Using sensitivity to word structure to explain variance in high school and college level reading ability

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ABSTRACT: In this study three experiments investigate the relationship of sensitivity to word structure to direct and indirect measures of reading achievement in normal high school and college students using a four-part morpheme Sensitivity Test (MST). This test assesses knowledge of the syntactic category of common noun, verb, and adjective suffixes (Part 1), the ability to generalize this knowledge to novel forms (Part 2), the ability to distinguish derivationally-related word pairs from pseudo-related word pairs (Part 3), and knowledge of how suffixes differ in their effect on syllable boundaries in the complex word (Part 4). Experiment 1 showed that the SAT Verbal scores of 26 undergraduates correlate significantly ($p < 0.05$) with Parts 2 and 4 of the MST; Part 1 showed ceiling effects. Experiment 2 showed that the Nelson Reading Test scores of 24 ninth-grade students correlate significantly ($p < 0.005$) with all parts of the MST. Experiment 3 showed a significant difference between means ($p < 0.005$) on all parts of the MST for 26 proficient and 54 non-proficient high school readers. Results are consistent with the morphophonemic nature of English spelling.

KEY WORDS: College readers, Derivational suffices, High school readers, Inflections, Metalinguistics, Morphological ability, Morphology, Reading development, Suffixes

INTRODUCTION

One of the best supported hypotheses in current reading research concerns the relationship between phoneme awareness and success in learning to read English. Deficiencies in phoneme awareness have been associated with reading disability in both children (Liberman, Shankweiler, Blachman, Camp & Werfman 1980) and adults (Read & Ruyter 1985). Longitudinal studies of children (Bradley & Bryant 1983; Mann 1984; Perfetti 1985) have shown that phoneme awareness is a strong predictor of early reading progress. However, it is also becoming evident that, although phoneme awareness is a necessary condition to reading success, it is not a sufficient condition. That is, although there are virtually no proficient readers of English who lack phoneme awareness, there remain some individuals who possess phoneme awareness yet fail to read well. This observation points to the existence of some additional ability, or abilities, which can account for much of the remaining variance in reading skill.

One likely ability is sensitivity to word structure (i.e., morphology). This is predicted by the following line of reasoning: Writing systems represent linguistic structure at one or more of three levels, that of the morpheme, the

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syllable, or the phoneme. Logographies or morphographies, such as the Chinese characters, represent whole morphemes; syllabaries, such as the two Japanese Kanas, represent syllables; and alphabets, such as the Roman or Cyrillic systems used to write most of the European languages, mostly represent phonemes. Reading can be defined as the assignment of the appropriate linguistic structure to graphic symbols. Second, readers must have access to, that is, have 'metalinguistic awareness' of, the particular units which their writing system represents (Liberman, Liberman, Mattingly & Shankweiler 1980). Third, although the English writing system basically uses alphabet letters to transcribe phonemes, it does so in such a way as also to represent morphemes, so much so that English spelling is more accurately described as morphophonemic than alphabetic (Chomsky & Halle 1968; Templeton & Scarborough-Franks 1985). Therefore, successful readers of English must have awareness of not only phonemes, but morphemes as well.

To date, the majority of research on the relation between metalinguistic awareness and reading ability has focused on phoneme awareness with results which support the theoretical arguments mentioned above (Adams 1990; Brady & Shankweiler 1991; for a review, see Mann & Brady 1989). There is much less evidence concerning the relation between morpheme awareness and reading ability, and it is reasonable to expect that the relation will be more complex than the relation between phoneme awareness and reading ability. This is because, in contrast to phonemes, morphemes have not only meaning and structure, but also syntactic, selectional, phonological, relational, and distributional properties. Phonemes have no independent meaning, only structure and phonotactic constraints; sensitivity to phonemes, as it relates to reading development, consists primarily of the ability to segment, blend, and contrast them in word-initial, -medial, and -final positions. Matters are further complicated by the fact that numerous morphemes are structurally ambiguous with other morphemes and with meaningless sequences of letters. For example, compare the sequence '-er', which is the agentive morpheme in 'teacher', the comparative morpheme in 'taller', and non-morphemic in 'butter'. Also, categorical perception, which obscures the phonetic differences between the various allophones of a phoneme, does not operate to obscure the phonetic and spelling differences between the allomorphs of a morpheme. That is, while it is often difficult to persuade native English speakers that the two 'p's in 'pop' are different sounds, they readily see and hear the difference between the allomorphs **in-**, **im-**, **il-**, and **ir-** of the prefix meaning **not** in 'independent', 'impossible', 'illegal', and 'irregular', and must often be taught explicitly that these are variations of the same prefix.

The expected complexity of the relationship between morphological ability and reading ability as well as the complexity of the task of investigating this relationship can be rendered more manageable by viewing each of the properties of morphology as the basis of a separate type of morphological ability. That is, awareness of the syntactic property, for example, should be

investigated as a type of morphological ability independent of awareness of the selectional, phonological, relational, or distributional properties. This approach allows for the possibility that the various types of morphological sensitivity differ in their relevance to reading development and that some types may prove to be essential while other types matter less or not at all. For example, mastery of inflectional morphology is so fundamental, so much a part of native linguistic competence, that deficiencies in this area will necessarily be associated with disability in all types of language processing including reading. In contrast, it would be difficult to argue that reading development is somehow dependent on arcane relational knowledge of the type that recognizes the common roots (underlined) in the pairs 'gypsy/ Egyptian' and 'pterodactyl/helicopter'.

In this study, three experiments investigate sensitivity to the syntactic, phonological, and relational properties of suffixes and their relationship to reading achievement in high school and college-level readers. Although morphology also includes word formation by compounding and prefixation, suffixation was selected for study as a good representation of the whole; suffixes are ubiquitous, include the inflectional system, and have properties, such as phonological effects on the base, which are not characteristic of prefixes. Following is a description of the syntactic, phonological, and relational properties and a summary of extant research on their acquisition and relationship to reading development.

The syntactic property

English suffixes comprise two discrete systems: the inflectional and the derivational. The inflectional system is a small, closed class of high-frequency grammatical suffixes whose only function is to mark their bases for such things as case, number, person, or tense. The derivational system is a large, open class of lexical suffixes. Both systems have syntactic properties.

Two closely related aspects of the syntactic property of suffixes are syntactic category membership and category selection. All suffixes, both inflectional and derivational, form one, and only one, of the four open-class syntactic categories: nouns, verbs, adjectives, and adverbs. Structurally identical suffixes forming different categories, such as the noun **-al** (e.g., $[[\text{betray}]_V\ \text{al}]_N$) and the adjective **-al** (e.g., $[[\text{person}]_N\ \text{al}]_A$ are separate items, the bound-form analogue of homonyms. Although most derivational and all inflectional suffixes attach to only one syntactic category, a few derivational suffixes select for more than one. For example, the agentive ending **-er/-or/ -ar**, which selects verb bases the majority of the time (e.g., 'teacher', 'actor', 'beggar'), occasionally attaches to nouns (e.g., 'prisoner') and adjectives ('stranger').

One of the chief functions of the derivational process is to form a new word with a category different from the base (e.g., $[[[\text{govern}]_V\ \text{ment}_N\ \text{al}]_A$). However, there are some cases in which derivational suffixes have the same

grammatical category as the base they select for, such as the concrete-to-abstract noun suffixes, which include **-hood** (e.g., $[[\text{percent}]_N \text{ hood}]_N$) and **-ship** (e.g., $[[\text{friend}]_N \text{ ship}]_N$). In contrast to derivational suffixes, inflectional suffixes never alter the grammatical category of their base (e.g., $[[\text{boy}]_N \text{ s}]_N$, $[[\text{walk}]_V \text{ ed}]_V$, $[[\text{long}]_A \text{ er}]_A$).

Tyler and Nagy (1989) investigated the acquisition of knowledge of the syntactic category of derivational suffixes on real and nonce stems in fourth-, sixth, and eighth-grade children. They found significant main effects of both grade and stem type which they attributed to age-related increases in reading, vocabulary, and general test-taking skills. They did not evaluate any of these three skills or attempt to correlate them to morphological ability.

The phonological property

Derivational suffixes. The phonological property of suffixes refers to the effect that the suffix has on the pronunciation of the base form and vice versa. Neutral suffixes have no effect at all. All Germanic suffixes are of this type (e.g., **-ful, -less, -ness, -ish, -like, -en**) and some Latin and Greek suffixes (e.g, **-able/-ible**, (agentive) **-er**). Additionally, suffixes which only trigger a change, such as velar softening at the juncture of the stem and the suffix (e.g., 'critic' → 'criticism') are sometimes classified as 'neutral' (Gordon 1989). Nonneutral suffixes trigger changes which may include stress shift (e.g., 'móron' → 'morónic'), vowel or consonant alternations ('receive' → 'reception'), or a combination of these (e.g., 'próduce' → 'prodúction').

Myerson (1976) developed tasks involving production, judgement, and recall of forms derived from nonce bases to investigate the development of knowledge of the phonological property of three suffixes in good, average, and poor readers in grades three, six, nine, and twelve. All three measures correlated to reading ability and showed significant increases in this type of morphological knowledge at each grade level.

Inflectional suffixes. The direction of the phonological influence is reversed in the case of the regular plural and past tense inflections; these do not affect the pronunciation of the base but are, instead, affected by it, resulting in phonologically-conditioned allomorphs. Both the plural and past tense morphemes assimilate to the voicing of the final phoneme in the base and epenthesize a neutral vowel if the base ends in a consonant phoneme that is articulated in both the same place and manner as the inflection (e.g., /roz/ + plural → /rozIz/, /want/ + past tense → /wantId/). (The genitive and third-person-singular present tense inflections are structurally identical to the plural inflection and behave identically to it.)

The early onset and predictable order of the acquisition of inflection morphology is well-documented in normal children (Berko 1958; Brown 1973; de Villers & de Villers 1973) and in mentally-retarded children (Newfield & Schlanger 1968; Dever & Gardner 1970). It has been shown

that mastery of the ability to generalize inflectional knowledge to novel words is related to reading achievement in normal first- and second-grade children (Brittain 1970). Significant deficits in this ability have been found in non-retarded learning-disabled children (Wiig, Semel & Crouse 1973; Vogel 1977, 1983) and teenagers (Elbro 1989).

Suffix boundaries. An especially interesting aspect of the phonological property of suffixes is the way suffixes differ from each other in their effect on syllable boundaries in the complex word. Consider the base forms 'sign' and 'bomb'. Both words have a 'silent' letter that is retained in the spelling for morphological reasons. Nevertheless, the pronunciation of both words must be considered regular in that the 'silent' letter in each case is part of a predictable grapheme-to-sound correspondence ('gn' → /n/ and '-mb' → /m/) which is seen in other words in the language (e.g., 'reign', 'malign', 'lamb', and 'succumb'). As long as these letter sequences remain within the same syllable, the correspondence is undisturbed as seen in the inflected past tense and progressive forms 'signed', 'signing', 'bombed', and 'bombing'. However, when the same letter sequences, still serving to identify the same morphemes, are split between syllables as in derived forms such as 'signal', 'signify', 'bombard', and 'bombardier', the formerly 'silent' letters are realized. Suffix boundaries of the first type are 'impermeable' to letter redistribution; suffix boundaries of the second type are 'permeable' and permit redistribution of letters.

It would appear at first that derivational suffixes should create boundaries of the permeable type because derived forms and their bases are normally considered to be separate lexical items as opposed to inflected forms and their bases, which are not. However, (agentive) **-er, -athon** and **-able/ible** are examples of derivational suffixes which are impermeable. Neither is the difference based on structural characteristics of the suffix; the agentive **-er** does not permit redistribution of letters across its boundary, while the structurally identical comparative suffix **-er** forces it (compare: 'sing/singer' and 'strong/stronger'). There have been no investigations of the acquisition of knowledge of suffix boundary properties or its relationship to reading development.

The relational property

The relational property of words simply refers to the fact that derived words are related semantically to their bases and to other derivations of the same base. This relationship is frequently obscured by spelling or pronunciation changes that alter the shape of one member of the pair or by the semantic drift of one or both members. Many of the spelling and pronunciation changes are systematic (e.g., 'deceive/deception', 'receive/reception') and have been discussed extensively (Chomsky 1964; Chomsky & Halle 1968).

In another component of the study cited above, Tyler & Nagy (1989)

found that relational knowledge increases with grade level and is not significantly affected by differences in the phonological neutrality of the suffix. Wysocki & Jenkins (1987) found that the substantial increase in reading vocabulary that occurs between the third and seventh grades can be attributed to the ability to use morphological generalization as well as contextual information and that the most marked growth in both these abilities occurs between grades four and six. Derwing & Baker (1979) assessed the role of both semantic and phonetic similarity in the ability of students ranging from third-grade to college level to recognize morphemes in pairs of common words representing the full range of variation along both dimensions. Results indicated that the ability to recognize correct relationships and reject false ones increased regularly with age. Younger subjects tended to accept false relationships on the basis of similarity along a single dimension provided the similarity was sufficiently transparent ('bug/buggy', 'cat/kitty'). Older subjects were especially able to recognize relationships that are typically taught in school ('Halloween/holy', 'moon/month') despite low semantic and phonetic similarity. Older subjects were also better able to recognize morphological relatedness that is preserved in spelling patterns despite changes in pronunciation ('break/breakfast', 'cup/cupboard'). In none of the three studies just cited was any attempt made to relate morphological ability to reading ability. In the only study looking at individual differences, Freyd & Baron (1982) found that academically-superior fifth-grader students were better able than average eighth-grade students to utilize knowledge of derivational relationships to assist in learning 'derivationally-related' pseudowords.

In sum, extant research indicates that (1) the ability to apply inflectional suffixes correctly is associated with early reading achievement and that deficits in this ability are associated with reading disability as late as adolescence, (2) knowledge of the relational and syntactic properties of suffixes increases with grade level, (3) superior students excel at learning new vocabulary by morphological generalization, and (4) knowledge of the phonological properties of three derivational suffixes correlates to reading ability in normal subjects at and above grade three. While there has been at least one investigation into the acquisition of many of the properties of English morphology, almost nothing is known about the relationship of most types of morphological awareness to reading achievement at different levels. The one exception is the relatively large amount of research relating inflectional ability to reading ability. The purpose of the present study is to investigate four types of morphological ability in high school and college students and to compare measures of these abilities to a different measure or indicator of reading achievement in each of three experiments.

METHOD

Subjects. The subjects for Experiment 1 were 26 University of California, Irvine (UCI) undergraduates who volunteered to participate for extra course

credit. They were required to be native speakers of English and to provide Verbal and Math scores for a Scholastic Appitude Test (SAT). Since the majority of subjects were underclassmen, 20 had taken the SAT within the previous three years. Of the remaining six students, five presented a four-year-old score, and one presented a five-year-old score. Although the SAT is intended as a predictor of academic success, SAT Verbal scores are also a general indicator of skill in processing written language. The UCI Placement Testing Cener has found that SAT Verbal Scores correlate significantly with scores on the reading component of the Sequential tests of Educational Progress (STEP) administered by the Center and, for this reason, were used as a reading indicator for this population. There were nine males and seventeen females. Average age was 20.2 (SD 2.5).

All the subjects for Experiments 2 and 3 were volunteers from English classes at an upper-middle-class high school in Southern California. All students who wished to participate were permitted to do so; however, only the scores from native English-speaking subjects were considered. Subjects for Experiment 2 were 14 males and 12 females (mean age 14.2; SD 0.6) from three 9th-grade composition classes composed of students of all levels of proficiency. All of these subjects had been given the Nelson Reading Skills Test six months earlier by their classroom teachers late in the spring of 8th grade, and these scores were made available by the school counseling office.

Subjects for Experiment 3 were 24 students from an 11th-grade 'Advanced Placement English' class (AP), which comprises the school's most proficient English students in that grade (14 males, 10 females; mean age 17.11; SD 0.3), and a total of 56 students from three 'Youth Literature' classes (YL), which comprised the school's least proficient English students in grades 10, 11, and 12 (35 males, 21 females; mean age 17.9; SD 0.10). Students are placed in YL classes solely on the basis of low scores on a departmental reading skills test; many have satisfactory or even superior academic skills in other areas. On the other hand, students are placed in AP English classes on the basis of high overall GPA and not specifically because of high reading scores. However, high academic achievement certainly implies strong reading skills.

Materials. The Morpheme Sensitivity Test (MST) comprises four parts: three paper-and-pencil measures and an oral reading test. Parts 1 and 2, modeled after Tyler & Nagy (1989), were designed to assess subjects' knowledge of the syntactic category of common Latin and Greek suffixes, Part 3 assessed the subjects' knowledge of the derivational relationships of word pairs, and Part 4, the oral test, assessed the subjects' knowledge of how the pronunciation of a letter that was 'silent' in a base form is affected by different types of word-internal boundaries in derived and inflected forms of that base.

Part 1: Syntactic Categories of Suffixes Using Real Words (Syncat-real Test). The Syncat-real Test (see Appendix A) consists of 27 sentences containing a blank and followed by four real words which are different derivations of the

same stem; that is, the answer choices differ from each other only in their suffixes. The following example is typical:

The cost of _____ keeps going up.

electric electrify electricity electrical

All of the test sentences are unambiguous, and the blanks are highly constrained syntactically, limiting the choice of possible correct answers to one.

The correct answers comprise three noun types, three verb types, and three adjective types. The noun types are *-ion/-ation, -ity*, and *-ist*. One token of each type functions as (1) subject of the verb, (2) object of the verb, and (3) object of a preposition. The verb types are *-ate, -ize*, and *-ify*. One token of each type occurs (1) following a modal, (2) following an infinitive marker, and (3) either as a verb without overt inflection immediately following a third-person plural subject or as an imperative immediately following 'please'. The adjective types are **-ous/-ious, -al** and **-ive**. The blanks for all adjective tokens were preceded by an adverb.

Part 2: Syntactic Categories of Suffixes Using Nonsense Stems (Syncat-nonce Test). The Syncat-nonce Test (see Appendix B) is identical in structure to the Syncat-real Test except that the four answer choices are Latinoid nonce words composed of a real Latin or Greek bound stem followed by a nonsense syllable which is followed by one of four real suffixes. The context of the sentence frames is compatible with the meaning of the first element of the word, the real bound stem. For example:

The meeting was highly _____ and invigorating.

loquarial loquarify loguarialize loquarialism

In both the Syncat-read and Syncat-nonce Tests the order of the 27 test sentences and the order of the answer choices was randomized. Instructions to the subjects are included in Appendices A and B.

Part 3: Test of Knowledge of Derivational Relationships. The Relational Test (see Appendix C) is comprised of 42 pairs of words, 25 of which are related and 17 of which are not. Each pair of words is followed by the words 'YES' and 'NO'. The task was to circle the word 'YES' if the pair of words are related and to circle the word 'NO' if the pair of words are not related. The related word-pairs were of the following seven types:

(1) The first and least complex type are transparent relationships in which the derivation does not alter the phonetic realization of the base, either its stress or pronunction. Spelling changes, such as doubling of final consonants or y → i, are rule-governed. Four tokens were used:

add — additive allow — allowance

bag — baggage pity — pitiful

An additional pair of this type (happy — happiness) was presented in the instructions as an example of a related pair.

(2) The next category involves stress shift with consequent vowel changes. Spelling changes are rule-governed. Eight tokens of this type were used:

moron — moronic	angel — angelic
solid — solidity	divine — divinity
curious — curiosity	reptile — reptilian
malice — malicious	preside — president

(3) There were two examples of the type of relationship that entails stress shift with velar softening but no spelling change.

magic — magician electric — electrician

(4) There were two examples of the type of relationship that entails stress shift with both pronuncation and spelling changes.

maintain — maintenance abolish — abolition

(5) There were two examples of the type of relationship having both pronunciation and spelling changes but without stress shift.

receive — reception appear — apparent

(6) There was one example of the type characterized by pronunciation change alone.

heal — health

(7) There were six examples of the type of relationship in which a letter which was silent in the base form is sounded as a result of being assigned to a different syllable in the related form.

sign — signature	crumb — crumble
know — acknowledge	doubt — dubious
debt — debit	damn — damnation

The 17 pairs of morphologically unrelated words were of the following five types:

(1) Three examples were borrowed directly from children's linguistic riddles which turn on the listeners' knowledge that words can have segments in them which are identical to another word in the language but which are not that word and are not related to it. The unrelated pairs

tail — retail tile — reptile ill — illegal

came from the following riddles:

Q. If a dog lost his tail, where could be get a new one?
A. At a retail store.

Q. What kind of tiles do snakes put on their bathroom floors?
A. Reptiles.

Q. What's the difference between 'illegitimate' and 'illegal'?
A. 'Illegitimate' is against the law. 'Illegal' is a sick bird.

(2) Seven of the unrelated pairs are 'psuedo-transparent' in analogy to the first class of related words listed above. That is, the first word of the pair 'appears' unaltered in the second word even though the two words have no morphological or semantic relationship.

bad — badminton	let — letter
badge — badger	dust — industry
gust — August	tell — intellect
alto — altogether	

Another pair of this type (cat — category) was presented in the instructions as an example of an unrelated pair.

(3) Two of the unrelated pairs were analogous to the related pairs in the 'silent letter' group listed above. The silent letter in the first member of the pair is sounded when it appears as a part of the same letter string but in a different syllable in the second word of the pair. Again, the identical letters strings are not semantically related.

numb — numbers	comb — combination

(4) One pair was an appeal to the common tendency to invent 'folk etymology' (Derwing & Baker 1979).

fry — Friday

(5) The remaining pairs share a semantically-unrelated sequence of letters which does not constitute a free word, a 'pseudo-bound-morpheme', therefore.

alligator — allegory	back — bacon
apple — applause	sword — swift

Part 4: Test of Knowledge of the Differences in the Nature of Different Types of Word-Internal Boundaries (Silent Letters). The Silent Letters Test (see Appendix D) is an oral reading test, whereas the other three tests are paper-and-pencil tests. It consists of four sets of seven sentence frames, one set for each of four nonsense 'verb' paradigms. Each of these 'verbs' is presented in its (1) infinitive, (2) third-person singular, (3) past tense, (4) and progressive inflections, and also in (5) agentive, (6) adjectival, and (7) nominal derivations. The first set, used as a 'warm-up' exercise, presented the base 'trimp', which does not contain a 'silent' letter. The remaining three 'verbs' were 'pemb', 'stramn', and 'blign'. The following set of sentences frames is typical:

1. Mary likes to pemb.
2. She pembs every day.
3. She pembed yesterday.
4. She is pembing right now.
5. She is the best pember in town.
6. She is very pembive.
7. She is famous for her pembation.

In the inflected forms (1—4) the pronunciation of the base does not change in spite of the apparent opportunity to reassign the 'silent' consonant to the newly added syllable because inflectional boundaries for verbs are impermeable to this type of movement. However, in the case of the adjectival and nominal derivations (6—7), the previously 'silent' letter is reassigned to the newly added syllable because most derivations constitute distinct lexical

items. An exception to this is the agentive boundary (5) which is impermeable. To summarize, the 'b' is pronounced in forms six and seven; it is 'silent' in forms one through five.

Procedure. The subjects in Experiment 1 were tested individually in the UCI laboratory with no time constraint. The instructions for all parts of the test, which appear in Appendices A-D along with the test materials, were read aloud to each subject. The order of the written and oral tests were counterbalanced. For Experiments 2 and 3 a modification of this procedure was dictated by the constraint of having to test all the students in a class during a single class period. Materials for the three paper-and-pencil tests were distributed to all participating students at the beginning of the class period, and the instructions were presented to them as in Experiment 1. It was then explained that each student would be interrupted once while working on the written tests in order to leave the classroom briefly to be tested individually on another subtest in a quiet area near the classroom. The instructions for the Silent Letters Test, which were read at the beginning of the group testing session, were briefly reviewed at the time of individual testing.

RESULTS

Group differences

The mean and standard deviation of the scores for all groups of subjects on the four sections of the MST are summarized in Table 1.

Table 1. Summary of MST means and standard deviations

MST test	Exp. 1	Exp. 2	Exp. 3	
	UCI	9 G	AP	YL
Syncat-real	26.92	25.35	26.96	25.14
(max = 27)	0.27	2.40	0.20	2.96
Syncat-nonce	25.54	23.54	26.63	20.20
(max = 27)	2.32	3.42	0.65	6.32
Relational	39.00	35.65	39.75	34.02
(max = 42)	1.75	2.93	1.78	4.15
Silent letters	24.35	22.23	24.88	20.60
(max = 28)	2.04	3.74	1.80	5.60

UCI = University of California, Irvine, undergraduate students; AP = Advanced Placement English students, eleventh grade; YL = 'Youth Literature' English students, grades ten through twelve.

Experiment 1. For the UCI subjects, scores on all four parts of the MST were quite high, with Syncat-real scores at ceiling. Pearson correlations were calculated to investigate the relationship of the scores on each section of the MST to SAT scores and to investigate any effects of sex and age. Results are summarized in Table 2. As seen in that table, SAT Verbal scores were significantly related to scores on the Syncat-nonce and Silent Letters Tests but not to scores on the Syncat-real or Relational Tests. The ceiling effect on Syncat-real explains the lack of significance for that section. SAT Math scores were not related to any of the MST scores or to age. However, SAT Math scores were significantly related to sex, $r(26) = -0.69$, $p < 0.001$, with males being more likely than females to have higher scores. Subjects' scores on the Math section of the SAT were not related to their scores on the Verbal section, $r(26) = 0.07$.

Experiment 2. For the 9th-grade students, scores were somewhat lower, with none at ceiling. Correlational tests were computed between scores on the Nelson Reading Skills Test and performance on the four parts of the MST. Results are summarized in Table 2. As seen in that table, scores on all four parts of the MST were significantly correlated with the Nelson Reading Skills Test scores.

Table 2. Summary of correlations from Experiments 1 and 2

	Experiment 1 UCI Students (n = 26)		Experiment 2 9th-graders (n = 24)
	SAT Verbal	SAT Math	Nelson Reading Test
Syncat-real	−0.13	0.29	0.52***
Syncat-nonce	0.34*	−0.14	0.59***
Relational	0.16	−0.17	0.51***
Silent letters	0.37*	−0.28	0.68****

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.005$; **** $p < 0.001$

Experiment 3. For these subjects the only available indicator of reading success was class membership (Advanced Placement (AP) = good, Youth Literature (YL) = poor). Accordingly, t-tests were conducted on reading group differences in the MST scores. Results, summarized in Table 3, revealed significant differences between the two groups for all four MST test measures.

As a further analysis of the data from Experiment 3, the scores on the Syncat-real Test and the Syncat-nonce Test were subjected to an ANOVA with the factors class membership (Advanced Placement vs. Youth Literature) and stem type (real vs. nonsense). Results revealed a significant main

Table 3. Summary of t-tests from Experiment 3

	Advanced placement (n = 24)	Youth literature (n = 56)	t-value	df	2-tail prob.
Syncat-real					
Mean	26.96	25.14	2.99	78	0.004
SD	0.20	2.96			
Syncat-nonce					
Mean	26.63	20.20	4.96	78	0.000
SD	0.65	6.32			
Relational					
Mean	39.75	34.02	6.49	78	0.000
SD	1.78	4.15			
Silent letters					
Mean	24.88	20.60	3.65	77	0.000
SD	1.80	5.60			

effect for both class membership [$F(1, 79) = 33.129$; $p < 0.001$], and stem type [$F(1, 53) = 29.459$; $p < 0.001$], as well as a significant interaction of class membership and stem type [$F(1, 53) = 10.373$; $p < 0.005$]. Rather than having equal difficulty in recognizing the grammatical category of suffixed words in all situations, the poor readers had greater difficulty when required to generalize knowledge about suffixes to novel words.

Item analysis

To better understand the cause of the subjects' errors, an item analysis was conducted on each part of the MST.

Syntactic categories. The percentage of correct responses for all groups of subjects on each type of suffix that was tested on the Syncat-real Test and the Syncat-nonce Test is presented in Table 4 and Table 5 respectively. All groups of subjects most often selected verb suffixes correctly on both real and nonsense stems. Noun suffixes on both real and nonsense stems were the most difficult for all groups of subjects.

One possible explanation for the relative ease in recognizing verb endings is that English only has a total of four verb-forming suffixes: the nonproductive **-en**, which selects almost exclusively Germanic bases, plus the three Greek and Latin suffixes used in Syncat-real and Syncat-nonce. In contrast, English has a much larger inventory of noun- and adjective-forming suffixes. Noun suffixes include Germanic: **-ness, -let, -kin, -ard, -hood, -th,** Greek: **-ocrat, -ology, -cy/acy, -ism**, and Latin: **-itude, -ance/ence, -age** and **-ure**. Adjective suffixes include Germanic: **-ford, -ish, -ful, -less, -some, -ward,**

Table 4. Percent correct responses on Syncat-real by item and category for Experiments 1, 2, and 3

			UCI	9G	AP	YL	Total
Noun suffixes							
-ion		subj. of vb.	100	100	100	91	
		obj. of vb.	100	88	100	93	
		obj. of prep.	100	100	100	98	
	-ion	in all positions	100	96	100	94	
-ity		subj. of vb.	96	69	100	73	
		obj. of vb.	100	92	100	100	
		obj. of prep.	96	92	100	98	
	-ity	in all positions	97	84	100	90	
-ist		subj. of vb.	92	88	100	70	
		obj. of vb.	100	96	100	98	
		obj. of prep.	100	88	100	91	
	-ist	in all positions	97	91	100	86	
All noun suffixes			98	90	100	95	95
Verb suffixes							
-ate		after a modal	100	100	100	100	
		after an infinitive	100	100	100	98	
		inflected	100	100	100	98	
	-ate	in all positions	100	100	100	99	
-ize		after a modal	100	100	100	95	
		after an infinitive	100	100	100	98	
		inflected	100	100	100	98	
	-ize	in all positions	100	100	100	97	
-ify		after a modal	100	96	100	98	
		after an infinitive	100	100	100	96	
		inflected	100	96	100	98	
	-ify	in all positions	100	97	100	97	
All verb suffixes			100	99	100	98	99
Adjective suffixes							
-ous			99	87	99	87	
-al			100	90	100	90	
-ive			100	99	100	96	
All adjective suffixes			100	92	100	91	96

-like, -ly, -most, -ways French: **-esque, -ese**, and Latin: **-able/ible**, and **-al/ial** (see Marchand 1969).

Relational test. The percent of correct responses for each pair of related words is presented in Table 6 and for each pair of unrelated words in Table 7. All four groups of subjects scored a larger percentage of misses than false

Table 5. Percent correct responses on Syncrat-nonce by item and category for Experiments 1, 2, and 3

		UCI	9G	AP	YL	Total
Noun suffixes						
-ion	subj. of vb.	77	77	100	52	
	obj. of vb.	100	88	100	77	
	obj. of prep.	100	92	100	86	
-ion	in all positions	92	86	100	72	
-ity	subj. of vb.	100	85	100	68	
	obj. of vb.	88	69	92	55	
	obj. of prep.	85	77	92	55	
-ity	in all positions	91	77	95	59	
-ist	subj. of vb.	100	92	100	89	
	obj. of vb.	96	92	96	80	
	obj. of prep.	96	85	100	75	
-ist	in all positions	97	90	99	81	
All noun suffixes		93	84	98	71	87
Verb suffixes						
-ate	after a modal	96	88	100	80	
	after an infinitive	96	100	100	82	
	inflected	92	77	100	84	
-ate	in all positions	95	88	100	82	
-ize	after a modal	96	96	100	84	
	after an infinitive	96	96	100	84	
	inflected	88	88	100	75	
-ize	in all positions	95	92	100	81	
-ify	after a modal	92	100	100	79	
	after an infinitive	100	92	100	84	
	inflected	92	92	96	80	
-ify	in all positions	95	95	99	81	
All verb suffixes		95	92	99	81	92
Adjective suffixes						
-ous		97	87	100	74	
-al		90	86	97	73	
-ive		94	87	100	74	
All adjective suffixes		94	87	99	74	89

alarms. That is, they were all more accurate in their rejection of unrelated pairs than in their recognition of related pairs.

In order to investigate the possibility that word frequency was a factor in failure to recognize the relationships that did exist, a Pearson correlation was computed between the frequency of the derived forms (estimated occurrences per million words, Carroll, Davies & Richmond 1971; also presented

Table 6. Estimated frequency of individual items (in parentheses) and percent correct responses on relational test for related word pairs, Experiments 1, 2, and 3

	UCI	9G	AP	YL
1. add (435.78) additive (2.94)	85	88	96	73
2. allow (102.45) allowance (7.92)	69	62	96	57
3. bag (86.57) baggage (3.0055)	92	96	100	91
4. damn (5.08) damnation (0.3104)	96	58	100	68
5. pity (8.16) pitiful (1.7026)	100	92	100	98
6. moron (0.1149) moronic (0)	85	81	96	64
7. angel (11.95) angelic (0.1088)	92	69	100	54
8. solid (65.84) solidity (0.3365)	100	100	92	82
9. divine (5.25) divinity (0.43)	96	92	100	80
10. curious (32.32) curiosity (12.49)	100	100	100	96
11. reptile (27.42) reptilian (0.5974)	96	85	100	91
12. malice (1.5245) malicious (0.1135)	100	85	100	86
13. preside (3.07) president (126.02)	81	38	83	27
14. magic (50.71) magician (6.97)	100	100	100	100
15. electric (82.82) electrician (0.69)	100	100	100	93
16. maintain (29.07) maintenance (3.70)	100	85	100	95
17. abolish (1.94) abolition (0.2842)	100	73	100	88
18. receive (131.32) reception (3.43)	81	65	92	61
19. appear (176.26) apparent (11.852)	91	73	100	64
20. heal (4.72) health (47.75)	73	65	75	55
21. sign (189.06) signature (8.92)	100	96	100	91
22. crumb (4.09) crumble (4.06)	85	75	83	71
23. know (1471.56) acknowledge (3.33)	85	85	88	66
24. doubt (42.30) dubious (0)	73	65	88	46
25. debt (11.06) debit (0)	65	38	33	25
Mean percentage of correct responses by group	89.8	79.8	92.8	72.9

in Table 6) and the percent of correct responses for each group of subjects. For all but two of the related word pairs the derived form has a lower frequency than the base form. The two exceptions are the derived forms **president** (126.06/million) and **health** (47.75/million), which are higher frequency than their bases, **preside** (3.07/million) and **heal** (4.72/million). For these two cases the lower frequency of the base form was used in calculating the correlation. This treatment assumes that **president** and **health** are viewed psychologically as base or primary forms, not unanalysable but unanalysed, and that **preside** and **heal**, if the relationship with the base is recognized, are viewed as back formations. Results indicated that there is no significant relationship between the frequency of the derived forms and the ability of the subjects in any group to identify them as being related to their bases ($p > 0.2$). Nevertheless, lack of word recognition due to low frequency may have been a cause of error on some items. As can be seen in

Table 7. Percent correct responses on relational test for unrelated word pairs, Experiments 1, 2, and 3

	UCI	9G	AP	YL
1. tail — retail	92	92	100	95
2. tile — reptile	96	96	100	98
3. ill — illegal	81	65	92	70
4. bad — badminton	100	100	96	96
5. let — letter	96	100	100	98
6. badge — badger	100	100	96	96
7. dust — industry	100	96	100	98
8. gust — August	100	96	92	91
9. tell — intellect	96	92	100	95
10. alto — altogether	100	88	100	93
11. numb — numbers	100	100	100	95
12. comb — combination	96	96	96	88
13. fry — Friday	100	100	100	96
14. alligator — allegory	100	88	96	91
15. back — bacon	100	100	100	100
16. apple — applause	100	85	92	91
17. sword — swift	100	96	100	98
Mean percentage of correct responses by group	97.5	93.5	97.6	93.5

Table 6, for the two related word pairs which were missed the most often by almost all groups, #24 **doubt/dubious** and #25 **debt/debit**, the derived forms are infrequent enough that neither one appeared in the Carroll et al. (1971) corpus even once. A much more useful frequency count, were it available, would combine the occurences of all the derived forms in the language, for example, all words having a stress shift due to suffixation with **-ity**.

Degree of phonological distortion in the derived form also does not appear to be a factor in successfully identifying relationships. This can be inferred from the fact that the related word pairs which were accurately identified the most often were those involving stress shift with spelling change or stress shift with velar softening. All subjects except two of the 54 Youth Literature subjects correctly identified #10 **curious/curiosity** as related. All subjects identified #14 **magic/magician** as related, and all subjects except four Youth Literature subjects identified #15 **electric/electrician** as related. In contrast there is a lower percent of correct responses on test items #1—5, all of which involve neutral suffixes.

Silent Letters Test. The responses on Silent Letters Test, the oral reading section of the MST, revealed three types of errors. Errors of the first type indicated a lack of awareness of the phonological effects of different suffix

boundaries. These are the errors that the test was designed to elicit. The most common error for all subject groups, and the one most typical of the better readers, was failure to reassign the 'silent' consonant in the stem to the suffix in those cases in which the boundary was permeable (i.e., **blignant, blignatude, stramnal, stramnory, pembive, pembation**). The most commonly missed items were **blignant** and **blignatude**. The most likely explanation is that these two items differ from the other 'derived' forms in that not only is there a vowel change, but the effect on the consonant cluster is regressive. That is, the 'silent' letter surfaces in the first syllable when the final letter of the stem, 'n', which was already sounded in the base, is reassigned to the syllable created by suffixation. A less common boundary error, one which was found only among the YL subjects, was the reassignment of the 'silent' consonant to the inflectional suffix (e.g., **bligned** → /blIgnId/, **stramning** → /stræmnIn/). In the case of the 'past tense', this incorrectly creates a second syllable. Correct formation of the past tense for stems of this type creates a consonant cluster (i.e., /blaynd/, /stræmd/, /pemd/); it does not add a syllable.

A second type of error indicated lack of mastery of the grapheme-to-phoneme rules for pronouncing clusters containing a 'silent' letter. Subjects attempted to circumvent this difficulty by altering the cluster by means of one or more of the following strategies: letter substitution (**pemb** → **pemp**), vowel epenthesis (**stramn** → **stramen**) and metathesis (**blign** → **bling**). The most common strategy was letter substitution. When this happened, the experimenter would interrupt the student after the first sentence of the set, point to the word **pemb** and say "Oh, look. This a 'b' not a 'p'." Although the majority of subjects were able to correct the error once it was brought to their attention, several subjects continued to use 'pemp' as the base form throughout the paradigm. Errors involving epenthesis or metathesis were not called to the subject's attention.

Two of the YL subjects made a third type of error which indicates more serious deficits in decoding ability. This involved substituting a visually-similar real word for each nonsense word. Thus, **trimp** → 'tramp' or 'trip', **pemb** → 'pump', **stramn** → 'strum', and **blign** → 'blink'. These same subjects also substituted semantically-related words for real words in the sentences (e.g., 'famous' → 'fabulous', 'today' → 'yesterday'). Additionally, one of these subjects failed to read the word 'to' each of the four times it appeared.

DISCUSSION AND CONCLUSIONS

To the extent that the four sections of the MST measure different types of sensitivity to word structure, this study demonstrates a significant relationship between these types of sensitivity and one direct measure of reading skill and several indirect indicators of reading success. These include sensitivity to

the syntactic category formed by suffixes (Syncat-real and syncat-nonce Tests), sensitivity to derivational relationships (Relational Test), and sensitivity to the differences in boundary types created by suffixation (Silent Letters Test). These results are consistent with the morphophonemic nature of English orthography.

It was assumed at the outset that the subjects in all three experiments would have sufficient decoding and word recognition skills to be able to read the test materials and that errors would reflect differences in sensitivity to word structure. This assumption appears to be correct for the UCI subjects in Experiment 1 and for the AP subjects in Experiment 3. One evidence for this is the high scores of both these populations on the test involving real word answer choices (i.e., Syncat-real and Relational).

It is likely, however, that sensitivity to word structure is confounded with phonemic decoding ability in the performance of the YL subjects in Experiment 3. This can be seen most clearly in the preceeding discussion of the Silent Letters Test. One possible reason that the Silent Letters Test proved to be the strongest indicator of the various measures and indicators of reading success in all three experiments may be the fact that this test taps awareness of spelling-to-sound regularities at all possible levels and that subjects have no way to compensate for deficiencies without the compensating strategy resulting in a noticeable error. Therefore, the subjects' scores on this section should not be interpreted as a measure of the unique contribution of morpheme boundary sensitivity to reading success. There is, however, an advantage to this feature of the Silent Letters Test; it demonstrates the large amount of variance in reading success that can be accounted for by the combination of phoneme awareness and even a single type of word structure awareness. Even the AP subjects, who had the highest scores on all sections of the MST, were not at ceiling on the Silent Letters Test, and these subjects had more variance on this section of the MST than on any other section.

The experiment which most strongly supports the hypothesis of this study is Experiment 2 in that fairly strong correlations were found between all four sections of the MST and a direct measure of reading ability, the Nelson Reading Skills Test. The possibility exists, however, that the significance of these correlations was heightened by other causes of poor reading in the least proficient readers in that group.

Neither Experiment 1 nor Experiment 3 provides this same type of direct support for the hypothesis because the measures used, SAT Verbal scores and class membership, are only indirect indicators of reading success. However, both these experiments provide an interesting line of support for the hypothesis in the following way: On all four sections of the MST, the scores of UCI students in Experiment 1 and the AP students in Experiment 3 were high, at or near ceiling on Syncat-real and Syncat-nonce. So, although, as previously noted, it is not possible to determine exactly the extent to which the poor readers' errors indicate a deficiency in sensitivity to word structure alone, it is evident that the proficient readers in this study, the UCI

and AP populations, have a high degree of sensitivity to word structure. That is, while the association between poor reading and poor word structure sensitivity is weak, the association between good reading and good word structure sensitivity is strong.

These results cannot be used to argue that sensitivity to word structure is a cause rather than a consequences or concommitant of reading development. However, it seems evident that sensitivity to word structure, like sensitivity to phonemes, is a necessary condition for successful reading since there were no good readers without it. Again, this is consistent with the predictions implicit in the morphophonemic nature of English orthography.

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APPENDIX A: PART 1 OF THE MST – SYNCAT-REAL

Instructions. Each of the next 27 sentences contains a blank and is followed by four words. Each word of the four words has the same root (base) with a different suffix (ending). For each sentence circle the work which best fits in the blank.

EXAMPLE: John wants to make a good _____ on his date.
impressive impressionable impression impressively

Complete all of the sentences.

---

1. Fortunately, age improved his _____.
personality personal personify personalize
2. My assistant will _____ the new procedure.
demonstration demonstrate demonstrative demonstrable
3. The secret police arrested the _____ before he could give his speech.
active activist activate activize
4. They _____ those fields early in the spring.
fertilizer fertility fertilization fertilize
5. John didn't anticipate the harshly _____ response to his work.
criticism criticize critical critically
6. The committee was not persuaded by the arguments of the _____.
reductionist reduce reductive reductional

7. Frank broke down under the highly _____ questioning.
   intensive intensity intensify intensification

8. The _____ of the geese was complete by Thanksgiving.
   migration migratory migrate migrational

9. The success of the entire _____ depends on Bob.
   operative operational operation operationalize

10. All four studies produced nearly _____ results.
    identity identical identify identification

11. They _____ their own desires at the expense of the group.
    gratification gratify gratuity grateful

12. Three separate agencies _____ the traffic in that sector.
    regular regularity regulation regulate

13. They hope to _____ their investments.
    diversity diversion diversify diversionary

14. It is impossible to _____ people's thoughts.
    legislate legislative legislature legislation

15. The _____ of their approach prevented many errors.
    systematic systematicity systematize systematically

16. The cost of _____ keeps going up.
    electric electrify electrical electricity

17. His consistently _____ behavior eventually destroyed his family.
    adultery adulterate adulterous adulterousness

18. They should _____ that room if they plan to grow orchids in there.
    humidity humid humidifier humidify

19. Only the most _____ males survived the winter.
    activity active activation activate

20. You can't _____ results from studies done only on rats.
    generalization generality generalize generalizable

21. The new owners turned the failing business into a highly _____ operation.
    production produce productive productivity

22. The _____ targeted the new administration.
    satiric satirical satirist satirize

23. They planned to _____ the entire southern coast.
    colonist colonize colonial colonization

24. Only the most _____ farmers showed any profit that year.
    industrious industry industrialize industrialization

25. Continued food shortages finally caused the _____ to revolt.
    popular popularity popularize population

26. It was an overwhelmingly _____ conclusion.
glorify glorification gloriousness glorious

27. We all appreciate the tremendously _____ part you played in securing the grant.
instrumental instrumentation instrumentality instrument

APPENDIX B: PART 2 OF THE MST – SYNCAT-NONCE

Instructions. Complete the following section of the test in the same manner that you did in the section you just finished. Do not be concerned if you do not recognize the word choices in this section. Complete all 27 sentences.

---

1. They _____ the data in the back office.
curfamic curfamation curfamate curfamity

2. All those models are strictly _____ and outdated as well.
ambilemptify ambilemptivist ambilemptity ambilemptive

3. In spite of his _____, he did an outstanding job.
dispribize dispribation dispribational dispribify

4. Desert animals are not normally _____.
commalianization commalious commalianism commalianize

5. He is so _____ that he offends almost everyone.
dictopithify dictopithification dictopithial dictopithity

6. You can't even begin to _____ without modern equipment.
equamanize equamanizable equamanity equamanive

7. They presented the highly _____ evidence first.
credenthive credenthification credenthicism credenthify

8. They hope to _____ the two sides together.
uniromosity uniromify uniromous uniromative

9. He wants to _____ while he still can.
fidamoration fidamorian fidamorational fidamorate

10. Please try to be as totally _____ as possible.
progenalism progenalize progenious progenify

11. Please _____ these forms as soon as possible.
scribsumptist scribsumptious scribsumptian scribsumptize

12. The story of the _____ was repeated every year.
vergalize vergalicious vergalify vergalist

13. The most _____ samples were discarded.
birendal birendment birendalize birendify

14. If we can just overcome its inherent _____, we should complete the project on schedule.
antiflidify antiflidian antiflidacious antiflidicity

15. Dr. Jones, a well-known _____, is speaking tonight.
circumtarious circumtarist circumtarify circumtarize

16. We should _____ that money by the end of the year.
relaptification relaptian relaptify relaptable

17. His _____ is greatly admired.
superfilize superfilive superfilial superfilation

18. The meeting was highly _____ and invigorating.
loquarify loquarial loguarialize loquarialism

19. Too much _____ is bad for the economy.
malburnity malburnify malburnicious malburnable

20. Their progress was stopped by an unexpected _____.
postramify postramic postramity postramicize

21. Their approach to the problem is deceptively _____.
torbatify torbative torbativize torbature

22. The breeders _____ their stock every four generations.
genilify genility genilification geniliar

23. She met her first _____ when she moved out west.
benedumptist benefumptify benedumptize benedumptuous

24. Everyone resented the obvious _____ on the manager's part.
spectitious spectitionalize spectition spectitive

25. You must _____ them quickly or you'll ruin the colors.
premanicism premanicize premanicity premanic

26. All the suspiciously _____ specimens are kept in a separate tank.
tribacize tribacion tribacism tribacious

27. The new equipment will _____ everything automatically.
transurbate transurbativity transurbatist transurbative

APPENDIX C: PART 3 OF THE MST — RELATIONAL

Instructions. Below are 42 pairs of words followed by YES and NO. For each pair, if you think that the second word "comes from" or is derived from the first word, or that both words come from the same root, circle the word YES. If not, circle the word NO.

Example: happy — happiness YES NO
cat — category YES NO

1.	add — additive	YES	NO	6.	gust — August	YES	NO
2.	ill — illegal	YES	NO	7.	doubt — dubious	YES	NO
3.	sign — signature	YES	NO	8.	magic — magician	YES	NO
4.	abolish — abolition	YES	NO	9.	curious — curiosity	YES	NO
5.	dust — industry	YES	NO	10.	maintain — maintenence	YES	NO

11. moron — moronic	YES	NO	27. divine — divinity	YES	NO
12. receive — reception	YES	NO	28. damn — damnation	YES	NO
13. know — acknowledge	YES	NO	29. tile — reptile	YES	NO
14. alto — altogether	YES	NO	30. comb — combination	YES	NO
15. sword — swift	YES	NO	31. back — bacon	YES	NO
16. electric — electrician	YES	NO	32. reptile — reptilian	YES	NO
17. tail — retail	YES	NO	33. badge — badger	YES	NO
18. heal — health	YES	NO	34. bad — badminton	YES	NO
19. pity — pitiful	YES	NO	35. alligator — allegory	YES	NO
20. fry — Friday	YES	NO	36. allow — allowance	YES	NO
21. preside — president	YES	NO	37. solid — solidity	YES	NO
22. malice — malicious	YES	NO	38. crumb — crumble	YES	NO
23. let — letter	YES	NO	39. appear — apparent	YES	NO
24. debt — debit	YES	NO	40. numb — numbers	YES	NO
25. angel — angelic	YES	NO	41. bag — baggage	YES	NO
26. tell — intellect	YES	NO	42. apple — applause	YES	NO

APPENDIX D: PART 4 OF THE MST — SILENT LETTERS

Instructions. "I have four pages here with some short sentences on them. Each sentence has a nonsense word in it. Please read the sentences out loud the best you can. You can turn the pages yourself."
(Type was enlarged.)

(*first page*)
1. John likes to trimp.
2. He trimps every day.
3. He is trimping right now.
4. He trimped yesterday.
5. He is the best trimper is town.
6. He is very trimpish.
7. The new trimpent arrived today.

(*second page*)
1. Mary likes to pemb.
2. She pembs every day.
3. She pembed yesterday.
4. She is pembing right now.
5. She is the best pember in town.
6. She is very pembive.
7. She is famous for her pembation.

(*third page*)
1. Bob likes to stramn.
2. He stramns every day.
3. He stramned yesterday.
4. He is stramning right now.
5. He is the best stramner in town.
6. He is very stramnal.
7. He practices stramnory every day.

(*fourth page*)
1. Pat likes to blign.
2. She bligns every day.
3. She bligned yesterday.
4. She is bligning right now.
5. She is the best bligner in town.
6. She is more blignant than her sister.
7. She is proud of her blignatude.

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