr [1971, p. 1] notes that "Teachers talk sometimes of 'second grade' reading level or 'fourth grade' reading level as if these labels represented well-defined and widely accepted standards. They do not.")

6. Reading readiness assessment needs to be a continuing process. An additional danger of a one-time assessment of reading readiness can be seen in a study which showed that "The error rate on the second day of testing was about half that on the first day (in Calfee, Chapman, and Venezky [1972, p. 160])."

7. Reading readiness assessment should be an inseparable part of the instructional process. Calfee (1974), Eller and Farr (1974a), Gleitman (1974), Singer (1970), and Sticht (1974) argue that reading readiness tests, as well as other kinds of school tests, need to be tied very closely to what is taught. In a 1939 study, Gates, Bond, and Russell found that the extent to which a variable correlated with later reading achievement was determined, in part,

by the type of instructional method used. Gates et al. (p. 43) recommended that "Reading readiness tests, therefore, must be chosen to fit the teaching method. In other words, one should test the reading abilities which the teaching program will attempt to develop in order to determine the needs of each pupil before instruction is begun and to predict the pupil's likelihood of becoming a successful reader." This 1939 study, as well as an earlier study by Gates and Bond (1936) are two illustrations of the failure of educational research to have an impact on educational practice, since practices contrary to these two research findings have been widespread in the forty years since these findings have been published. (In the 1936 study, Gates and Bond examined each child's mental age in relation to his reading achievement, and were forced to conclude that there was no critical mental age level above which relatively few students fail, and below which relatively many students fail.)

Commenting on the issue addressed by Gates, et al., Gleitman (1974, p. 1) states that "Many people in the field of reading display a baffling disdain for tests that measure what has been taught. For example, they are inclined to chuckle, knowingly or otherwise, when it is suggested that children who are given extensive training in 'phonics' do better than other children, ceterus paribus, on tests that emphasize phonics knowledge. . . . An achievement test ought simply to measure for acquisition of what was taught. . . ."

An implication of the principle that reading readiness assessment and other types of reading assessment should be tied closely to instruction is that the design and use of global or all-purpose measures of reading readiness should be replaced by "specific tests for specific purposes (Eller and Farr, 1974a, p. 17)." In order for this principle to be implemented, teacher-training programs must be designed to help teachers become better-informed consumers of reading research (Eller & Farr, 1974a; Wanat, 1973). One is led to the following principle:

8. The classroom teacher is in a much better position to select readiness probes than any test author (Tuinman, 1974). Tuinman (p. 3) goes on to state that "The only 'readiness' assessments that seem acceptable to me are teacher judgments based on close ob-

serving of performance on everyday tasks and the administration of test items that parallel the actual instruction to which the child is exposed." While the present author agrees that the child's classroom teacher is in a better position than any test author to develop readiness probes, it is still useful to have a valid outside check on the teacher's appraisal of the child's potential.

9. Reading readiness tests should help determine the most effective instructional strategies by helping teachers to observe and understand the children's learning processes. Procedures for reading readiness assessment should make visible to the teacher the perceptual strategies that the student employs in extracting meaning from visible language. Of particular importance here are the kinds of perceptual strategies that an individual student uses—how he applies his knowledge, especially his knowledge of language, to the task of making sense out of visible language (Wanat, 1972a, 1976; Wanat & Levin, 1968, 1976). Currently available reading readiness tests provide measures of the child's environment, since the items in them deal with the kinds of vocabulary, sentence structures, objects, and concepts that the child has been exposed to. A test which confuses the issue of the child's readiness or reading ability with the child's familiarity with a particular set of vocabulary items, sentence structures, objects, and concepts provides the teacher with misleading information.

Not surprisingly, R. Williams and L. Rivers (1972) found that when test items and instructions were presented to a group of children in the language style most familiar to them, the children's level of performance was higher than when another language style was used. One approach, then, would be to "translate" available reading readiness tests into the language variety of the children to be tested. Hoover (1974, p. 1) suggests that "Tests should include vocabulary that not only gives all ethnic groups a chance but that gives students taught by different methodologies a chance." Another approach to this problem is to construct reading readiness tests containing, to the greatest extent possible, items taken from the child's own speech (Miller, 1974; Sticht, 1974).

10. Reading readiness tests should be accompanied by appropriate interpretive scales, since a set of test items does not, by itself, make up a test that is meaningful to the teacher (Woodson,

1973). Thus, local norms as well as national norms should be used. Indeed, a number of different kinds of norms may be called for, each sensitive to different kinds of learner characteristics (e.g., language background, suburban versus urban versus rural context, high income versus middle income versus low income family background).

While the student's performance should be interpreted using norms based on the performance of students with similar characteristics, assessment of an educational system's success in improving the student's level of reading readiness should be based upon a national or international standard. In this way, poor performance by a local educational unit can be identified, and inequities in the allocation of resources to different educational units, or to different populations of students, can be identified.

11. It is inefficient for the assessment procedure to provide more detailed information than is necessary for deciding upon a particular instructional strategy (Tuinman, 1974).

12. It is inefficient for the assessment procedure to be used with a larger number of students than is necessary for deciding upon a particular instructional strategy.

The principles discussed above deal mainly with the use of reading readiness tests. The types of factors that should be included in an assessment of reading readiness are included in the summary which follows. All of the factors listed would not be included in one reading readiness assessment. Rather, a subset of those factors would be included in a particular test, depending upon the specific decision-situation to be served.

Summary

The research outlined above indicates that there is a wide variety of viewpoints on the kinds of factors that should be included in an assessment of reading readiness. Following is a synthesis of the research on factors that should be included in an assessment of reading readiness. The factors listed below are based, in part, on the deliberations of a research seminar directed by S. Wanat, and including W. Eller, R. Farr, M. Hoover, N. Mackworth, R. McDermott, R. Shuy, and T. Sticht.

1. Present general level of reading performance.
2. Ability to understand and follow directions to be encountered in the readiness assessment and in the instructional program.
3. Physical efficiencies which might obstruct learning.
   A. Visual acuity.
   B. Auditory acuity.
   C. Other physical efficiencies.
4. Learning skills.
   A. Attention span.
   B. Modality strength.
   C. Learning rate.
   D. Proficiency in all language varieties to be encountered.
5. Linguistic awareness.
   A. Understanding that visible language is related to spoken language.
   B. Sensitivity to language sounds (e.g., rhyme).
   C. Ability to deal with words and sounds as objects.
6. Level of comprehension of spoken language, including factors such as vocabulary development and concept development.
7. Decoding skills. Facility with:
   A. Letter discrimination.
   B. Letter order within words.
   C. Sound-spelling correspondences.
   D. Spelling patterns (groups of letters which are functional perceptual units).
   E. Syllabic units.
   F. Structural analysis.
   G. Sight word recognition (reader can identify a word visually, without having to "sound it out").
   H. Applying his knowledge of syntax and semantics.
8. Child's attitudes.
   A. Towards school.
   B. Towards learning to read.
   C. Towards different language varieties as media of instruction.

9. Teacher's attitudes.
   A. Towards the child's ability to learn.
   B. Towards the child's culture.
   C. Towards the child's language.
10. Teacher's understanding.
   A. Of the child's ability to learn.
   B. Of the child's culture.
   C. Of the child's language.
11. Teacher's proficiency.
   A. With the varieties of language, culture, cognitive style, personality, and ability present in the instructional setting.
   B. With the instructional varieties present.
12. Factors external to the classroom.
   A. Administrators' attitudes and understandings.
   B. Parents' attitudes and understandings.
   C. Community's attitudes and understandings.

The preceding list of factors that should be included in an assessment of reading readiness, and the earlier analysis of research into reading readiness factors lead to this definition: "Reading readiness is the presence, in the learner and in the learning environment, of the skills, information, and attitudes that enable the learner to begin acquiring a new reading skill." This definition speaks of the condition of the learning environment as well as the condition of the learner. Thus, an assessment of reading readiness based upon this definition would have to take into consideration characteristics of the teaching methods and materials to be employed, characteristics of the teacher, and other components of the learning environment (e.g., the attitudes of the learner's peer group towards reading). A reading readiness assessment based upon this definition could lead to attempts at modifying the learning environment and the nature of the reading skill to be acquired, on the one hand, as well as attempts at modifying the learner, on the other hand. A further implication of this definition is that it does not treat reading readiness (or reading) as a single thing. Readiness, according to this definition, can be assessed only in terms of a specific reading skill. Given this orientation, assessment of reading readiness does not relate just to the child or adult

who has not yet been taught to read, but assessment of reading readiness is also an appropriate educational procedure for people who would already be considered mature readers. For example, one might ask if a particular college student is ready to read—or ready to learn to read—a psychology (or mathematics or chemistry or law or medical) textbook of a certain level of difficulty. Or one might ask if a particular soldier is ready to read—or ready to learn to read—an equipment repair manual, or a cooking and baking procedures manual. In order to answer such questions, one must be able to provide a detailed analysis of the task to be performed. While this point may seem obvious and trivial, many commercially produced tests of reading readiness approach reading and the task of learning to read as a global and undifferentiated skill.

An assessment of reading readiness can take place only after the assessor has specified the nature of the new reading skill that is to be acquired in sufficient detail so that prerequisite skills, information, and attitudes can be described. An assessment of reading readiness within this framework will take the following form: "Are there present, in the learner and the learning environment, the skills, information, and attitudes that enable the learner to begin acquiring a new reading skill?"

In conclusion, this paper on the nature and assessment of reading readiness has considered subskill categories in extant reading readiness tests, and subskill categories derived from research on reading readiness, reading acquisition, and reading achievement. This examination provided evidence that there is lack of overall consensus as to which skills should be included in reading readiness assessment. Also, this paper identified "aiding the process of instructional decision-making" as a major purpose for reading readiness testing. This broad purpose was further analyzed into (1) comparing the performance of one group of learners with other groups of learners, (2) assigning a student to a particular instructional group, and (3) identifying where a learner's specific difficulties lie. Twelve principles to guide the use of reading readiness tests were presented. Finally, a synthesis of the research on factors that should be included in an assessment of reading readi-

ness was developed, along with a comprehensive definition of reading readiness, and a comprehensive definition of reading readiness assessment.

REFERENCES

Athey, Irene. "Affective factors and reading," in Harry Singer and Robert B. Ruddell (eds.), *Theoretical Models and Processes of Reading*, 2nd ed. Newark, Delaware: International Reading Association, 1976.

Ausubel, D. P., and E. V. Sullivan. *Theory and Problems of Child Development*. New York: Grune and Stratton, 1970.

Biemiller, Andrew. "Reading readiness—a major research problem," IRA Paper, New Orleans, 1974.

Blanton, William, Roger Farr, and J. Jaap Tuinman (eds.) *Reading Tests for the Secondary Grades: A Review and Evaluation*. Newark, Delaware: International Reading Association, 1972.

Brookover, W. B., J. M. LePere, D. E. Hamachek, S. Thomas, and E. Erickson. *Self Concept of Ability and School Achievement: II. Improving Academic Achievement Through Students' Self-Concept Enhancement*. Final Report, Cooperative Research Project No. 1636. U. S. Office of Education, 1965.

Buros, Oscar K. (ed.) *Reading Tests and Reviews*. Highland Park, New Jersey: Gryphon Press, 1968.

Buros, Oscar K. (ed.) *Seventh Mental Measurements Yearbook*. Highland Park, New Jersey: Gryphon Press, 1972.

Calfee, Robert C. "Priorities for reading research in the seventies," manuscript, School of Education, Stanford University, 1974.

Calfee, Robert C., Robin S. Chapman, and Richard L. Venezky. "How a child needs to think to learn to read," in Lee Gregg (ed.), *Cognition in Learning and Memory*. New York: John Wiley, 1972, 139-182.

Deutsch, Martin. "The disadvantaged child and the learning process," in A. Harry Passow (ed.), *Education in Depressed Areas*. New York: Teachers College Press, 1963.

Doman, Glenn. *How to Teach Your Baby to Read*. New York: Random House, 1963.

Downing, John, and Derek V. Thackray. *Reading Readiness*. London: University of London, 1971.

Durkin, Dolores. *Children Who Read Early*. New York: Teachers College Press, 1966.

Durkin, Dolores. *Teaching Them to Read*. Boston: Allyn and Bacon, 1970.

Durkin, Dolores. "Confusion and misconceptions in the controversy about kindergarten reading," in Stanley Coopersmith and Ronald Feldman (eds.), *The Formative Years: Principles of Early Childhood Education*. San Francisco: Albion, 1974, 228-235.

Eller, William, and Roger Farr. "Consumer awareness in test reviews," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills*. Washington: Sociolinguistics Program, Georgetown University, 1974a.

Eller, William, and Roger Farr. "What! Should early reading tests measure?", in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills*. Washington: Sociolinguistics Program, Georgetown University, 1974b.

Farr, Roger. *Reading: What Can Be Measured?* Newark, Delaware: International Reading Association, 1969.

Farr, Roger. *Grade Levels and Test Scores*. Washington: National Reading Center, 1971.

Farr, Roger, and Nicholas Anastasiow (eds.) *Tests of Reading Readiness and Achievement: A Review and Evaluation*. Newark, Delaware: International Reading Association, 1969.

Fry, Edward. *Emergency Reading Teacher's Manual*. Highland Park, New Jersey: Dreier Educational Systems, 1974.

Gates, Arthur I., and G. L. Bond. "Reading readiness: A study of factors determining success and failure in beginning reading," *Teachers' College Record*, 1936, *37*, 678-685.

Gates, Arthur I., G. L. Bond, and D. H. Russell. *Methods of Determining Reading Readiness*. New York: Teachers College Press, 1939.

Gibson, Eleanor J., and Harry Levin. *The Psychology of Reading*. Cambridge: The M.I.T. Press, 1975.

Gleitman, Lila. "Notes and hopes from a passing linguist," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills*. Washington: Sociolinguistics Program, Georgetown University, 1974.

Gleitman, Lila, and Paul Rozin. "Phonecian go home? (A response to Goodman)," *Reading Research Quarterly*, 1973, *8*, 494-501.

Gough, Philip B. "One Second of Reading," *Visible Language*, 1972, *6*, 291-320.

Grimes, Jesse W., and Wesley Allinsmith. "Compulsivity, anxiety, and school achievement," *Merrill-Palmer Quarterly*, 1961, 247-271.

Heiman, Julie R., Mark J. Fischer, and Alan O. Ross. "A supplementary behavioral program to improve deficient reading performance," *Journal of Abnormal Psychology*, 1973, *1*, 390-399.

Henderson, Edmund H., and Barbara H. Long. "Personal-social correlates of academic success among disadvantaged school beginners," *Journal of School Psychology*, 1971, *9*, 101-113.

Hoover, Mary R. "Comments on tests of reading readiness and initial reading skills," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills*. Washington: Sociolinguistics Program, Georgetown University, 1974.

Jackson, P. *Life in the Classroom*. New York: Holt, Rinehart and Winston, 1968.

Kolers, Paul A. "Experiments in reading," *Scientific American*, 1972, *227*, 84-91.

LaBerge, David, and S. Jay Samuels. "Toward a theory of automatic information processing in reading," in Harry Singer and Robert B. Ruddell (eds.), *Theoretical Models and Processes of Reading*, 2nd ed. Newark, Delaware: International Reading Association, 1976.

Lecky, Prescott. *Self-Consistency: A Theory of Personality*. New York: Island Press, 1951.

MacGinitie, Walter H. "Evaluating readiness for learning to read: a critical review and evaluation of research," *Reading Research Quarterly*, 1969, *4*, 396-410.

Mackworth, Jane F. "Comments on PMA, Primary Mental Abilities, K-1," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills.* Washington: Sociolinguistics Program, Georgetown University, 1974a.

Mackworth, Jane F. "What early reading tests should measure," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills.* Washington: Sociolinguistics Program, Georgetown University, 1974b.

Mackworth, Norman H. "The line of sight approach to children's reading and comprehension," manuscript, Department of Psychology, Stanford University, 1973.

Mackworth, Norman H. "What early reading tests should measure," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills.* Washington: Sociolinguistics Program, Georgetown University, 1974.

Mackworth, Norman H., and Jerome S. Bruner. "How adults and children search and recognize pictures," *Human Development,* 1970, *13,* 149-177.

McDermott, R. P. "The cultural context of learning to read," in Harry Singer and Robert B. Ruddell (eds.) *Theoretical Models and Processes of Reading,* 2nd ed. Newark, Delaware: International Reading Association, 1976.

Miller, George A. (ed.) *Linguistic Communication.* Newark, Delaware: International Reading Association, 1974.

Morphett, M. V., and C. Washburne. "When should children begin to read?", *Elementary School Journal,* 1931, 31, 496-503.

Nelson, J. B. "How the reading teacher can help parents," in H. A. Klein (ed.) *The Quest for Competency in Teaching Reading.* Newark, Delaware: International Reading Association, 1972, 131-140.

Palardy, J. M. "For Johnny's reading sake," *Reading Teacher,* 1969, *22,* 720-724.

Purkey, W. W. *Self Concept and School Achievement.* Englewood Cliffs, New Jersey: Prentice-Hall.

Rist, Ray C. "Student social class and teacher expectation: The self-fulfilling prophecy in ghetto education," *Harvard Educational Review,* 1970, *40,* 411-451.

Rude, Robert T. "Readiness tests: Implications for early childhood education," *Reading Teacher,* 1973, *26,* 572-580.

Samuels, S. Jay. "Success and failure in learning to read: A critique of the research," *Reading Research Quarterly,* 1973, *8,* 200-239.

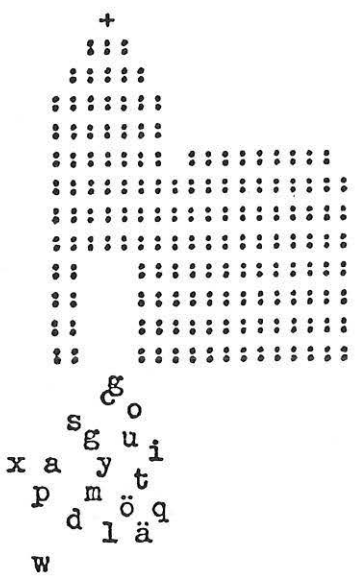
Samuels, S. Jay, and James E. Turnure. "Attention and reading achievement in first-grade boys and girls," *Journal of Educational Psychology,* 1974, *66,* 29-32.

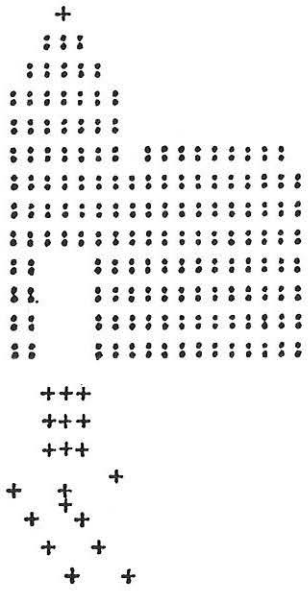
Savin, E. "What the child knows about speech when he starts to learn to read," in James F. Kavanagh and Ignatius G. Mattingly (eds.), *Language by Ear and by Eye. The Relationship Between Speech and Reading.* Cambridge: The M.I.T. Press, 1972, 319-326.

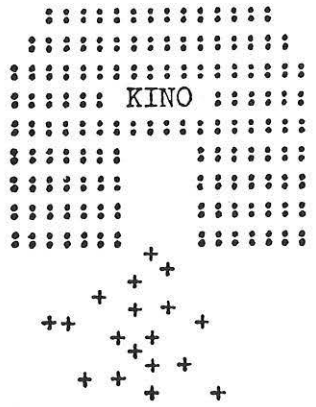
Singer, Harry. "Research that should have made a difference," *Elementary English,* 1970, *47,* 27-34.

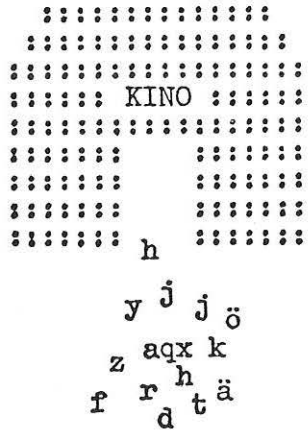
Singer, Harry. "Measurement of early reading ability: Using norm-referenced, standardized tests for differential assessment of progress in learning how to read and in using reading to gain information," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills.* Washington: Sociolinguistics Program, Georgetown University, 1974.

State of New York. "School factors influencing reading achievement: A case study of two inner city schools." Albany: Office of Education Performance Review, State of New York, 1974.
Sticht, Thomas G. "Notes on what early reading tests should measure," in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills.* Washington: Sociolinguistics Program, Georgetown University, 1974.
Thorndike, Robert L. "Dilemmas in diagnosis," in Walter H. MacGinitie (ed.), *Assessment Problems in Reading.* Newark, Delaware: International Reading Association, 1973, 57-67.
Tuinman, J. Jaap. "What should early reading tests measure?", in Stanley F. Wanat (ed.) *Final Report: Conference on Tests of Reading Readiness and Initial Reading Skills.* Washington: Sociolinguistics Program, Georgetown University, 1974.
Wanat, Stanley F. "Effects of language patterns upon scanning patterns in reading," *Proceedings of the American Psychological Association,* Washington, 1972a, 533-534.
Wanat, Stanley F. "Performance tests: Assessing teachers of reading," *Reading Teacher,* 1972b, *25,* 623-633.
Wanat, Stanley F. "Tabulated comparison of programs," *Reading Programs Supported by the National Institute of Education,* Washington: National Institute of Education, 1974, 33-55.
Wanat, Stanley F. "Relations between language and visual processing," in Harry Singer and Robert B. Ruddell (eds.), *Theoretical Models and Processes of Reading.* 2nd ed. Newark, Delaware: International Reading Association, 1976.
Wanat, Stanley F., and Harry Levin. "The eye-voice span: Reading efficiency and syntactic predictability," in Harry Levin, Eleanor J. Gibson, and James J. Gibson (eds.) *The Analysis of Reading Skill. A Program of Basic and Applied Research.* Ithaca: Cornell University, 1968, 237-253.
Wanat, Stanley F., and Harry Levin. "The eye-voice span in sentences containing different amounts of information," manuscript, Department of Psychology, State University of New York at Stony Brook, 1976.
Weintraub, Samuel. "What research says to the reading teacher: Readiness measures for predicting reading achievement," *Reading Teacher,* 1967, *20,* 551-558.
Williams, Robert L., and L. Wendell Rivers. "The use of standard versus nonstandard English in the administration of group tests to Black children," APA paper, Honolulu, 1972.
Woodson, M. I. Chas. B. "How test scales get their meaning," manuscript, School of Education, University of California at Berkeley, 1973.









"Sunday" by Helmut Zenker (1971), reproduced with kind permission from *Typewriter Art*, edited and with an introduction by Alan Riddell (London: London Magazine Editions, 1975. £10)—a visual record of the artist at the typewriter keyboard since Flora Stacey's first drawing of a butterfly in 1898.

Judgment of Meaningfulness of Chinese Characters by English-Speaking Observers

T. M. Nelson and C. J. Ladan

Liu and Chuang (1970) obtained measures of meaningfulness for 1,200 Chinese characters from ratings made by literate Chinese. A sample of these characters rated by persons unfamiliar with Chinese showed that the amount of perceptual information conveyed to English-speaking observers correlates with Liu and Chuang's index for Chinese-speaking individuals. For English-speaking observers, meaningfulness appears more closely related to visual form characteristics than is the case for the Chinese reader. Results of the study provide a further hypothesis: that the Chinese language evolved according to a visual "simplicity" principle. Results also suggest that conclusions from some experiments involving Chinese characters as stimuli may be limited by ignorance of the role that visual dimensions play in discrimination of language forms.

Liu and Chuang (1970) report an index of meaningfulness for 1,200 characters rated by Chinese observers, who produced up to four associations for each stimulus within a timed limit of 10 seconds. The basis of such associations are stimulus factors which may be represented at both cognitive and perceptual levels for the person literate in the language. Chinese characters have conceptual, tonal, and visual meanings for the reader but these are lacking for the non-reader.

The present report describes an experiment in which stimuli selected from the Liu and Chuang study were rated by non-reading (English-speaking) observers to provide a degree-of-meaningfulness scale.[1] Whereas Liu and Chuang's observers were able to make associations to both perceptual and semantic aspects of the characters, native English-speaking persons do not have this knowledge available and hence judge meaningfulness visually. The complexity of the Chinese character and its ideographic origins provide distinctive visual features to which the non-reader can attend and frame a judgment.

Visible Language, X 2 (Spring 1976), 129-143.

Authors' address: Department of Psychology, University of Alberta, Edmonton, Alberta, Canada.

Even though the number of associations given by the non-reader is determined by visual dimensions only, it is possible to compare the meaningfulness of the symbols for both readers and non-readers. This is because the term "meaningfulness" is applied not only to the number of associations given to words but also to the number of associations given nonsense *shapes* (Kling and Riggs, 1971). The degree of meaningfulness for the non-reader is dependent upon visual properties of shape termed "complexity" (i.e., the number of sides, symmetry, etc.) rather than upon semantic structure as is the case for words. The process involved is perhaps similar to what happens for ideograms in the hieroglyphic systems (Brainwood, 1948).

An experimental investigation of visual meaning of traditional classical Chinese symbols is also relevant to a report of Rozin, Poritsky, and Sotsky (1971). They appear to have overlooked differences in visual structures of traditional classical Chinese and roman systems when reporting that they were able to teach English-speaking children to read using traditional Chinese characters as intermediaries (Nelson and Ladan, 1976). In so doing they may have misrepresented the nature of reading. Although Rozin and colleagues do make brief reference to perceptual factors operative in reading Chinese, they conclude that phonic differences are responsible for the improvement of reading ability they found. However, the improved performance found in reading English using Chinese symbols as intermediaries could reflect more basic differences in visual processing of Chinese as compared to roman systems than those they alluded to. It is possible that a natural distinctiveness of many Chinese symbols favors easy recognition of traditional classical Chinese as contrasted to roman word forms.

The specific purpose of the study is to determine the extent to which English-speaking participants directly perceive meaningfulness in traditional Chinese characters, and further, the extent to which English-speaking participants attribute degrees of meaningfulness to symbols which have been differentially rated by Chinese-speaking participants. In accordance with the preceding analysis it is hypothesized that the traditional Chinese symbol system contains stimulus materials which will be differentially experienced as "meaningful," conveying ideas or implications for non-Chinese readers on the basis of complexity of shape.

The present study measures *meaningfulness* (dependent variable) of Chinese symbols using a rating scale. A second measure records the average number of responses to a stimulus within a timed limit. This second method for obtaining judgments of meaning is similar to that used by Noble (1952), whose stimuli were verbal materials.

Complexity (independent variable) is defined along two dimensions. The cognitive dimension, termed "simple-compound," was represented by characters selected from Liu and Chuang (1970), where "compound" as contrasted with "simple" characters are composed of several symbols each able to be interpreted as a single (simple) element. More specifically, "simple" characters are defined as those which are composed of single elements of speech, rather than combinations of speech elements. The "compound" level includes those symbols to which two or more ideas are attached (e.g., "elevator-girl"—"girl" and "up and down") or short phrases (e.g., "school house"). Analysis of the second or visual dimension follows Arnoult (1960) and Attneave (1957), in that "visual complexity" relates to a symmetry-asymmetry feature, with asymmetrical figures considered to be more complex than symmetrical figures. Using this method, symmetrical figures convey one-half the visual information provided by asymmetric figures, when characters are matched on other visual dimensions such as number of continuous strokes, number of angles, number of sides and the average number of different angles. Yeh and Liu (1972) seem to define visual complexity of Chinese characters in terms of number of strokes and/or word shape. However, based on translation, their definitions were not clear enough to be used.

If visual dimensions are critical, then it is expected that the symmetrical-asymmetrical dimension of Arnoult and Attneave will be a more significant dimension of meaningfulness than will the simple-compound dimension because the former variable is more closely bound to the visual stimulus than is the culture-bound latter variable. It is hypothesized that asymmetrical Chinese forms will be judged as more complex and thereby judged as being intrinsically less easily encoded than when symmetrical forms are viewed. This prediction is consistent with Garner's (1974) discussion of how information is extracted from "rotated," "reflected," and asymmetric patterns.

Selected Examples from the Fifty Stimuli Employed

	Simple	
	Symmetrical	Asymmetrical
Lowest Level of Meaningfulness (Chinese Observers)	 Heinous	The Chinese Listing Did Not Provide Characters Appropriate For This Cell
Second Lowest Level of Meaningfulness (Chinese Observers)	 A Form of Movement	 Acting; In Place Of
Moderate Level of Meaningfulness (Chinese Observers)	 Moveover	 Method
Second Highest Level of Meaningfulness (Chinese Observers)	 Large	 Old
Highest Level of Meaningfulness (Chinese Observers)	The Chinese Listing Did Not Provide Characters Appropriate For This Cell	 Water; Liquid

Compound	
Symmetrical	**Asymmetrical**
荳 Bean 艹 豆 Grass Bean	蛄 A Form of Harmful Worm 虫 古 Worm Ancient
箕 A Bamboo Utensil ⺮ 其 Bamboo That (As in that person; that thing)	屜 Drawer 尸 彳 世 Corpse Taking a Small Step with the Left Foot Generation
番 Number of Times (As in one time; two times; etc.) 釆 田 Identify Field	紛 Tangled; Confused 糸 分 Small Thread Divide
會 Convention 人 一 曰 People One Speak	娘 Young Girl; Mother 女 良 Feminine Fair
軍 Armed Forces 冖 車 To Cover Vehicle	將 Captain; Future 爿 寸 The Left Half Inch

Symmetrical and asymmetrical symbols were selected from the list of Liu and Chuang by visual inspection. The symbols were chosen to provide maximal differences between the stimulus categories. Simple and compound symbols were selected by an individual fluent in the Chinese language.[2] Symmetrical symbols of compound interpretation were selected from the list of Liu and Chuang so as not to confound the simple-compound with the symmetry-asymmetry variable. Their table provides a number of examples in each of the cells of a 2 x 2 composed of the levels of simple-compound (cognitive content) and the symmetrical-asymmetrical (visual) factors. However, sampling along the symmetrical-asymmetrical dimension is restricted by the predominant number of asymmetrical as compared to symmetrical figures. Apparently this imbalance is not peculiar to the characters Liu and Chuang sampled, but may be found throughout the Chinese language.

Five approximately equal Chinese levels of meaningfulness were produced by dividing the range (0.28 to 3.55) supplied by Liu and Chuang. Three examples of each of the four combinations of simple-compound and symmetrical-asymmetrical forms were selected from each of the five Chinese levels of meaningfulness. These served as stimuli. Replications were matched across the four stimulus categories, within the limitations imposed by the non-availability of matches. Although three matched examples of each combination were originally planned, the two extreme categories of meaningfulness contained an insufficient number of symbols fulfilling the requirements of the other two factors. Thus, a total of ten examples were not available—five from the lowest and five from the highest categories. In the data analysis, these were treated as missing examples. The stimulus characters were drawn on 8 x 10-inch film transparencies by a native Chinese person fluent in the language, and used with a 3M overhead projector.

Thirty English-speaking introductory psychology students unable to speak or read Chinese volunteered to serve as participants. Seated in a partially darkened classroom, they viewed the stimuli (Chinese characters) projected onto a screen via an overhead projector controlled by a Hunter timer (Model 111-C, Series D) set for a 30-second exposure. During 30-second inter-

stimulus intervals, observers rated the stimuli for meaning; first using values along a 0-5 scale, and second by providing verbal associations. The directions follow:

"Please rate each symbol in terms of its meaningfulness on a 0-5 scale, where '0' refers to 'no meaning' and '5' refers to 'greatest possible meaning.' Circle one of the whole numbers from 0 to 5. Then, consider that the degree of meaningfulness of a symbol is reflected: by the degree it resembles an article or an idea. The character may resemble an object, such as a tree or building; *or* the character may resemble an abstraction, such as a piece of music; *or* it may imply its use or origin or association with other things. Please use the second column to describe what articles or ideas each form suggests to you."

All participants were instructed to provide responses for all stimuli on the rating scale and by providing one or more associations for the greater number of characters employed. The 0-5 index of rated meaningfulness was directly interpreted. The second dependent response measure was interpreted following Thorndike and Lorge (1944). Associations values were measured as (1) average number of associations given an item (Method #1) and (2) percentage of *0*'s giving any associations to the item (Method #2). A third measure employed by Thorndike and Lorge did not prove applicable to our task; hence the third measure we used was the *type* of association elicited; i.e., objects, abstractions, origins, or uses.

The index of meaningfulness (0-5) tested three main factors as well as a variable representing matching in terms of the Chinese meaningfulness ratings. An analysis of variance (Table I) applied to these four variables shows the factor of Chinese levels of meaningfulness and the symmetrical-asymmetrical dimension to be significant. With respect to the latter difference, and contrary to the hypothesis, a comparison of means indicates symmetrical symbols convey greater meaning than do asymmetrical symbols (Table II). Garner's (1974) discussion of the pattern "goodness" of "reflected" and "rotated" versus asymmetric forms is consistent with this finding. He reports that R & R forms are superior to asymmetric patterns when simple discrimination and the encoding and generation functions of recognition memory are considered.

TABLE I. The analysis of variance for the three factors: (1) Chinese levels of meaningfulness (derived from Liu and Chuang), (2) Symmetry-asymmetry of form (the visual factor), and (3) Simple-compound content (the cognitive factor). The fourth factor represents variance attributed to replications of matched characters within each level of meaningfulness. Significant interactions are numbered to provide cross-reference with the text.

Source of Variance	*Degrees of Freedom*	*Mean Squares*	*F*
Chinese Levels of Meaningfulness (M)	4	13.9	11.44**
Simple vs. Compound (SC)	1	3.6	1.29
Symmetrical vs. Asymmetrical (SA)	1	41.7	18.46**
Matched replications within levels (r)	2	2.9	2.56
1. M x SA	4	10.8	8.11**
2. M x SC	4	15.3	9.24**
3. M x r	8	6.4	3.78**
4. SC x SA	1	16.8	10.80**
5. SC x r	2	22.0	18.75**
6. SA x r	2	6.3	5.95**
M x SC x SA	4	3.6	2.20
7. M x SC x r	8	6.4	5.04**
8. M x SA x r	8	5.1	3.69**
SC x SA x r	2	1.3	1.23
9. M x SC x SA x r	8	3.9	2.71*

*$p < .05$
**$p < .01$

These processing components are basic to the task described here.

Differences associated with the simple-compound dimension were not reliable, and differences within levels also did not reach the criterion, indicating homogeneity of symbols within each level.

Nine of the eleven interactions in Table I also proved significant. Although these are of varying degrees of interest, all will be reviewed.

1. The first interaction indicates that it is only the symmetric forms which increase in meaningfulness from Chinese levels of meaningfulness 1 through 4. Inspection of the relationship shows this to be true except where semantic meaning is high: when semantic

TABLE II. Mean ratings of judgements of meaningfulness given by English-speaking observers averaged over all other possible sources of variance for those main factors and interactions noted as statistically significant ($p < .05$) in Table I. Means are omitted which contain the r (replication) factor because the arbitrary choice of ideograms within categories confounds interpretation.

Means for English-speaking observers for each level of meaningfulness: Level 1 represents the category containing the least number of associations provided by the Chinese observers of Liu and Chuang (1970) and Level 5 represents the category of greatest number:

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*
1.95	1.98	2.18	2.34	2.38

Means for English-speaking observers for the visual dimensions of symmetry-asymmetry:

Symmetry	*Asymmetry*
2.32	2.01

Means for English-speaking observers for each level of meaningfulness X symmetry-asymmetry:

	Symmetry	*Asymmetry*
Level 1 (as above)	1.97	1.93
Level 2	2.07	1.90
Level 3	2.23	2.12
Level 4	2.79	1.89
Level 5	2.53	2.22

Means for English observers for each level of meaningfulness X simple-compound:

	Simple	*Compound*
Level 1	2.03	1.86
Level 2	2.12	1.85
Level 3	2.36	1.99
Level 4	2.48	2.20
Level 5	2.06	2.69

Means for English observers for simple-compound X symmetry-asymmetry:

	Symmetry	*Asymmetry*
Simple	2.26	2.15
Compound	2.37	1.87

meaning is high this visual aspect does not relate to cognitive content in any greater degree than does asymmetry of form (Table II).

2. Characters with single meanings for the Chinese convey more meaning than do more cognitively complex characters when selections are made from the four lowest levels of cognitive meaningfulness. At level five (highest degree of meaning as rated by Chinese observers) the opposite is true (Table II). Since symmetry of form has been controlled in the analysis, this result suggests that some undetermined visual dimension was being discriminated by the native English-speaking sample, and moreover that this visual dimension negatively influences meaning for the Chinese as compared to the degree of meaning derived by English-speaking observers.

This result may have relevance for prior ideographic research employing English participants. Visual differences between characters of single as contrasted to multiple meanings likely were operative in Hull's (1920) demonstration of the discriminability of radicals embedded in compound characters, and may also be related to Kuo's (1923) report that English participants could discover the meaning of radicals when combined forms containing the radical were named. Thus the cognitive dimension distinguishing characters of single versus those of multiple concepts may contain important perceptual components that allow differentiation of character types and influence meaning.

3. There is a reliable interaction of replications and cognitive levels; however, plotting the median at each level gives a steady increase in meaningfulness over cognitive levels although the selected matches follow irregular paths. This result combined with the lack of significance found between symbols within each level suggests that stimulus selection was not biased.

4. A comparison of meaningfulness across symbol types shows that symmetrical symbols which are combinations convey greater meaning of concepts than do similar symbols which are of single composition, while the reverse is true when asymmetric symbols are considered (Table II).

5. and 6. The homogeneity of perception within symbol groups was studied and two interactions are found significant. One of these is with a visual dimension and the other with a cognitive

dimension. This suggests that certain symbols within groups of characters were unique with respect to rated meanings. However, since the ideograms were arbitrarily placed into categories the interactions are treated as chance events difficult to interpret ad hoc.

7. and 8. Chinese level of meaningfulness and replications prove significant in three-way interaction with both the visual and cognitive dimensions. As noted, simple characters prove more meaningful visually except at level five where asymmetric are the more meaningful. This reversal of trend also happens in replication three at levels three and four as well as level five. Trends also differ across replications for the visual variable plotted over Chinese levels of meaningfulness. Specifically, replication two shows regularly increasing curves for both symmetric and asymmetric forms while consistent trends are absent in replications one and three.

9. No easy description of the four-way interaction is possible. In general, the tendency is for visual meaning to be least for compound and asymmetric figures but this generalization is consistent only for the three middle Chinese levels of meaningfulness in replications one and two. Graphic presentation of this interaction indicates that visual meaningfulness for English-speaking observers is not precisely related to semantic judgments made by Chinese participants.

Table III shows that the ratings of the English-speaking participants significantly increase as degree of meaningfulness for the Chinese participants increased, the relationship being $r = +.92$; $df = 3$; $p < .05$. These results lend support to the hypothesis that visual differences between ideograms are perceived as differences in meaning. Without doubt, important visual cues to meaning are to be found in the graphic content of Chinese script.

Turning now to the second measure, the results indicate that the number of associations given an item by the English-speaking participants is consistent with data from the 0-5 index when scored by either of two methods. Analysis of method #1 (the average number of associations given an item) indicates that asymmetrical-

TABLE III. The range and arithmetic means of Liu and Chuang's index for the tested Chinese characters compared to the mean values chosen by English-speaking participants from a 0-5 scale where "0" represents "no meaning" and "5" represents "greatest possible meaning." The Chinese and English index means correlate significantly ($r = +.92$, $df=3$; $p<.05$).

X of index of meaningfulness

Chinese-speaking	*English-speaking*
.60 (range: .28-.93)	1.95
1.26 (range: .94-1.58)	1.98
1.91 (range: 1.59-2.23)	2.18
2.66 (range: 2.24-2.88)	2.34
3.22 (range: 2.89-3.55)	2.38

compound and symmetrical-simple symbols provide more associations than do other combinations, but differences do not reach statistical significance. Unfortunately, analyses of these data could not be extended as we hoped because the range of responses is too small (0-2). Analysis of method #2 (the percentage of observers giving a response to the item) shows differences in both the simple-compound and symmetrical-asymmetrical dimensions, both of which prove reliable ($F=4.74$; $df=1/32$; $p<.05$; and $F=9.90$; $df=1/32$; $p<.01$, respectively). Data show that more persons give responses to simple than to compound forms, and to symmetrical than to asymmetrical types. This is consistent with what was found using the 0-5 scale; Vanderplas and Garvin (1959) and Garner (1974) report similar results.

The second method of measuring meaningfulness (via association) correlates $r = +.31$ ($df=48$; $p<.05$) with the Chinese index of meaningfulness, and $r = +.85$ ($df=48$; $p<.01$) with the English-speaking index rated on the 0-5 dimension. The difference between these correlations is significant ($z=4.5$; $p<.01$), consistent with an interpretation of a greater emphasis on visual characteristics by the English-speaking participants.

Analysis of the types of meanings associated by English-speaking people—namely, (1) resemblance to an object, (2) resemblance to an abstraction, and (3) use or origin or association with other things—shows additional factors operating along visual and cognitive dimensions. Characters of single meaning and symmetric

symbols tend to resemble objects while compound characters and asymmetric symbols reflect use or origin or an association with other things. Abstract associations are not reliably related to visual appearance or to level of semantic meaning.

In many psychological experiments Chinese symbols have been treated as "neutral," ambiguous, or nonrepresentational stimuli for English-speaking persons because they lack verbally-defined cognitive components. The present results are inconsistent with this assumption. These indicate a definite relationship between the physical stimulus characteristics of written Chinese and both the particular meanings associated and ratings of meaningfulness given by English-speaking participants. Chinese characters are not "nonsense" forms. The correspondence between Chinese and English indexes affirms that Chinese symbols contain implicit degrees of meaning, and moreover, that the levels of visual meaning produced by the symbols are usually related to identifiable form characteristics.

Gestalt theorists have long emphasized the implicit meanings conveyed by simple forms. Zuzne (1970) also has found that verbal associations to form depend in part upon visual factors. On the basis of studies using non-ideographic stimuli he reports that symmetrical bilateral shapes produce more responses of "animal" and "other biological forms" than do asymmetrical shapes. The similarity in his and the current results raises the question of the extent to which quality of verbal association and level of meaningfulness in studies involving visual shapes rest upon resemblance of the shape to the form of a real object, the use or origin of the object, or associations to other objects.

The conclusion that perceptual aspects contribute to the meaningfulness of Chinese symbols is consistent with Wang's (1973) speculations about the derivation and content of Chinese characters. Wang notes that some of the earliest components of the Chinese language are visually based. He says that the Chinese language expressed a cognitive dimension as a visual sketch in its most rudimentary stage. In the evolved traditional classical style (the current stimuli), pictorial characteristics are less obvious even though quite effectively communicated, as shown. It has been claimed that all writing, including both roman and ideographic

scripts, has evolved from pictographic representation toward simplification, schematization, conventionalization, and thence to abstraction based upon phonics (Kuhn, 1955). The latest reformation of the Chinese language shows a movement toward abstractness which is based, at least in part, upon phonic structure and this is consistent with Kuhn's contentions.

It is also possible to speculate on the probable course of visual abstraction to this point. Analogous to the development of other languages, Chinese may have transformed according to a "simplicity principle." Just as the most frequently used words in a language also are the shortest (Zipf's law), it seems likely that the most frequently used Chinese characters may be those which have been progressively altered towards visual simplicity. The results reported here provide empirical support consistent with this hypothesis.

Interpretation based upon a "simplicity principle" would only apply to some of the characters, however. Many modern characters have origins which are not pictographic. Many of these were formed via operations involving borrowing the sound or meaning from other characters. A second potential bias in the results may occur because the language was not randomly sampled but equal representations within each visual category were chosen. Because of selective sampling, the available pool of symmetrical characters is much smaller than the pool of asymmetrical characters. However, the results were supported by the statistical tests applied, and the best evidence favors the perceptual hypothesis.

Whatever the dynamics of evolution, it is clear that through this development visual factors have become of much less importance and perceptual distinctiveness may no longer serve the reader very well in certain alphabets. It is here that the present results may have relevance for the earlier mentioned study of Rozin, Poritsky, and Sotsky (1971). In light of current results it now seems possible that the children of their study who were aided in reading English via Chinese forms may have been assisted by the comparatively easy perceptual content of Chinese characters to an extent not previously appreciated.

1. The authors thank Dr. B. L. Evans for his comments in review of the manuscript.
2. The authors are grateful to Mr. P. Wong for preparation of the symbols employed in the study.

REFERENCES

Arnoult, M.D. Prediction of perceptual responses from structural characteristics of the stimulus. *Perceptual Motor Skills*. 1960, *11*, 260-286.

Attneave, F. Physical determinants of the judged complexity of shapes. *Journal of Experimental Psychology*. 1957, *53*, 221-227.

Brainwood, R. J. *Prehistoric Man*. Chicago Natural History Museum Popular Series, Anthropology No. 37. Chicago Natural History Museum Press, 1948.

Garner, W. R. *The Processing of Information and Structure*. New York: Wiley, 1974.

Hull, C. L. Quantitative aspects of the evolution of concepts. *Psychological Monographs*. 1920, *28*, #123.

Kling, J. W., & Riggs, L. A. (ed.) Woodworth and Schlosberg's *Experimental Psychology*, 3rd edition. New York: Holt, Rinehart and Winston, 1971.

Kuhn, H. *On the Track of Prehistoric Man*. New York: Random House, trans. 1955.

Kuo, Z. Y. A behavioristic experiment on inductive inference. *Journal of Experimental Psychology*. 1923, *6*, 247-293.

Liu, I., & Chuang, C. Scaling 1,200 Chinese characters for meaningfulness (in Chinese). *Acta Psychologica Taiwanica*. 1970, *12*, 33-52.

Nelson, T. M., & Ladan, C. J. Perceptual factors in the application of an intermediary to introducing reading. Submitted for publication, 1976.

Noble, C. E. An analysis of meaning. *Psychological Review*. 1952, *59*, 421-430.

Rozin, P., Poritsky, S., & Sotsky, R. American children with reading problems can easily learn to read English represented by Chinese characters. *Science*. 1971, *171*, 1264-1267.

Thorndike, E. L., & Lorge, I. *The Teacher's Wordbook of 30,000 Words*. New York Teacher's College, 1944.

Vanderplas, J. M., & Garvin, E. A. The association value of random shapes. *Journal of Experimental Psychology*. 1959, *57*, 147-154.

Wang, W. S. Y. The Chinese Language. *Scientific American*. 1973, *228*, 51-60.

Yeh, J., & Liu, I. Factors affecting recognition thresholds of Chinese characters (in Chinese). *Acta Psychologica Taiwanica*. 1972, *14*, 113-117.

Zuzne, L. *Visual Perception of Form*. New York: Academic Press, 1970.

A most unusual horizontal inscription: eight large
characters, two by two, which must be read,
not from right to left, but backwards,— and
what is more

The eight large characters are inverted. Passing
travellers exclaim: «Ignorance of the stone-
cutter! Or some unholy eccentricity!» and,
seeing nothing, they move on.

o

You, oh you, will you not translate? These eight
large backwards signs mark the return to the
grave and the SOUL'S WAY,— they are not
meant to direct living steps.

If, turning their backs to the air sweet to breath,
they burrow in stone; if, fleeting from light,
they look into the depths of solidity,

Clearly, it is to be read from the other side of space,—
where there are no roads and where the eyes
of the dead journey unblinkingly.

By Victor Segalen, translated from the French by Michael Taylor; excerpted from a broadside "STELE DU CHEMIN DE L'AME" which was printed and distributed by The Greenwood Press (San Francisco, CA 94133) earlier this year.

Legibility of Numerals Displayed in a 4 x 7 Dot Matrix and Seven-Segment Digits

Bernard Orth, Hans Weckerle, and Dirk Wendt

Conventional and especially designed numerals in 4 x 7 dot matrices and 7-segment displays were tachistoscopically presented to, and identified by, human observers. The number of errors made in this identification task were analyzed as a measure of legibility in terms of information transmission. It is shown that the representation of digits in such matrices can be improved by appropriate design.

Although Nixie cubes and liquid crystal displays are predominantly used for numerical displays on electronic equipment, there are many visual output devices which use lights or dots in a 5 x7, 4 x 7, or 6 x 8 matrix; e.g., time and scores on athletic scoreboards and time and temperature on outdoor signs for banks, etc. For experimentation we chose a 4 x 7 matrix. Although 5 x 7 grids may be more standard in electronic equipment, you can fit a numeral from a 4 x 7 grid into a 5 x 7 or 6 x 8 grid; thus the results from 4 x 7 grids apply to larger grids as well. The more general point in this study is to find possibilities for the improvement of graphic design of numerals as such.

Comparative studies of the legibility of different types of electronic digital displays (including matrix displays) built by light emitting diodes (LEDs) have been performed, for example, by Radl-Koethe and Schubert 1972, and Simpson 1971 (see also Cornog and Rose 1967). With respect to printed numerals, there have been several attempts to design more legible individual characters (see, e.g., Fitts 1951, McCormick 1964, or Murrell 1965). Matrix displays also allow for some variability in the design of individual numerals; i.e., there are several ways (sets of dots) to represent the same numeral. This experimental study was accomplished to find an optimal design for such displays.

Visible Language, X 2 (Spring 1976), 145-155.

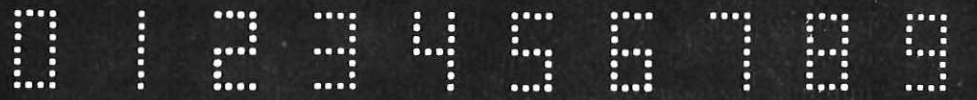
Dirk Wendt's address: Bei der Flottbeker Kirche 3, D-2000 Hamburg 52, Germany.

Six sets of 10 numerals (0-9) were designed on a 4 x 7 grid, as shown in Figure 1. Series 1 was designed to simulate the seven-segment numerals in the 4 x 7 grid. Series 2 shows the standard numerals now in use in such displays. Series 3 attempts to increase legibility by increasing the differences or dissimilarities between the numerals within the series. These dissimilarities are still more emphasized in Series 4. In Series 5 we introduced a new dimension (double lines) to base the differences between numerals on more attributes of the characters. In Series 6 we tried to maximize dissimilarities by using elements from all previous series. This was done under the assumption that larger dissimilarities would lead to less confusion, and thus to better legibility.

Out of the numerals within each set, three-digit numbers were composed and displayed by means of light-emitting diodes arranged in a 4 x 7 matrix (size about 6 x 8 mm.) for about 0.275 msec. using a tachistoscope. In addition, similar numbers composed of seven-segment numerals (Series O in Figure 1) were presented for the same exposure time. The distance between subject and display was adjusted for each subject according to his individual threshold. The distances ranged from 50 to 100 cm., with an average of about 90 cm. However, for the seven-segment numerals only about half this distance was appropriate.

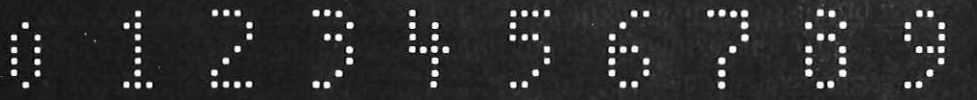
Prior to each series of trials, subjects were shown the individual characters (from 0 to 9) to be used in the composition of the three-digit numbers presented in the series of trials. The subjects then initiated each trial by pushing a button, 2.25 sec. after which the three digit stimulus appeared for about 0.275 msec. The subject's task was to name the three-digit number he thought he had seen. This was recorded by the experimenter. Each series of trials consisted of the presentation of 100 stimuli (three-digit numbers) in the random order fixed for each series (set of characters) but systematically rotated over sequences in order to cancel any possible sequential influences. Series 0 and 2 were presented a second time, at a distance of about 270 cm. from the subject, for about 8.665 msec., but only to 41 of the 49 subjects. This was introduced into the experiment in order to compare the seven-segment numerals to a series of 4 x 7 dot display materials under equal conditions. Subjects were run individually in sessions lasting about

Series 0. Seven-segment numerals.

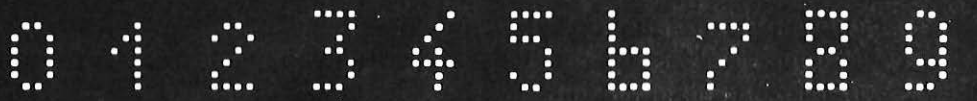


Series 1.

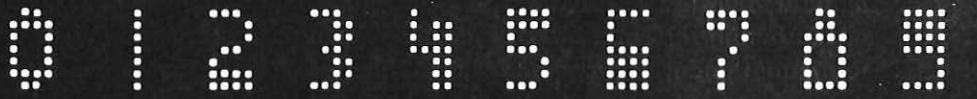
Series 2.



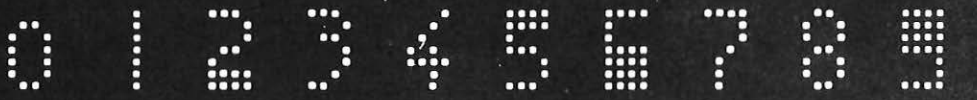
Series 3.



Series 4.



Series 5.



Series 6.

105 to 120 minutes; i.e., about 7 or 8 minutes per series of 100 stimuli, plus instructions, plus inspection of the individual characters prior to each series, plus break. Subjects were 49 volunteering graphic design and psychology students in Hamburg, West Germany.

The dependent variable—the measure of legibility—was the proportion of correct identifications, or rather some logarithmic transformation of it: the amount of information transmitted. Also analyzed was the structure of errors made in this task; i.e., the confusion between characters.

The total number of data collected was: 3 (digit positions) x 100 (trials) x 49 (subjects) x 7 (series of stimuli) = 102,900 at short distance and short exposure time; plus 3 (digit positions) x 100 (trials) x 41 (subjects) x 2 (Series 0 and 2) = 24,600 at longer distance and longer exposure time.

Data were collected for each subject and each series individually in a stimulus-response list. Each of these protocols was then transformed into a 10 x 11 confusion matrix, with the stimuli displayed represented in rows, and subjects' reactions (numerals named by them) in columns. There was one more column than rows, to count stimuli not identified by the subject. With ideal and completely correct identification, all entries should be in the main diagonal of this matrix. A tally occurring in cell (i,j) (row i, column j) indicates that the numeral i was shown whereas the subject reported a j.

These matrices, summed up over all subjects and transformed into relative frequencies, are shown in Tables I-IX, with the data from the respective stimulus sets 0 through 6 in Tables I through VII, and for the second presentation of sets 0 and 2 at a longer distance and with a longer exposure time in Tables VIII and IX, respectively. Original tables for each subject were recorded separately for the first and second half of each series (to control learning effects), and for each digit position (i.e., first, second, or third digit in the number displayed). Thus, the procedure of summing up individual matrices resulted in 6 matrices for each of the 9 series of stimuli:

a. all data (the matrices shown in Tables I-IX
b. first digit only, summed over all subjects and trials

Table I. Series 0.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	
0	.74	–	.01	–	.01	.01	.02	.02	.06	.03	.09
1	.02	.66	.01	.01	.02	–	.01	.07	–	.01	.18
2	.03	.03	.62	.02	.01	.01	.02	.03	.04	.02	.17
3	.04	.05	.02	.53	.01	.01	.01	.05	.03	.12	.13
4	.04	.03	.01	–	.67	.01	–	.02	.01	.10	.12
5	.02	.01	.01	.02	.02	.63	.05	.01	.02	.07	.15
6	.03	.02	.01	–	.03	.03	.69	.01	.03	.01	.15
7	.02	.15	.01	.03	.01	.01	.01	.61	–	.03	.13
8	.15	.01	.02	.02	.02	.01	.09	.02	.46	.07	.14
9	.06	.03	.02	.01	.05	.02	.01	.05	.03	.55	.16

Table II. Series 1.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.79	.01	–	–	.01	–	.03	–	.09	.02	.05
1	.01	.90	–	–	.01	–	–	.02	–	–	.05
2	.01	–	.86	.02	.01	–	.01	.01	.02	–	.05
3	.01	.02	.02	.67	.01	.02	.01	.02	.03	.11	.06
4	.01	.03	–	–	.79	.02	–	.02	.01	.06	.06
5	.01	.01	–	.01	.01	.80	.05	–	.01	.04	.05
6	.02	–	.01	.01	–	.10	.72	–	.07	.01	.06
7	.02	.27	–	.02	.01	–	–	.64	–	–	.03
8	.12	.01	.02	.01	.01	.01	.08	–	.63	.04	.07
9	.03	.01	.01	.06	.02	.08	.01	–	.05	.66	.06

Table III. Series 2.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.79	.01	–	–	.01	–	.04	–	.07	.03	.04
1	.02	.86	–	.01	.02	–	.01	.03	.01	.01	.04
2	–	.01	.89	.01	–	.01	.01	.01	.02	.01	.03
3	.02	.01	.02	.78	.01	.02	.01	.02	.03	.03	.06
4	–	.02	–	.01	.84	.02	.01	.01	.01	.03	.05
5	.01	–	–	.01	.01	.87	.04	–	.01	.01	.03
6	.01	.02	.01	.01	.03	.04	.77	.01	.05	–	.06
7	.01	.22	.01	.02	–	–	–	.69	–	.01	.03
8	.07	.01	.02	.03	.03	.02	.07	–	.65	.03	.07
9	.03	.02	.01	.12	.07	.04	.01	.01	.04	.58	.06

Table IV. Series 3.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.47	.04	.01	.01	.09	.01	.15	.01	.09	.02	.10
1	–	.91	.01	.01	.01	.01	.01	.01	.01	–	.03
2	–	.01	.87	.01	–	.01	–	.03	–	–	.04
3	.01	.01	.02	.74	.01	.09	.01	.03	.01	.03	.06
4	.01	.06	–	.01	.81	.02	.01	.01	–	.03	.05
5	–	.01	.01	.06	.01	.82	.02	.01	.01	.01	.04
6	.02	.01	.01	.01	.02	.02	.85	.01	.02	–	.04
7	–	.01	.06	.01	–	.01	–	.85	–	–	.05
8	.08	.02	.01	.02	.02	.02	.27	–	.46	.01	.07
9	.03	.01	.01	.08	.02	.06	.01	.02	.02	.66	.08

Table V. Series 4.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.74	.01	–	–	.02	–	.11	–	.04	.02	.05
1	.01	.86	–	–	.07	–	.01	.01	–	–	.04
2	.01	.01	.76	.02	.03	.01	.02	.03	.04	–	.08
3	.01	.01	.02	.82	.01	.03	–	.04	.01	.01	.05
4	–	.02	.01	.01	.86	.02	.03	–	–	–	.06
5	–	–	–	.05	.01	.81	.03	.01	.02	.02	.05
6	.01	.01	–	–	.06	.02	.80	–	.03	–	.06
7	–	.01	.06	.01	–	.01	–	.86	–	–	.04
8	.04	.01	.05	.03	.01	.03	.06	.01	.66	.03	.08
9	.04	–	.02	.02	.01	.03	.01	.01	.04	.79	.04

Table VI. Series 5.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.63	–	.01	.01	.02	.02	.14	–	.09	.03	.06
1	–	.93	–	.01	.01	–	–	.01	–	–	.04
2	.01	.01	.85	.04	.02	.01	.02	.01	.01	–	.04
3	.01	.07	.04	.75	.01	.02	–	.04	.01	–	.06
4	.01	.09	.01	.02	.71	.01	.01	.05	–	.03	.06
5	.01	.01	.01	.04	.01	.79	.04	.01	.01	.01	.05
6	.01	–	.02	–	.03	.31	.52	.01	.03	.01	.07
7	–	.02	.04	.01	.01	.01	–	.85	.01	–	.05
8	.16	.01	.01	.01	.04	.02	.38	.01	.28	.01	.08
9	.01	.01	–	.12	.02	.58	.01	.01	.02	.16	.06

Table VII. Series 6.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.75	.01	–	.01	.02	.01	.10	–	.04	.01	.05
1	–	.93	–	.01	.01	–	–	.01	–	–	.02
2	–	–	.83	.04	.02	.01	.01	.01	.01	–	.05
3	.01	.01	.02	.75	–	.07	–	.03	–	.02	.07
4	.01	.01	.01	.01	.87	.01	.03	.01	–	–	.05
5	–	–	.01	.04	.01	.80	.02	.01	.02	.03	.06
6	–	–	.01	.01	.02	.24	.62	–	.02	.01	.06
7	–	–	.04	.01	–	–	–	.90	–	–	.03
8	.05	.01	.03	.02	.02	.02	.10	.01	.57	.08	.09
9	.01	.01	.01	.11	.02	.43	.01	.01	.03	.29	.07

Table VIII. Series 0-long.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.60	.01	.04	.01	.02	.01	.04	.01	.15	.05	.07
1	.01	.78	.01	.01	.04	–	.01	.05	.01	.01	.09
2	.02	.01	.76	.02	.02	.01	.02	.03	.04	.02	.07
3	.01	.05	.08	.54	.01	.03	.01	.05	.04	.08	.10
4	.01	.02	.01	.01	.80	.01	–	.02	.01	.05	.06
5	.01	.01	.01	.03	.03	.65	.07	.01	.03	.06	.09
6	.01	.01	.02	.01	.09	.03	.71	.01	.03	.02	.07
7	.01	.33	.02	.04	.02	.01	–	.48	.01	.02	.07
8	.10	.01	.06	.01	.03	.01	.06	.01	.53	.09	.09
9	.02	.02	.01	.02	.24	.04	.01	.05	.04	.46	.09

Table IX. Series 2-long.

Stimuli	*Reaction of Subjects*										
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	–
0	.71	–	.01	.01	.01	.01	.06	–	.10	.03	.06
1	–	.88	–	–	.01	–	.01	.01	.02	.01	.04
2	–	–	.92	.01	–	.01	.01	–	.01	–	.03
3	.01	–	.08	.76	.01	.03	.01	.02	.03	.03	.03
4	.01	.01	–	–	.90	.02	–	.01	–	.01	.03
5	–	–	.01	.01	.01	.85	.05	.01	.01	.02	.03
6	.01	–	.01	–	.05	.05	.81	–	.02	.01	.04
7	.01	.26	.01	.02	.01	–	–	.67	–	.01	.03
8	.09	–	.04	.01	.02	.02	.10	–	.57	.05	.09
9	.03	.02	.02	.06	.05	.07	.02	.01	.03	.65	.05

c. second digit only, summed over all subjects and trials
d. third digit only, summed over all subjects and trials
e. first half of series only (trials 1-50) summed over all digit positions and all subjects
f. second half of series only (trials 51-100) summed over all digit positions and all subjects

As a criterion of evaluation, the amount of transmitted information was calculated for each of these 54 matrices. The information transmitted (from the stimuli to the subjects) may be regarded as a measure of discrimination ability of the subject (see Garner, 1962, ch. 3). This statistic takes into account the relative distribution of errors made by subjects, and thus is more adequate than the average error probability (since not all errors are equally wrong). The amount of transmitted information is defined as

$$T(S:R) = H(S) + H(R) - H(S, R)$$

where $H(S) = -\sum_i p(S_i) \log_2 p(S_i)$

$H(R) = -\sum_j p(R_j) \log_2 p(R_j)$ ad

$H(S, R) = -\sum_j \sum_i p(S_i, R_j) \log_2 p(S_i, R_j)$

are the average amounts of information provided by a stimulus S_i, a response R_j, or a combination (S_i, R_j), respectively.

Differences between the amounts of information transmitted by the different series of digits were tested for significance by means of

$$x^2 = 1.3863 \left\{ T(S:R)_{S-\text{set A}} - T(S:R)_{S-\text{set B}} \right\}$$

As a perhaps more convenient statistic, we also calculated coefficients of constraint, defined as

$$\eta = \frac{T(S:R)}{H(S)}$$

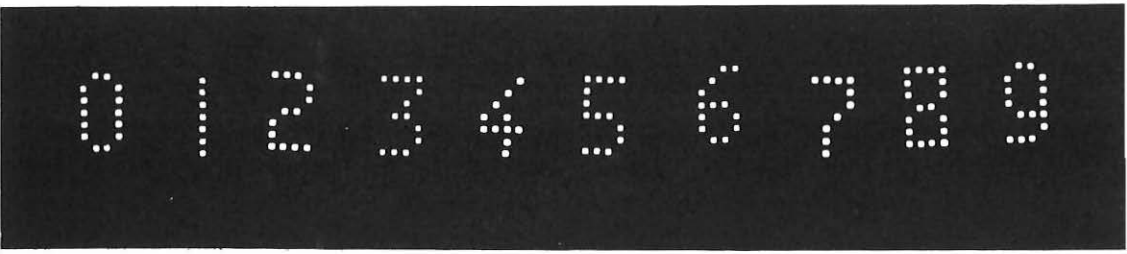
which vary between 0 (no information transmitted) and 1 (the transmitted information is equal to its maximum, H(S)). For a more detailed discussion of an analysis of confusion matrices in terms of information theory, see Quastler 1955, Attneave 1959,

Table X.

Series	*H(S)*	*H(R)*	*H(S, R)*	*T(S:R)*	*H(R|S)*	*H(S|R)*	η	*rank*	*p(error)*	*rank*
0	3.3039	3.4266	5.2854	1.4452	1.9815	1.8587	.4347	–	.392	–
1	3.3166	3.4233	4.7256	2.0144	1.4089	1.3023	.6074	4	.252	4
2	3.3163	3.4279	4.6847	2.0595	1.3684	1.2567	.6210	2	.231	2
3	3.3023	3.3872	4.6918	1.9977	1.3895	1.3046	.6049	5	.248	3
4	3.3126	3.4411	4.6022	2.1515	1.2896	1.1611	.6495	1	.210	1
5	3.3173	3.3273	4.8616	1.7831	1.5442	1.5343	.5375	6	.359	6
6	3.3114	3.3746	4.6719	2.0141	1.3605	1.2973	.6082	3	.267	5
0_1	3.3039	3.4398	5.2393	1.5045	1.9354	1.7994	.4554	–	.381	–
2_1	3.3163	3.4231	4.6428	2.0965	1.3266	1.2198	.6322	–	.232	–

Garner 1962, Meyer-Eppler 1959, or Coombs, Dawes and Tversky 1970. Both the results of this analysis and, for comparative reasons, the average error probabilities, p (error), for each series of numerals are displayed in Table X. It shows that the newly designed Series 4 is considerably superior to the 7-segment Series 0, both in terms of information transmitted and in error probability: .392 for the 7-segment numerals and only .210 for the best dot-matrix, Series 4. The more fancy Series 5 and 6 did not prove superior to the more conventional Series 2 and 3, and Series 1 which is a 4 x 7 dot matrix representation of Series 0 (7-segment numerals) does not look very favorable, either. The bad result with Series 5 was mainly due to confusion of 9 with 5. The same confusion prevents Series 6 from proving superior to Series 2. Comparison of Series 0 (7-segment) and 2 at a longer exposure time and longer distance (0_1 and 2_1) confirmed the inferiority of 7-segment digit displays to 4 x 7 dot matrices.

Analyses of confusion probabilities for individual numerals within the series (not reproduced here) showed that, in general, numerals 6, 8, and 9 are hard to discriminate. An optimal selection of 4 x 7 dot numerals would consist of:



Numeral	0	1	2	3	4	5	6	7	8	9
From Series	1 or 2	6	2	4	6	2	3	6	4	4

However, this new series would have to be tested again because we cannot infer what new confusions might occur. All pairwise differences between series are statistically significant at the 0.01 level; except between Series 1 and 6.

The third digit (last position) was less likely to be identified correctly than the first two digits, with no noteworthy difference between the first and second digit. There was no notable systematic difference between first and second half of trials; thus we can rule out learning effects during the experiment.

In a separate paper, Orth (1974) reanalyzed the data from this experiment under a measurement-theoretical point of view. He transformed the confusion probabilities into measures of dissimilarities—or cognitive (perceptual) distances between stimuli (numerals)—and found that Series 5 and 6 actually do need more dimensions for representation of pairwise distances in a geometric space, where differentiation between numerals is chiefly based on the most obvious dimension (attribute). However, the influence of cognitive factors determining the discrimination between nominally different numerals was larger than the influence of graphic design factors on the perception of the stimuli.

Although the subjects' habituation to the traditional digit displays may have worked against the success of those newly designed in this experiment, it has still been possible to show that the legibility of traditional designs can be improved.

REFERENCES

Attneave, F. *Applications of Information Theory to Psychology*. New York: Holt & Co., 1959.

Coombes, C. H., Dawes, R. M., & Tversky, A. *Mathematical Psychology: An Elementary Introduction*. Englewood Cliffs, N.J.: Prentice Hall, 1970.

Cornog, D. Y., & Rose, F. C. *Legibility of Alphanumeric Characters and Other Symbols, II: A Reference Handbook*. Washington: National Bureau of Standards, Miscellaneous 262-2, 1967.

Fitts, P. M. Engineering psychology and equipment design, in Stevens, S. S. (ed.) *Handbook of Experimental Psychology*. New York: Wiley, 1951, 1287-1340.

Garner, W. R. *Uncertainty and Structure as Psychological Concepts*. New York: Wiley, 1962.

McCormick, E. J. *Human Factors Engineering*. New York: McGraw-Hill, 1964, ([3]1970).

Meyer-Eppler, W. *Grundlagen und Anwendungen der Informationstheorie*. Berlin: Springer, 1959.

Murrell, K. P. H. *Ergonomics*. London: Chapman and Hall, 1965.

Orth, B. Zur meßtheoretischen Analyse von Konfusionsmatrizen. Diplomarbeit, Fachbereich Psychologie, Universität Hamburg, 1974.

Quastler, H. (ed.) *Information Theory in Psychology: Problems and Methods*. Glencoe, Ill.: Free Press, 1955.

Radl-Koethe, H. & Schubert, E. Comparative studies of the legibility of light emitting numerals. *SID Journal, 1*, 1972, 5-10.

Simpson, G. C. A comparison of the legibility of three types of electronic digital displays. *Ergonomics, 14*, 1971, 497-507.

We gratefully acknowledge the help of Messrs. Otte and Döre (Fachhochschule Hamburg, Fachbereich Elektronik) who designed and built the apparatus.

HOW TO FIND CHARACTERS PER PICA FOR CAPS

The method of finding characters per pica (c.p.p.) for lines of all capitals is long and laborious if calculations are done by pencil. I am referring to finding the c.p.p. for type sizes from 6-point to 36-point, for instance. The use of the slide rule shortens the work involved, but some individuals have trouble learning how to use the slide rule. The electronic or mini calculators are easy to use and extremely accurate.

We will use 10-point Futura Demi Bold for this demonstration. Measure lower-case alphabet from a to t. This figure is 8 picas and 1 point. Divide 8.1 into 21 (21 is more accurate than 20, the actual number of characters from a to t). 2.59 is the answer on the computer. This is the figure listed in a type specimen book. This is the c.p.p. for 10-point FDB lower-case.

The next step is to do the same with a line of caps from A to T. This will measure 10 picas. Divided into 21 equals 2.1—c.p.p. for 10-point FDB caps.

The c.p.p. 2.1 for 10-point FDB caps arrived at in the preceding paragraph is correct and can be used, but the following development to be used for obtaining the c.p.p. for all size caps will give a figure of 2.09.

This is the formula for getting the c.p.p. for 10-point caps of FDB:

$$2.59 \times 8.1 = 20.97 \div 10 = 2.09$$

2.09 is the c.p.p. for 10-point FDB caps. We have multiplied the lower-case c.p.p. by the width of the lower-case a to t, and divided it by 10 which is the width of 10-point caps in picas.

The following formula will give the c.p.p. for any size caps once the c.p.p. for 10-point caps is found:

c.p.p.	*size*	*new size*	*cap c.p.p.*		
2.09 x 10 = 20.9	÷	6 = 3.48	12 = 1.74	24 = 0.87	
		8 = 2.61	14 = 1.49	30 = 0.69	
		10 = 2.09	18 = 1.16	36 = 0.58	

When c.p.p. is found, multiply that by the measure to give the number of characters that will fit in a measure.

When this exercise is done a few times, and learned, the c.p.p. for any size caps in any typeface can be readily found. I have used 10-point type as the base size because this size is found on the bottom of most pages of the type catalog.

George A. Parker
The Boston Globe

Palindromes, Poems, and Geometric Form

Jerrald Ranta

Emphasizing the similarities between the form of the palindrome and the forms of certain modern American short poems, I urge the recognition of a unique kind of little-studied, modern, cyclic, poetic form which, lacking an established term, I call "palindromic" form. Widely used by twentieth-century American poets, this kind of form is distinguishable from the better-known, traditional kinds of poetic form, though it sometimes occurs in combination with them. Cedric Hubbell Whitman's discussion of ring composition and hysteron proteron in the *Iliad* reveals the classical origin of this form and suggests that its larger class is geometric form.

The words "palindrome" and "palindromic" refer to a well-known formal pattern that is shared by certain words, clauses, sentences, paragraphs, and verses: e.g., "Odo tenet mulum, madidam mappam tenet Anna, Anna tenet mappam madidam, mulum tenet Odo."[1] It is this formal pattern, which always occurs at least on the level of the letters in these language units, that is important here.

The palindrome is essentially a reversal pattern that pivots around a center. However, since the quantity of letters in a palindrome may be odd or even in number, the center of a palindrome might be one of two kinds. If there is an odd number of letters, the center will be a non-repeated letter, as the "c" in "A man, a plan, a canal—Panama!"[2] And if there is an even number of letters, the center will be a point in space, as it were, between two identical letters, as between the two "a's" in "Subi dura a rudibus."[3]

Except for their reversal pattern, the twofold nature of their centers, and the equality and reversed identity of their two halves, palindromes are not fixed formally and are highly variable in length and complexity.[4] Indeed, a palindrome may vary from

Visible Language, X 2 (Spring 1976), 157-172.
c/o The Cleveland Museum of Art, Cleveland, Ohio USA 44106.
Author's address: Department of English, University of Wyoming, Laramie, Wyoming 82071.

these ideal conditions and still be a palindrome. For instance, the comma and the word "and" are not part of the reversal pattern in "as Lewd did I live, and evil I did dwel."[5] The possibility of such variations, which are generally held to a minimum, might be a further characteristic of the palindrome, inasmuch as the demands of syntax and meaning sometimes make them unavoidable.

Finally, it must be insisted that the form of the palindrome—at least as it is being treated here—is essentially a visual form. It is the letters as visual surface configurations addressed to the eye, and not the sounds of the palindrome as sounds, or the meaning of its content as meaning, which are repeated in reverse. A visual, prototypical cyclic form of any linear writing, the palindrome is the sign or figure of a type of formal arrangement of tensions, whether viewed as at rest or in motion, among units of language, the tensions being those characteristic of vocabulary, syntax and meaning.

With the foregoing as background I would like to turn to the analysis of three modern poems: William Carlos Williams' "The Locust Tree in Flower" (the shorter version), E. E. Cummings' "[If you can't eat you got to]," and Marianne Moore's "To a Chameleon." These poems have been chosen deliberately for this study inasmuch as their forms consist of language units of various kinds—words, clauses, sentences, lines, and stanzas—arranged around their centers in symmetrical, palindromic-like patterns. Hence, by analogy, the term "palindromic form," which I shall use often here. What I am suggesting is that three study poems appear to belong to a single, frequently used, species of form. Moreover, since this species of form is really neither continuous, stanzaic, nor fixed, according to the textbook definitions of these kinds of form,[6] perhaps the proper class designation for palindromic form is geometric form. Letting this be as it may until later, I would like to acquaint the reader with this species of form through the analysis of the three study poems. Lest I be misunderstood, let me emphasize that I am not insisting that these poems are palindromes in the sense that we know the latter, but that, working by analogy, their forms in many respects are like the form of the palindrome and that, consequently, they appear to belong to a single formal class of poems.

I. William Carlos Williams' "The Locust Tree in Flower."

	Words	*Syllables*	*Letters*
Among	1	2	5
of	1	1	2
green	1	1	5
stiff	1	1	5
old	1	1	3
bright	1	1	6
broken	1	2	6
branch	1	1	6
come	1	1	4
white	1	1	5
sweet	1	1	5
May	1	1	3
again	1	2	5[7]

Obviously, whatever formal patterns Williams' "The Locust Tree in Flower" contains have to involve such things as the number of letters and syllables per each one-word line, as well as the vowel and consonant values of the thirteen words. Nevertheless, the amount of patterning in the poem is surprising. For example: all the lines are made up of one-syllable words except the first, the middle, and the last lines, all of which are made up of two-syllable words. The first line ("Among") and the last line ("again") are similar in stress pattern (⏑ /) and in their vowel and consonant values; they both begin with the unstressed *a*-sound and they both contain the consonants *n* and *g* in their stressed syllables. These two lines are also related in terms of letter-count; each contains five letters. In this respect they are like the third and fourth lines from the beginning and the third and fourth lines from the end of the poem, all of which also contain five-letter words. These six lines are the only five-letter lines in the poem. This is to say that the patterning in the poem indeed involves line-length, not only in terms of the number of words and syllables per line but also in terms of the number of letters per line.

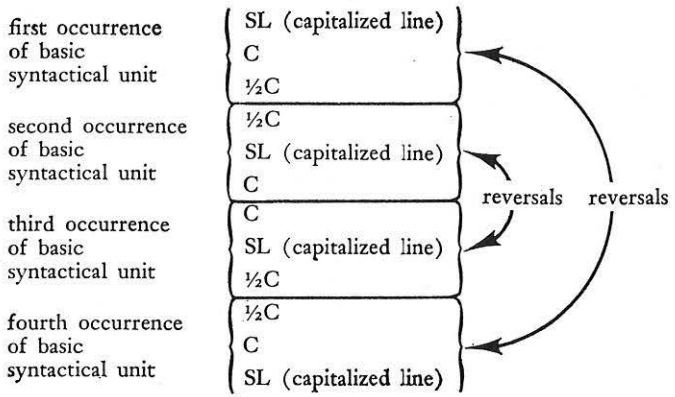
head of the third line; and in the fourth occurrence, only at the head of the fourth line. The stanza division of the poem is such that each of the capitalized lines is one of the four one-line stanzas in the poem, a fact that has structural significance which will be pointed out later. In the area of punctuation, the punctuation mark in the third line of the unit (see above) changes from a colon to a semicolon to a comma to a set of parentheses throughout the successive repetitions of the basic syntactical unit. And in the area of vocabulary, the words occurring at the three numbered and underlined points (see above) change with each repetition of the basic syntactical unit, as follows: I: 1 *eat,* 2 *smoke,* 3 *smoke;* II: 1 *smoke,* 2 *Sing,* 3 *sing;* III: 1 *sing,* 2 *die,* 3 *die;* IV: 1 *die,* 2 *dream,* 3 *dream.* Apart from these changes, the basic syntactical unit remains the same throughout the poem.

In respect to line length and structure, the four lines of the basic syntactical unit remain the same in word-count, syllable-count, and, presumably, in stress-count throughout the poem. In each of the four lines, from first to last, there are always seven, five, six, and four words, and seven, five, seven, and four syllables. (The reader can work out the stress pattern of the lines for himself.) These constancies of line-length and structure result in lines of two general lengths throughout the poem: 1) short lines of four or five syllables and four or five words, and 2) long lines of seven syllables and six or seven words. Starting with a long line ("If you can't eat you got to"), these long and short lines are alternated throughout the poem.

Finally, there are two kinds of stanzas in the poem—single-line stanzas and couplets, which will be symbolized here as SL (single-line) and C (couplet). Throughout the poem, the combination of these two stanzas makes the following pattern: SL // C // C // SL // C // C // SL // C // C // SL. Each of the single-line stanzas (SL) is one of the four lines that begins with a capital letter; these are balanced palindromically throughout the poem.

Apart from the placement of these capitalized lines, at least two other major instances of palindromic patterning occur in the poem's overall form, due to the manner in which the basic syntactical unit, with its four lines of fixed length and its progressively shifting capitalization, is divided into the two stanza patterns (SL and C) throughout the poem. One of these palindromic

arrangements occurs as a result of the alternation of long and short lines in the combination of the two stanza patterns. The effect of this is that, of the ten stanzas in the poem, the line-length pattern of the first four stanzas (long/ /short/long/ /short/long/ /short) is repeated, though not in reverse, in the line-length pattern of the last four stanzas, while the two middle stanzas (both couplets) possess their own unique pattern (long/short/ /long/short/ /). Also, the first and last single-line stanzas of the two, similar, four-stanza groups are the four capitalized lines in the poem. Perhaps the following schema will help to clarify this patterning:



The other instance of palindromic patterning becomes visible when one notices that the four lines of the basic syntactical unit are divided differently between single-line stanzas and couplets in each of the four occurrences of the unit. In terms of this division, the first occurrence of the syntactical unit is the reverse of the last, and the second is the reverse of the third. Also, in this pattern again, each of the single-line stanzas (SL) is one of the four lines that begin with capital letters; the positions of these four lines figure into this palindromic pattern, too. Perhaps the following schema will bring this pattern into the light (SL = single-line stanza, C = couplet, ½C = either the first or the second line of a couplet):

Stanza	1	2	3	4	5	6	7	8	9	10
Line-length (s = short, l = long)	1	s/l	s/l	s	l/s	l/s	l	s/l	s/l	s
Stanzas with capitals	x			x			x			x

Similar, though not reversed, sequences of stanzas.

It should be clear by now that the form in this poem is far more complex and subtle than the content. In fact, just as there appears to be no significant content in the lives of the narrator and the "kid" (Is this a woman or a child?), so there is none in the poem itself. Couched in four negative conditional structures, each followed by a command or invitation to sleep, the poem's content exhausts the possibilities of eating, smoking, singing, dying, and dreaming, and repeatedly offers sleeping as the only thing that the narrator and the "kid" can do, or rather, have the wherewithal to do. All this is done with a minimum of contentual, syntactical, rhythmical, and (apparently) inflectional change, and, consequently, with a maximum of repetition and monotony in all these areas. Thus, by giving as little as it can of anything new at any point, the poem formally and contentually dramatizes the narrator's point: "we aint got / nothing."

III. Marianne Moore's "To a Chameleon."

	Syllables	*Rhyme scheme*
Hid by the august foliage and fruit	9	a
of the grape-vine	4	b
twine	1	b
your anatomy	5	c
round the pruned and polished stem,	7	d
Chameleon.	4	e
Fire laid upon	4	e
an emerald as long as	7	f
the Dark King's massy	5	c
one,	1	g
could not snap the spectrum up for food	9	a
as you have done.[9]	4	g

Palindromic patterns occur in at least three areas of Moore's "To a Chameleon"—the syllabic length of the lines and their sequence in the poem, the rhyme scheme, and the visual shape of the poem on the page—all of which work together visually and aurally to express the content of the poem. As one would expect, all of them pivot around the center of the poem, which occurs between lines six and seven ("Chameleon. / Fire laid upon") and divides the poem into two halves that are identical formal reversals of each other. Each half contains one thirty-syllable sentence that is cast into six lines in such a way that the following palindromic pattern occurs in the syllables-per-line count throughout the poem: 9/4/1/5/7/4./4/7/5/1/9/4. Treated as two two-line units, the first two lines and the last two lines are syllabically identical (9/4 syllables and 9/4 syllables) though not reversals of each other. Then, starting with the third line from the beginning and the third line from the end, and working toward the center, the lines are syllabically identical and in reverse sequence; including the variation of the first two lines and the last two lines, the overall pattern is syllabically palindromic. This is, or results in, an aural or heard pattern. If one reads the lines of the poem as lines and listens closely to the line-to-line movement of the sound, he can hear this pattern in the poem. The pattern receives a little reinforcement from the identity of the word-counts per line between the second line from the beginning of the poem ("of the grape-vine": four words) and its corresponding line in the second half, which is the last line of the poem ("as you have done": four words), and between the third line from the beginning of the poem ("twine": one word) and the third line from the end of the poem ("one": one word). Occurring in corresponding places in the palindromic pattern, these two sets of lines are the only places where identical word-counts per line reinforce the pattern. Apart from this, the word-counts of corresponding lines in the pattern are only approximate and need not be considered here in order to see the palindromic form of the poem.

The aural or heard palindromic form in the poem is also reinforced by the palindromic arrangements in the poem's rhyme scheme. If we include approximate rhymes, of the twelve lines in the poem all but two rhyme in pairs, the rhyming lines as well as

the unrhyming being similarly placed in the poem's overall palindromic pattern. The unrhyming lines are the second line from the end of the first half ("round the pruned and polished stem") and the second line from the beginning of the second half ("an emerald as long as"). Of the five pairs of rhyming lines, the rhyme words of three pairs ("fruit" and "food," "anatomy" and "massy," and "Chameleon" and "upon") occur at the ends of corresponding lines *across* the two halves of the poem. Each of the other two pairs ("vine" and "twine," and "one" and "done") are located in corresponding positions *inside* the two halves; the last word of the initial two-line unit rhymes with the third line from the beginning, and the last word of the terminal two-line unit rhymes with the third line from the end. There are other subtleties in this rhyme scheme, but this much is sufficient to illustrate that the rhyme scheme is integrated into the poem's palindromic form.

Finally, the poem's visual shape-on-the-page also reinforces this form. This shape is determined partly by the fact that the poem contains twelve lines in continuous sequence, and, more importantly here, partly by the indentation pattern and the visual length of the lines. As one can see by looking at the poem on the page, the indentation pattern moves progressively to the right throughout the first half of the poem, and then progressively to the left throughout the second half. This movement not only parallels the division of the poem into two halves of six lines and one thirty-syllable sentence each, but it also parallels the syllabic identity of corresponding lines in the two halves by giving them identical indentation. Thus, the indentation pattern of the first two lines of the poem is identical to that of the last two lines, the indentation of the third line from the beginning is identical to that of the third line from the end, and so on, moving toward the center of the poem from both ends. Integrated with the syllabic palindromic pattern of the poem, this indentation pattern is the principle visual structuring of the poem, receiving only incidental, approximate reinforcement from the visual length of the lines. This latter reinforcement is most noticeable among the pairs of corresponding longer and shorter lines in the poem, particularly the first line and the next to the last line, and the two one-word, one-syllable lines. Because they are seen rather than heard, these visual patterns

bring the palindromic form of the poem to the eye in a manner that reinforces the patterning which is heard in the poem.

The foregoing analyses illustrate, as well as can be illustrated by a minimal number of studies, what is meant by palindromic form in individual short poems. It is possible, however, to say more about this kind of form by generalizing some of the information from the analyses. To this end, it is useful to list the elements that are involved, to one degree or another, in the palindromic forms of the study poems. These elements are:

1. the stress count per line;
2. the letter count per line;
3. the syllable count per line;
4. the word count per line;
5. the line count and structure per stanza per poem;
6. the stanza count and structure per poem;
7. the sonics (e.g., rhyme, alliteration, assonance, etc.);
8. the visual surface of the poem on the page;
9. the syntax, including capitalization and punctuation.

With few exceptions, these elements are generally dealt with in the three traditional prosodies (accentual, syllabic, and accentual-syllabic), the exceptions being items 2, 4, 8, and perhaps 9. While these exceptions have no doubt been dealt with prosodically from time to time down through the centuries, it is only in the twentieth century that they have been treated extensively by American poets. At any rate, in terms of what it includes and organizes with its peculiar design, palindromic form is uniquely comprehensive and flexible; there being no fixed metrical or formal elements for such form, any and all of the elements on the list, or rather, of a given poem, might be included in the palindromic patterning.

This is obviously a different case from that of the three traditional kinds of poetic form, all of which have their particular formal requirements: 1. fixed form, as in the case of the sonnet (the most frequently used fixed form in English-American poetry), is determined by a certain overall formal arrangement of lines and stanzas of particular lengths and structures, complete with particular rhyme schemes; 2. stanzaic form, which is characterized by the repetition of a certain stanza structure, or set of stanza structures,

throughout a poem; and 3. continuous form, which is characterized by the continuous, run-on repetition of one or more line structures throughout a poem. Form in these three kinds of form is essentially a matter of line and/or stanza structures of traditional kinds; indeed, traditional foot metrics are indispensable to any thoroughgoing discussion of these three kinds of form. At the same time, none of these three kinds of form is in any way determined by, or characterized by, any special consideration of the following things, any or all of which might figure into palindromic form: the number of letters per line, the number of words per line, the number and kinds of syntactical units in a given poem (including the nature and the placement of capital letters and punctuation marks), and the visual surface of the poem. To repeat, this is all different with palindromic form, for which there are no particular, identifying, textural or formal elements—only a particular formal design—and which therefore might include and organize any or all of the textural or formal elements of a poem as part of the pattern. Interestingly, as a result of this, it is possible for a poem in fixed or stanzaic or continuous form also to possess a palindromic form. Indeed, Moore's poem is in continuous form, while Williams' and Cummings' poems are in stanzaic form, though these terms alone do not fully and satisfactorily describe their forms. One could imagine a similar problem with a poem in fixed form—perhaps a sonnet—whose syntactical units make a palindromic pattern. All of this would seem to suggest that palindromic form is something different from the three traditional kinds of form, even though it sometimes includes and organizes the same textural and structural elements as they do, and even though it sometimes appears in combination with them in certain poems.

As was suggested above, perhaps the larger class of poetic form that palindromic form belongs to is geometric form, a kind of form that has been around for centuries and that many modern poets are supposed to have used, but about which usage little, if anything, has been written. Moreover, the standard handbooks on literature, as well as the basic textbooks on poetry, are mute on geometric form in poetry. The only commentary that I know which provides any extensive discussion of it concerns Homer's poems, particularly the *Iliad*, as in the following passages from

Cedric Hubbell Whitman's analysis of the *Iliad's* form. With the terms "ring composition" and "hysteron proteron," Whitman appears to name the same formal effects that I name with the term "palindromic form."

. . . Less involved with meaning, but more clearly formal and structural, is the phenomenon now known as ring composition. This framing device, whereby an episode or digression is rounded off by the repetition at the end of the formula with which it began, had its origin undoubtedly in the oral singer's need to bind the parts of his story together for the sake of simple coherence. Like the retrospective summaries of preceding action so characteristic of epic, it took both the poet's and the audience's mind back to a point where the next event was to find its orientation. But it has been ably demonstrated that Homer uses this device not only to serve a practical need, but also as an artistic device to give shape and clarity to the sections of his work, which, composed paratactically and with almost equal detail and emphasis in every part, might otherwise fall into an intolerably unarticulated series. . . .

Such a device as ring composition, especially as developed into an archetectonic principle, is wholly consistent with Geometric art. The very name "ring composition" arises because such enclosure by identical or very similar elements produces a circular effect, the acoustical analogue of the visual circle; and circles, especially concentric circles, are prime motifs in Proto-geometric art. In later Geometric, this design is not so common, but the idea of the circle is carried out in friezes of warriors or mourners running back into themselves, whose moving aesthetic principle is unbroken continuity, perfect and perpetual motion. One may indeed find a similar circularity penetrating all Homeric poetry, especially the *Iliad*, not merely in scenes, but in the poem as a whole; and again the root of the principle lies in a practical need. Ever since the time of Cicero, if not before, Homer's habit of returning to things previously mentioned in reverse order has been observed, and sometimes compared to the rhetorical figures of hysteron proteron. This device, doubtless of mnemonic purpose to assist the singer to keep in mind what he has said before, is also pregnant with stylistic possibilities; like ring composition, it returns to its point of origin and effects circularity of design, while the inverted elements may also be spread out to include as a centerpiece a whole scene or scenes, as in a frame. Thus hysteron proteron and ring composi-

tion, too, suggest not only circularity, but also framing and balance.

Moreover, even as ring composition balances by similarity or identity, the idea of inversion in hysteron proteron is simply a form of balance by opposites. Probably all aspects of formal symmetry depend ultimately upon these two categories of similarity and opposition, as Plato seemed to know when in the *Timaeus* he finished off his cosmology with the two spheres of Sameness and Difference, which revolve in opposite directions. A basic and highly refined intuition of these two categories, which are in a sense the *a priori* ground of all cognition, existed from the first in the classical mind, shaping especially its artistic and philosophic approaches to experience. All peoples of course must possess it, but in the Greeks from Homer on it rose to an extraordinary degree of conscious activity, causing in them a tendency to treat all things in the light of antithesis or identity. Of the two, antithesis seemed to be the more appealing, as perhaps the more dynamic. Sameness is static; antithesis embodies movement around a still point. . . .

The principle of circularity, including concentricity, or framing by balanced similarity and antithesis, is one of the chief dynamic forces underlying the symmetry of Geometric vase design. In the *Iliad*, the old device of hysteron proteron has been expanded into a vast scheme for transcending any mere mnemonic purpose, a scheme purely and even abstractly architectonic. Not only are certain whole books of the poem arranged in self-reversing, or balancing, designs, but the poem as a whole is, in a way, an enormous hysteron proteron, in which books balance books and scenes balance scenes by similarity or antithesis, with the most amazing virtuosity. . . .[10]

Among other things, Whitman helps us to see that palindromic form—or ring composition, or hysteron proteron, or whatever one wants to call it—is indeed verbally geometric; the relationship—not the substance—of its formal elements is definable in terms of geometry.

As it has been treated here, palindromic form in a poem is very much a matter of spatial structuring; it is mainly achieved by the arrangement or placement of similar formal elements, with perhaps a few dissimilar formal elements, in corresponding positions in space relative to a center. The space involved is both the two-dimensional space of printed language and the three-dimensional

space of spoken language. It is a quantitative measurement, the quantity that is actually measured being the visual matter of printed language and the aural matter of spoken language. This measurement of space and the matter that fills it is primary and numerically exact. While time also gets measured in palindromic form in poems in English, it is a secondary and a quantitatively approximate measurement. This is partly because English and/or American are stress or accent oriented languages that are not given to precise, temporal measurement, and partly because the spoken or aural aspect of the poem is subordinate to the printed or visual aspect; the reader gets his clues as to what he should do in speaking a poem by reading its visual aspects. The effect of all this is that palindromic form—like any other kind of form—is both controlled and free, regular and irregular, rigid and loose. It is a chameleon-like kind of form, possessing a variable, flexible design, a variable set of textural and formal elements, and a variable quality of regularity and irregularity.

All of this flexibility and variability show up in the form's different uses in the three study poems.[11] Williams uses it as a type of the seasonal cycle to celebrate the turning of the year and the coming of spring. Cummings uses it to dramatize the repetition and monotony—the closed circle—of poverty. And Moore makes it carry a load of contrasts and comparisons, celebrating natural creature qualities. Indeed, Moore's celebration of the chameleon is implicitly a celebration of the chameleon-like nature of palindromic form; Cummings' use of it to dramatize the closed circle of poverty is implicitly a recognition that "going in circles," so to speak, is natural, basic, human behavior; and Williams' use of it to announce and celebrate the return of spring is also implicitly an announcement and celebration of the form in all nature as well as of the natural life in the form itself. Whatever one calls it, it is a form whose uses and effects are as numerous as the circle's.

1. P[rocope] S. C[ostas], "Palindrome," *Princeton Encyclopedia of Poetry and Poetics*, ed. Alex Preminger, Frank J. Warnke, and O. B. Hardison, Jr. (Princeton, 1965).
2. "Palindrome," *American Heritage Dictionary of the English Language*, ed. William Morris (Boston, 1969).
3. "Palindrome," OED.
4. For an account of one of the longer and more complex palindromic constructions in the world, the reader might see the discussion of the Language Game of classical Chinese in G. Herdan, *Quantitative Linguistics* (Washington, 1964), pp. 207-13.
5. "Palindrome," OED.
6. Laurence Perrine, *Sound and Sense*, 3rd ed. (New York: Harcourt Brace Jovanovich, 1969), pp. 236 ff.
7. William Carlos Williams, *Collected Earlier Poems*. Copyright 1938 by New Directions Publishing Corp. Reprinted by permission of New Directions Publishing Corp.
8. Copyright, 1940, by E. E. Cummings; renewed, 1968, by Marion Morehouse Cummings. Reprinted from *Complete Poems 1913-1962* by E. E. Cummings by permission of Harcourt Brace Jovanovich, Inc.
9. From *The Complete Poems of Marianne Moore*. Copyright © 1959 by Marianne Moore. Reprinted by permission of The Viking Press, Inc.
10. Cedric Hubbell Whitman, *Homer and the Heroic Tradition* (Cambridge, 1958), pp. 252-55.
11. For an instance of palindromic form in a slightly longer poem, see the discussion of Wallace Stevens' "Thirteen Ways of Looking at a Blackbird" in Jerrald Ranta, "Counting and Formal Analysis," *Journal of Aesthetics and Art Criticism*, 29 (1971), 460-62.

A Course in Poetry and Printing

Aaron Marcus and Joe Rothrock

An experimental course was devised in which students with backgrounds in poetry and in the graphic arts worked to discover essential relationships between verbal and visual poetic statement. The course organization utilized a university environment to the fullest and is offered as a prototypical case study. Students participated in a series of multi-disciplinary guest lectures and in studio-based development of creative projects. Their work eventually moved beyond the more traditional views of the poetry-printing dialectic conceived for the course and resembled more the creative speculation of avant-garde art.

Modern art's once polemical claim that language and visual form are creatively related has today become the subject of less argumentative and more positive investigation—historical as well as theoretical—as is evident on many campuses and in art schools. Academic lectures examine its many facets, from the impact of Gutenberg's invention to the constellations of concretism, while studio courses and student publications experiment with closer integrations of writing, design, graphics, photography, and the processing of the object itself. The following is a report on one such course, called Poetry and Printing, which took place at Princeton University.

Poetry and Printing came about through the persistence of four undergraduates who wished to propose it as a student-initiated seminar under a Princeton program especially instituted to provide curricular response to campus interests. To formulate the course they enlisted the help of Joe Rothrock, curator of graphic arts in the university's library. A number of faculty members were asked to contribute ideas, two of whom later joined Rothrock as course supervisors. They were Aaron Marcus, graphic designer and assistant professor in the visual arts program, and John Peck, poet and lecturer in the program in creative writing.

Visible Language, X 2 (Spring 1976), 173-182.

Aaron Marcus's address: School of Architecture, Princeton University, Princeton, NJ 08540.

such as figured poems, when "speaking pictures and mute poetry" actually were combined, and with the obvious modern poet-artists, from Blake to Gomringer. In addition, one lecture (the first) compared English medieval poetry in manuscripts to early print. Another discussed the visually less obvious but hardly less crucial work of Ezra Pound. Finally, two lectures were devoted to Chinese lyric poetry, to Islamic calligraphy, and to tantric art.

Readings in poetry, literary criticism, and art history were assigned by the individual lecturers as preparation for the lectures and following discussions. The lectures were held in the library so that, besides slides, temporary displays of the original examples from the graphic arts collection and from rare books and special collections could be shown. Toward the end of the term the graphic arts collection mounted an exhibition of sixty West Coast poetry broadsides from the late fifties and sixties, and Marcus arranged for a viewing of international selections of surrealist, dada, and concrete poetry from the extensive private archive of Jean Brown of Tyringham, Massachusetts.

Projects

The students completed three poetry and printing projects of their own conception. They were asked but not required to use their own poetry. Collaboration between poets and artists was permitted, though not encouraged, because it was felt that collaboration should and would be spontaneous.

For pedagogical and practical reasons, there were several requirements. The projects had to be capable of exact manifolding, the first two in editions of five, the last in an edition of twenty. They also had to be complete in themselves, which, to the disappointment of some, excluded audio-visual projection. Finally, everyone was required to become familiar with all the technical choices available before starting the first project. Thus, five weeks of rather intensive instruction in letterpress and photo-reproductive techniques had to be arranged outside regular class hours at the beginning of the term. Faculty designers Marcus and Carol Bankerd, printer and printmaker Carol Stoddard, and photographer Sol Libsohn were more than cooperative. They also acted as consultants throughout the term.

After considering alternatives that would require a single instructor, including a seminar in concrete poetry or a workshop conducted by a guest poet-printer, it was decided to make Poetry and Printing a semester-long, interdisciplinary university effort. The course eventually involved instructors from eight academic departments, drew upon special collections in the library, and utilized letterpress, etching, and photographic equipment in the visual arts program and cold-type, copy camera, and photo-silkscreen facilities in the visual studies laboratory of the School of Architecture and Urban Planning. Further, it mixed literary with visual talents. Sixteen students were enrolled from more than twice their number of applicants according to demonstrated achievement as either poets or artists. Most were upperclassmen who had had previous university experience in creative writing or in Marcus's graphic design and typography courses.

The aim of the Poetry and Printing course was to gain as broad and as fundamental an experience as possible of the relationships between poetry and its visual presentation. This amibitious goal was to be met by tandem programs: a lecture survey by different scholars based on historical examples and a studio-workshop sequence of creative projects. Historical materials ranged from medieval illuminated manuscripts to recent concrete poetry and were drawn from Oriental as well as Western cultures. In the studio the students were more directly challenged to question typographical habits and other conventional visual and, in a sense, social elements in the process not only of printing poetry but also of writing poetry. From the very beginning they were asked to confront the realities of printing technology and its power to elaborate and transform verbal ideas.

Lectures

The twelve lectures (see Appendix) assumed a general knowledge of literary and art history. In particular they assumed an acquaintance with the classical humanistic theory that poetry and painting, though separately practiced, nonetheless share the same principles of aesthetic and moral edification, and with the subsequent collapse of that theory under romantic and modern pressures. The lectures therefore dealt with atypical examples,

The completed projects were criticized at class meetings interspersed in the lecture schedule. The students, course supervisors, and faculty artists attended. The four hours allotted each review proved barely sufficient.

Critique

The aim of "Poetry and Printing" seemed to dictate its organization: contact and dialogue between poets and artists, a freely experimental studio, and lecture topics that did not try to prescribe rigidly from either the distant or recent past what the students might find enlightening or creatively useful. On the whole, these components interacted successfully. Some doubts do remain, as mentioned below, about the specific lecture topics, but none about their spirit of wide-ranging and fundamental inquiry. For whatever reasons of background and timeliness, the students came prepared to seek broadly informed, basic confrontations with their creative dependencies on words and vision.

To say the least, the mixture of poets with artists also succeeded, not only in assuring a variety of approaches but also in enlivening the basic issues. Verbally and visually talented students soon had their passionate extremes. Lively, sometimes harsh debate erupted during the critiques, as the poets defended their oral and ultimately individuating definition of poetry against some of the more verbally reductive visual and social statements of the artists. Three of the poets, though well aware of visual elements in modern poetry and of the importance, for instance, of the typewriter in their own work, found how thoroughly verbal their poetics remained. Against such projects as one, for example, that consisted of a few conceptually associated sentence fragments typed on bits of paper and floated inside a solid globe or "organon" of amber acrylic, one poet steadfastly countered throughout the term with traditional stanzic poems symmetrically presented on broadside in handsome but economical letterpress.

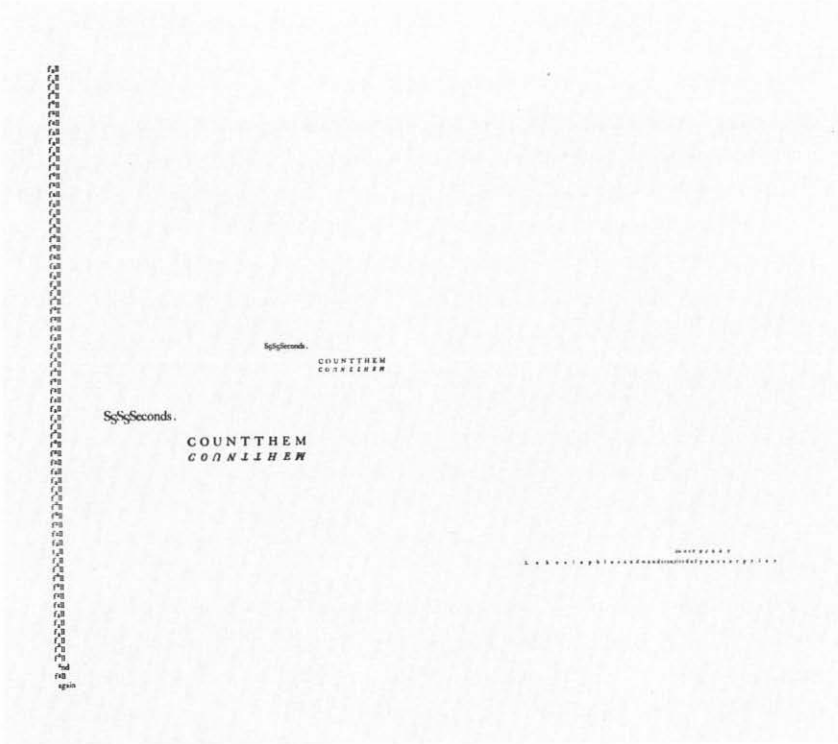
In retrospect, it seems that the rift between extremes ought to have been predicted, just as the absence of collaboration ought to have been predicted (with a single exception, there was none). The students quite rightly responded to the exploratory and fundamentalist spirit of the course with intense personality. The old

division of creative labor between poet and printer simply did not apply.

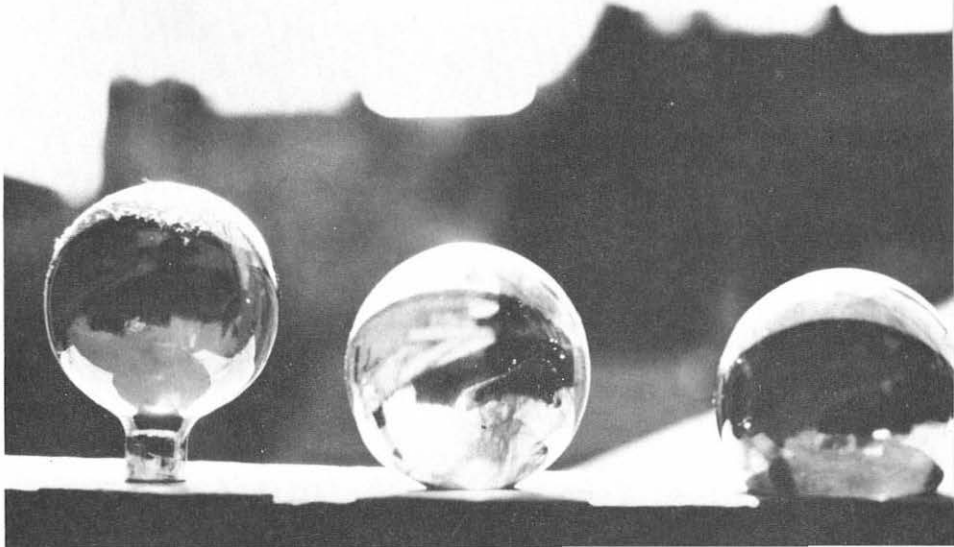
It was not easy to foresee how most of the students, poets as well as artists, would get beyond even the contemporary modes that combine poetry with visual form but nevertheless leave something of our semantic-pictorial habits intact. The first round of projects did conform to what was expected. They tended to rely on the more or less established modes of open-field word spacing, the typographic-pictorial broadside, and concretism. Thus they tended to retain the appearance of verbal entities, while being ingeniously juxtaposed to, laid beneath, superimposed, or otherwise interwoven with woodcuts, etchings, silkscreens, embossed shapes, colored transparencies, photographs, and found imagery. However, the subsequent projects took a radical turn towards the interventional effects of printing technology, to which the use of photography and found imagery more properly belong, and above all toward non-objective plastic qualities.

Everyone agreed that the concentration on non-objective technical and perceptual energies inexorably established his modern identity and corresponded generally to sensibilities behind open-field word spacing and concretism. The thrust, however, was towards far denser integrations of verbal and visual experience, with no particular allegiances to either expressionist or constructivist modes. Rather, the point of departure was spatial, that is, an attempt by sculptural imagination, including size, texture, overlap, seriality, process statement, and implied communal value, to break away from the finished two-dimensional, and in a sense too purely intellectual habituations of visual word-signs in perspectively organized space. In comparison, the impact of many of the projects overcame any lingering resemblances to poetry's heritage of the archetypal format of graphic art: the written, typographic, or pictorialized page.

The emphasis of the projects thus appeared to be radically visual, with inevitable consequences to poetry or, more accurately, to the word itself. Removed from their familiar format and syntax as passive signs for reading, words were recreated in the unfamiliar context of visual-plastic invention. The course title assumed newly conjunctive meaning as typographic words and letters were viewed



Margaret Burgess, three acrylic globes with stems, 4 inches in diameter. Sentence fragments typed onto fragments of paper float within the amber colored globes. As with Burgess' other work, the effects of light filtering through objects and the sculptural container for verbal messages are among her interests. By stringing the sentence parts together as one explores the sculptural object, one makes a magical connection between sensory and contemplative experience.



Gordon Curtis, 24 x 18 inches, black and white. The letterpress typography appears within a blind embossed panel set off-center within the field of the off-white slightly textured paper. In this unconventional visual entry the viewer is made to take in the whole object before reading the text. The poem concerns multiple planes of time. From left to right the poem literally reads: "fall . . . seconds . . . count them . . . Do not hurry . . . Lakes slap blue and wonder on, tired of your surprise." but visually it combines semantic meaning with kinaesthetics. The use of vertical and horizontal vectors, of repetitions and echoes, of mirror images and reflections, of roman and italic, of large and small type sizes, and of opening and contracting word spacing (which are confined in turn within the liquid-smooth recessed panel but are yet part of the white expanse of the textured sheet), combine with the semantic meanings to render this multiple sensation of limit and limitlessness.

as shapes creating a new reality, or were handled as points, lines, planes, and vectors contributing to a whole sensorial construction, or were ontologically examined through the artist's openly stated procedural sequences. Consequences to traditional poetic syntax and its discursive capacity were also obvious. They were replaced by a keen interest in cyclical, incantatory, ideogrammatic, kinetic and other non-linear verbal schemes.

Still, within their own terms the emphasis was more apparent than real, since the inspiration of the projects was semantic as well as visual. It is rather that words and vision were used together, dialectically, in a search for experiential and psychological totality. Put another way, both were treated as incomplete in themselves and equally illusory, so that the projects often provoked a conceptual dimension which was less an extension of projective verse or concrete poetry of the fifties and sixties than of questions raised and directions adumbrated by diverse aspects of art and poetry in the sixties, such as pop art, optical art, photographic fantasy, happenings, art as protest, the new social and creative intimacy implied by the proliferation of poetry readings and small presses, the interest in Oriental and native American religions, to name a few. If the first step in approaching the projects required the full sensory measure one normally reserves for objects, their ultimate comprehension required semantic understanding. Integrally combined in the space-time of visual art, poetic statement was conceived as a palpably dramatic reenactment of the discovery and communal celebration of language itself.

Later projects included a poem as a witty, syncopated pun of monosyllabic words, phonics, and flat geometric shapes presented as interchangeable cards for assembling in two or three dimensions and packaged for mass distribution from an instant food rack; a poem as the visually contiguous, variously distorted repetition of one vowel, so that the vowel, the optical illusion of plastic shape built up by its repetition and distortion, and its phonic evocation become strangely indistinguishable; a poem as a forty-page book, bound in plates of bronze which, though based on Gomringer's *Silencio,* is a far more extended visual-plastic exploration of the semantic theme; poems that, as graffiti, as the pictographic libretti of primitive chants, as calling cards, or as the legend on a brightly colored commercial map, are freed from the page to circulate like tribal or social messages; a poem about the experience of taking a photograph presented as incomplete process of manuscripts, typescripts, copycamera negatives, and so on; and poems presented on photographs, embossed on a mobile, or printed on a thermographic copy of a birth certificate as immediate reflections on experience and perception, again without the intermediary of the traditional page. Indeed, it made little difference whether the verbal element was in traditional poetic form or not, so long as the expectations of the page format were studiously avoided. Thus, even the broadside may be included here, insofar as it was not treated merely as an expanded page but instead used for its subtle potential to monumentally heighten the mysterious anatomy of poetic inspiration, structural formality, and verbal precision.

Response to the lectures was consistent with the spatially integrative thrust of the projects. To Mallarmé, to concrete poetry and particularly its forerunner in cubism, and above all to Miró and surrealism and to the Oriental examples, response was enthusiastic. In the remaining examples, however, even in the most exotic departures from conventional typographic presentations such as illuminated manuscripts and figured poems, an unconscious faith in the primacy of words was detected. It became clear that certain of the artists shared even less than artists of the past that faith in the efficacy of language.

Bruce Hahn, 18 x 24 inches, black and white. Photographically enlarged letterpress typography is reproduced through photo-silkscreening, overprinting a previous cloudy rectangle. Thus the text, full of puns, appears and disappears within the dense black space. The text is always legible, even though it sometimes appears as black on black. The poem itself, written by Hahn, evokes a mystery of light and dark, of joy and sorrow, and implies a magic discovery of visible writing. As in the previous example, Hahn demonstrates that he is primarily concerned with the process of defining language within his visual world.

In conclusion, the course led both poets and artists to discover something about themselves. It was not so much a matter of learning about possible relationships between verbal poetry and visual form as of uncovering their primal interdependencies. To this end the lectures were not always relevant, for the thrust of the studio projects revealed that the topics had been selected, in spite of a professed intention of universality, with a certain bias toward the age of print. The lectures left off, perhaps, where they ought to have begun. It was agreed that the theoretical touchstones for the creative combination of verbal poetry and visual art might lie even beyond a program concentrating on modern and Oriental examples, and that the theory behind a course such as the one described here might be more readily accessible and more readily acceptable to poets as well as artists in lectures on the origins of language, on archaeological inscriptions, on primitive ceremony, and on religious language.

Given the exploratory nature of the undertaking, this experimental, interdisciplinary course was viewed by the participants as a very worthwhile educational project. We hope that this report will encourage an exchange of information about others in the areas of "visual poetry," concrete poetry, and other combinations of verbal and visual art.

Appendix: Lecturers and Their Topics

Joe Rothrock: Poetry Broadsides.
Richard Schrader, Department of English: English Medieval Poetry and the Transition to Printing.
Yu-Kung Kao, East Asian Studies Program: Chinese Visual Lyric: A Momentary Englightenment.
Rosalind Krauss, Visual Arts Program: Surrealism and the Problem of Peinture-Poésie.
Roger Lipsey, Department of Art and Archaeology: The "Word" Organized in Space: Medieval Acrostrics and Eastern Mantras.
Thomas Roche, Department of English: English Figured Poetry and Emblem Books; *and* William Blake.
Albert Sonnenfeld, Department of Romance Languages: Mallarmé and Symbolist Poetry.
Susan Marcus, guest lecturer: Apollinaire and the Cubists.
John Peck: The Canto as Song: The Design of Pound's Printed Texts.
Carol Bankerd and Aaron Marcus: Concrete Poetry in the 1950's and 1960's.
Tom Ockerse, guest lecturer, Rhode Island School of Design: Verbi-Visual Poetry: A Discussion.

Book Review

F. E. Pardoe, *John Baskerville*. London: Muller, 1976;
ISBN 0-584-10354-9;£9.50

The author says in his introduction "It is surprising how little has been written in 200 years about John Baskerville." Well, the reason is laid bare in the later pages: not all that much is really known about him and practically nothing outside the 1937 two-volume standard life by William Bennett, the crown on an inspired series of four monographs from the Birmingham School of Printing started by its director Leonard Jay in 1932. After that there has been conjecture and re-assessment, but even then there is a limit to the amount that can be said about a particular typeface on a particular make of paper! However, what is known of the great man's life is often extraordinary and well worth hearing again.

Baskerville was baptised in January 1706 and died in 1775; his first book did not appear until late in his career in 1757. Drawing on his earlier trade as a writing master, Baskerville designed letters and then almost certainly had the letters cut into founders punches by another hand—but he was a critical paragon of printing and supervised this, and the casting of the type, the making of his paper and ink, and the press-work. The style he lent to his books was and remained entirely his own.

He was through and through "Birmingham," his own man and self-made—a bit aggressive, an agnostic—he had made his money japanning metal ware. His now lost "Buroes, Escritores, weather glasses or Wainscott" varnished by his patent process did not provide enough cash to run a considerable printing plant entirely as a hobby, but it was enough for some years of revolutionary technical development and engineering refinement. His press work was superb; he never used the same piece of type twice. He was sparing with his ink and punctillious with his impression—out of 2,000 printed copies, 500 would be rejected. He was Britain's best printer.

Pardoe's book tells us of three visitors—one called Baskerville "a man

of genius," the other two "a prating pedant." I would guess both were right. Then there are other opinions: "a profane wretch and ignorant of literature to a wonderful degree . . . a shrivelled old cox comb" (he had married his mistress of 16 years standing). "Idle in the extreme, but his invention was of the true Birmingham model, active. He could well design but procured others to execute!" When I see him full face in the National Portrait Gallery, I can understand that "although constructed with the light timbers of a frigate, his movement was as solemn as a ship of the line."

What were Baskerville's typographical distinctions? First, by example he encouraged a much needed austerity in the layout of type; for instance, when his customers were given a choice of bible page—plain or fancy bordered—he went along with their choice, plain. Second, he designed superb open letterforms with firm modelling and a strong contrast between thick and thin strokes. And here again he followed the mainstream of taste that had emanated from Jannon many years before. Third, his printing was of a standard that can compare with any other hand press work; he used a very black ink of his own formula, and used it sparingly. Then he often had his printed sheets "hot pressed" giving the paper an unprecedented smoothness. And lastly, by his personality as much as by his achievement he attracted a discriminating enthusiasm in the book trade for fine printing.

But Pardoe's enthusiasm leads him into blindness. Acknowledging title pages of letter-spaced capitals were not unique to Baskerville, he then praises the carefulness of his visual spacing, but this was clearly not good. Above all he is peeved because his hero's achievements are not generally acknowledged. But they *are*; if in general one accepts that after Caxton he is probably the only other printer an Anglophone will have heard of. If we move from the general public to the specific—typographers, printers, bibliographers and their kind—Baskerville surely comes first, above all his peers.

Printing is arguably the greatest of our post-renaissance inventions—so to invent it was important. What was primarily left to do after that, was to maintain mechanical perfection and to harness print to the culture of our time (this is where "design" comes in). Caxton, by the same lights, was a poor printer, but he secured the footings of English language and literature. Baskerville made no contribution here; as Philip Gaskell wrote in 1959 "Most of his books were beautiful, expensive, and incorrect."

There is an aggressiveness in Pardoes' claims that is uncalled for. Both author and subject come from the same commercial city, both came to

printing from other trades, and I suspect both of being inordinately sensitive about provincialism and amateurism. Neither need be, this book is a well and entertainly written account of a complex and attractive person.

Much of Pardoe's feeling that Baskerville's memory has been shortchanged descends from Baskerville himself; he was an unrelenting moaner even though he brought much of his problems on himself. It seems that friends or trade alike, Baskerville's rates were two to three times that of "the common press." It follows that he had reason to complain frequently that "After having obtained the Reputation of excelling in the most useful Art known to Mankind . . . I cannot even get bread by it. . . ." After his death this established plaint was taken up in Germany: "In England itself, no printer equals him and his service is the greater because his effort did not receive in his own country the encouragement and assistance it deserved. . . ." Salomon Bauer goes on in 1821 to remark "Against all religious cults, he was otherwise a benevolent and upright man"; Pardoe takes up the charge of neglect because of his "agnosticism," thinking this was too much for the Establishment to swallow. It may well have been.

However, when it comes to straight irascibility no one can beat our hero; after a fair exchange of public invective, rival Birmingham publishers threatened to expose Baskerville's atheism but then retracted, saying that the story would be too full of "Lewdness and Debauchery." This brought a riposte rounded off as follows: "Their impudent Falsehoods, Ignorance and scurrility, want of Decency and good Manners, will be no more an Object at all worthy of the Notice of John Baskerville."

None the less some of Baskerville's correspondence was more amiable. It is to be regretted that of that between him and Voltaire only four lines are extant, and there are some supplicating letters to Walpole. But there is quite a correspondence between him and Benjamin Franklin, who met and advised Baskerville and bought his books. In 1758 Franklin made his first visit to Baskerville. Earlier Franklin had bought six copies of the *Virgil*, one of these remains at Harvard. "I beg the College will do me the favour to accept a Virgil I send in the Case, thought to be the most curiously printed of any Book hitherto done in the World." His enthusiasm for the Birmingham Sage was infectious and spread to Isaac Norris the Speaker of the Pennsylvania Assembly, who begged to subscribe to the *Milton* "that I may have an Opportunity of contributing my Mite to encourage such a curious and Ingenious Man."

Franklin went to some lengths to discomfort his hero's detractors, as

Extract of a Letter from Benjamin Franklin, Esq; to J. Baskerville.

Craven-street, London.

Dear Sir,

Let me give you a pleasant Instance of the Prejudice some have entertained against your Work. Soon after I returned, discoursing with a Gentleman concerning the Artists of Birmingham, he said you would be a Means of blinding all the Readers in the Nation; for the Strokes of your Letters, being too thin and narrow, hurt the Eye, and he could never read a Line of them without Pain. I thought, said I, you were going to complain of the Gloss on the Paper, some object to. No, no, says he, I have heard that mentioned; but it is not that—it is in the Form and Cut of the Letters themselves: They have not that natural and easy Proportion between the Height and Thickness of the Stroke which makes the common Printing so much the more comfortable to the Eye.—You see this Gentleman was a Connoisseur. In vain I endeavoured to support your Character against the Charge: He knew what he felt, and could see the Reason of it, and several other Gentlemen among his Friends had made the same Observation, &c.—Yesterday he called to visit me, when, mischievously bent to try his Judgment, I stept into my Closet, tore off the top of Mr. Caslon's Specimen, and produced it to him as yours brought with me from Birmingham, saying, I had been examining it since he spoke to me, and could not for my Life perceive the Disproportion he mentioned, desiring him to point it out to me. He readily undertook it, and went over the several Founts, showing me every where what he thought Instances of that Disproportion; and declared, that he could not then read the Specimen without feeling very strongly the Pain he had mentioned to me. I spared him that Time the Confusion of being told, that these were the Types he had been reading all his Life with so much Ease to his Eyes; the Types his adored Newton is printed with, on which he has pored not a little; nay, the very Types his own Book is printed with, for he is himself an Author, and yet never discovered this painful Disproportion in them, till he thought they were yours.

I am, &c.

the accompanying 1760 letter to Baskerville shows. This subtle, humorous trait in Franklin had hardened into the cold eye of experienced treason by 1773 when he wrote to Baskerville on the credit worthiness of fellow Americans:

London, 21 Sept. 1773

Dear Sir,
I duly received your favor, and some time after the packet containing the specimen and your valuable present of Shaftesbury, excellently printed, for which I hold my self greatly obliged to you. The specimen I shall distribute by the first ship among the printers of America, and I hope to your advantage. I suppose no orders will come unaccompanied by bills or money, and I would not advise you to give credit, especially as I do not think it will be necessary.

Baskerville's will caused more trouble—he was buried as asked in his garden in a small pyramid; then dug up, put on show, reinterred secretly in a church (his coffin being trundled through the streets of Birmingham surreptitiously, under green baize cloth), exhumed again to the consternation of Parliament, and again lost. His type and plant were as initially difficult to dispose of; it was offered for sale in his own lifetime to the French Court at what seems to have been a very fancy price. Much of the material eventually exchanged hands between his widow (mistress Sarah) and Beaumarchais—and then that, too, disappeared. The story of the identification of the type and the tracking down of the original type material by Bruce Rogers was told by John Dreyfus in *The Library* in 1950. The happy and generous sequel was that Deberny and Peignot gave 2,000 of Baskerville's own punches to the Cambridge University Press in 1953.

The printing of Pardoe's book is marred by the coarse reproduction of the illustrations and by the layout of the pages which is self conscious and prissy—too small a typeface floating in acres of unrelated margin. The book is set in the somewhat "ironed out" but useful Monotype Baskerville. Experts are on the whole grudging about the superior claims of the Linotype version, and the best of the bunch, I think, is the Linotype/Stemple recutting.

It is a pity the beauty of Baskerville's letters cannot be clearly seen here because I do think he practiced superbly one of the most demanding and greatest crafts—the marriage of two thousand years of unbroken cultural development of letterforms to the opportunities of new and more sophisticated technology. However, the story of the man himself is good value and it is fitting to end with his own epitaph:

Stranger
Beneath this cone in unconsecrated ground
A friend to the liberties of mankind directed his body to be inhum'd
May the example contribute to emancipate thy mind
From the idle fears of superstition
And the wicked arts of Priesthood.

Colin Banks

Editor's note: The typeface you are now reading is Baskerville. In fact, since our first issue in 1967, the basic text and display typeface used in this journal has been Baskerville. The modification of a basic typeface is illustrated in the variations of Baskerville produced by the four different composing systems we have used during this period: Volumes I through VIII were produced on hot-metal composing machines—Volumes I and II by Linotype, Volumes III through VIII by Monotype. Volumes IX and X were produced on phototypesetting equipment —Volume IX, Number 1, on the VariTyper by Addressograph Multigraph Corporation, and all numbers since then on Monophoto equipment.

Colin Banks is a partner in the London design group Banks and Miles (1 Tranquil Vale, Blackheath, London SE3 OBU). As well as being a practising graphic designer he is an active campaigner in design education and information.

Résumé des Articles

Traduction: Fernand Baudin

L'aptitude à la lecture *par Stanley F. Wanat*

L'auteur analyse les éléments constitutifs de cette aptitude, les moyens de la mesurer et les principes susceptibles d'orienter les recherches. Il décrit les tests qui ont été mis au point, ainsi que certaines aptitudes secondaires qui sont apparues au cours des tests, lesquels portaient sur l'aptitude proprement dite, son développement et les performances. Les aptitudes secondaires supposent à leur tour: concentration, automatisme, sensibilité linguistique, compréhension; perception des caractères, de leurs combinaisons, des mots, des enchaînements de mots; agilité mentale. L'auteur ne néglige pas les aspects pédagogiques. En fait son objectif principal est justement d'éclairer les options pédagogiques. Il expose douze principes qui devraient gouverner l'élaboration et l'application des tests et douze catégories d'éléments prémordiaux dont il faudrait tenir compte dans toute enquête concernant l'aptitude à la lecture. Sa conclusion est qu'une aptitude ne peut être conçue et mesurée que dans les termes qui correspondent à ceux du test imposé.

L'interprétation des caractères chinois par des témoins anglosaxons *par T. M. Nelson et C. J. Ladan.*

En 1970, Liu et Chuang ont élaboré un tableau mesurant les niveaux d'interprétation de 1200 caractères chinois lus par des lettrés chinois. Un échantillon de ces caractères a été interprété par des occidentaux non initiés. Il est apparu que les données visuelles perçues par les occidentaux entraient en corrélation avec les cotations de Liu et de Chuang. De plus, le symbolisme semblait plus directement lié au graphisme pour les occidentaux que pour les chinois. Autre hypothèse: la langue chinoise se serait formée sur un principe de simplification visuelle maximum. Enfin, il se pourrait bien que les expériences faites à l'aide de caractères chinois sont limitées par notre ignorance totale quant à l'importance réelle du graphisme par rapport à la signification du langage.

La lisibilité des chiffres pour affichage en 4 x 7 points ou en 7 segments *par Bernhard Orth, Hans Weckerlé, et Dirk Wendt.*

Des chiffres ordinaires et d'autres spécialement dessinés pour affichage en 4 x 7 points ou en 7 segments, ont été donnés à lire à des lecteurs humains dont le temps de lecture était mesuré au tachyscope. Les erreurs ont été analysées en vue d'établir les lisibilités relatives dans un contexte lié à la transmission des informations. Il est apparu que le graphisme des chiffres spéciaux gagnerait à être revu et corrigé.

Palindromes, poèmes et géométries *par Jerrald Ranta*

Le palindrome offre bien des analogies avec certaines formes poétiques de la littérature américaine contemporaine. C'est pourquoi je propose l'étude d'une forme particulière, peu connue, moderne, cyclique, que j'appellerai palindrome faute d'autre terme convenu. Souvent utilisée par les poètes américains de nos jours, elle diffère des formes traditionnelles avec lesquelles toutefois elle est combinée. L'étude de Cedric Hubbell Whitman sur l'utilisation des compositions cycliques et de l'hysteron proteron dans l'Illiade témoigne de l'origine classique de cette forme et invite à la ranger dans la catégorie des formes géométriques.

Un cours de poésie concrète *par Aaron Marcus et Joe Rothrock*

Il s'agit d'un cours expérimental où des étudiants ayant une formation à la fois poétique et graphique ont tenté d'établir des relations fondamentales entre des représentations verbales et des représentations visuelles. Le programme fait appel à toutes les ressources d'un milieu universitaire; il est conçu comme un prototype; les participants ont suivi une série de conférences multidisciplinaires organisées à leur intention, et disposaient d'un atelier d'art graphique. Les résultats ont nettement débordé les présentations graphiques traditionnelles et ressemblaient davantage aux formes les plus avancées de l'avant-garde.

Kurzfassung der Beiträge

Übersetzung: Dirk Wendt

Lesebereitschaft *von Stanley F. Wanat*

Die Natur und die Diagnose der Lesebereitschaft werden anhand einer Untersuchung von Faktoren der Lesebereitschaft und von Zielen und Prinzipien der Diagnose der Lesebereitschaft betrachtet. Fertigkeiten in den bestehenden Lesebereitschaftstests werden herausgearbeitet, und Gruppen von Teilfertigkeiten werden aus der Forschung zur Lesebereitschaft, zum Lesenlernen und zur Leseleistung abgeleitet. Zu diesen Fertigkeiten genhören Aufmerksamkeit und Automatisierung, Sprachbewußtsein, Aufgabenverständnis, Buchstaben-, Buchstabenfolgen- Wort- und Wortfolgenfertigkeiten sowie Flexibilität im Lesen. Außerdem werden Auswirkungen von Instruktionsfaktoren auf die Lesebereitschaft betrachtet. Als Hauptzweck der Lesebereitschaftsdiagnose wird die Bereitstellung von Information für Unterrichtsentscheidungen erkannt. Es werden zwölf Prinzipien für die Planung und Benutzung von Lesebereitschaftstests entwickelt, und zwölf Hauptklassen von Faktoren identifiziert, die bei der Diagnose der Lesefertigkeit berücksichtigt werden sollten. Es wird die Auffassung vertreten, daß Lesebereitschaft unter Berücksichtigung der besonderen Lesefertigkeit(en) definiert und diagnostiziert werden sollte, die von der Aufgabe gefordert werden, die an den Lernenden gestellt wird.