A Longitudinal Study of Sentence Context Effects in Second-Grade Children: Tests of an Interactive–Compensatory Model

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During the first half of the school year and at the end of the school year second-grade children (mean age: 7 years, 4 months at the first testing) completed a task in which they read words preceded by either a congruous sentence context, an incongruous sentence context, or a neutral context. Prior to the first testing, each child was given practice at recognizing one-half of the words in isolation. Word difficulty was varied orthogonally with practice and context condition. The effect of context on reading times decreased with development and practice, and increased with word difficulty. The results were interpreted as supporting an interactive–compensatory model of the development of reading fluency.

One fundamental fact that looms large in the literature of cognitive psychology is that the processing of a stimulus is crucially dependent upon the spatiotemporal context in which the stimulus appears. Thus, it is not surprising that several models of the reading process have strongly emphasized the role of context in determining reading speed and comprehension (e.g., Gibson & Levin, 1975; Goodman, 1976; Rumelhart, 1977; Smith, 1971). However, the development of more powerful

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models of the reading process awaits a more precise specification of exactly how context is used during reading, and how the use of context changes as a function of reading experience and/or ability. Stanovich (1980) has argued that a more specific understanding of developmental changes in the effect of context on reading performance would be gained if two broad classes of context effects were distinguished: Contextual effects on comprehension and memory storage, and contextual effects on ongoing word recognition. Prior context has been shown to aid in the efficient comprehension and storage of textual information (e.g., Bransford & Johnson, 1973). However, it has been argued that contextual information can have another, qualitatively different, type of facilitative effect. Several proponents of what have become known as top-down models of the reading process (e.g., Goodman, 1976; Smith, 1971) have hypothesized that contextual information can speed ongoing word recognition during reading, because the contextual redundancy reduces the number of visual features that must be extracted from each word. Furthermore, it has been argued (see Smith, 1971) that as fluency develops, the reader is increasingly reliant on contextual information during ongoing recognition. The claim is that the fluent reader is less reliant on visual cues because of his efficient use of contextual redundancy. It is this second type of contextual effect, to aid ongoing word recognition, that is the focus of the present paper.

The prediction of the top-down models, that the word recognition performance of better readers will be more dependent on prior context than the performance of less-skilled readers, has been disconfirmed by several recent empirical studies. Schvaneveldt, Ackerman, and Semlear (1977) employed a lexical-decision task in a developmental investigation of the use of semantic context in word recognition. Second- and fourth-grade children were asked to make word–nonword decisions about targets in semantically related or unrelated contexts. A context consisted of a prior display of a single word that was either a high associate or a nonassociate of the target word. Decision times were faster for target words in the semantically related as opposed to unrelated contexts. The context effect was larger for the second-grade children (94 msec) than for the fourth-grade children (49 msec), although the interaction between grade and context condition was of marginal significance ($p < .10$). There was also evidence that, within each grade, the poorer readers made relatively greater use of context. The magnitude of the context effect for children of both grades was correlated with the vocabulary, spelling, and reading tests of the Iowa Basic Skills Achievement Test. All six of these correlations were in the negative direction (lower test scores tended to go with larger context effects), although only two reached statistical significance.

West and Stanovich (1978) conducted a developmental study that employed incomplete sentences as contexts, and produced results that were highly consistent with those of Schvaneveldt et al. (1977). Subjects of three ages (fourth-grade children, sixth-grade children, and adults) named a target word that had been preceded by an incomplete sentence that was congruent with the word, by an incomplete sentence that was incongruent with the word, or simply by the word "the" (i.e., a no-context condition). The use of a no-context condition allows for the separation of the facilitative effects of context from those that result in a lengthening of response time (i.e., inhibition effects). The assessment of facilitation and inhibition is an important part of the evaluation of theories that distinguish between the automatic and attentional effects of context (see Fischler & Bloom, 1979; Neely, 1977; Stanovich, 1981; Stanovich & West, 1979, 1981), although other theoretical perspectives also make use of the facilitation/inhibition distinction (see Becker, 1980; Schuberth & Eimas, 1977). However, as regards the prediction of the general top-down perspective, that better readers will make more use of contextual redundancy in recognizing words, it is the magnitude of the overall context effect (the difference between the congruous and incongruous conditions) that is crucial. Here the results of the West and Stanovich (1978) study were clearcut. The age × context condition interaction was highly significant. The fourth-grade children displayed a larger context effect (84 msec) than the sixth-grade children (64 msec), who in turn showed a larger context effect than the adults (26 msec). In addition, within each age level, correlations between the magnitude of the context effect and scores on a standardized reading measure were negative (a result consistent with that of Schvaneveldt et al. (1977). The contextual effect in the adults was manifest exclusively as facilitation, whereas both child samples displayed significant facilitation and inhibition effects. Thus, as reading fluency develops, contextual effects on ongoing word recognition appear to diminish. However, for adults, the remaining facilitation of words that are in congruous contexts does not appear to be purchased by an increase in response time when an unlikely word occurs. This developmental trend will be more closely examined in the study to be reported.

Perfetti, Goldman, and Hogaboam (1979) examined the speed with which skilled and less-skilled fifth-grade readers named words in isolation and words preceded by a sentence context. Words in context were named faster, and the context condition by reader skill interaction was significant. The direction of the interaction indicated that the times of the less-skilled readers were more affected by the presence of a prior context. In another experiment reported in the same paper, Perfetti et al. (1979) had subjects attempt to predict the target word from context before

naming it. They found that skilled readers were better able to predict a word from context, but that the naming times of the skilled readers were significantly less affected by an incorrect guess. Using a lexical decision rather than a naming task, Schwantes, Boesl, and Ritz (1980) have replicated this finding, as well as all of the other important trends in the West and Stanovich (1978) and Perfetti et al. (1979) papers (see also Perfetti & Roth, 1981).

These findings have a number of interesting theoretical implications. First, contrary to the top-down view of individual differences in reading fluency, the ongoing word recognition of skilled readers is more stimulus-driven and less dependent on contextual hypotheses than that of less-skilled readers. Furthermore, the findings suggest that reading theorists should pay attention to the distinction between the degree to which a reader can display a particular subskill in an experimental situation designed to tap that subskill, and the degree to which that subskill is actually used during ongoing word recognition. The Perfetti et al. (1979) results suggest that while more highly skilled readers may possess better predictive abilities, compared to less-skilled readers, they are less likely to actually use those abilities to aid in recognizing words. Their efficiency at context-free word recognition is so great that this skill is the dominant influence on their performance. Thus, this argument suggests that studies showing more skilled readers to have better predictive abilities [e.g., the well-known correlation between cloze performance and reading ability (Bickley, Ellington, & Bickley, 1970; Ruddell, 1965)] should not be cited as supporting the top-down hypothesis that the word recognition performance of better readers is more dependent on contextual prediction than is the performance of less-skilled readers.

The studies reviewed above, as well as other results from different experimental situations (e.g., Allington & Strange, 1977; Biemiller, 1977/1978; Juel, 1980; Samuels, Begy, & Chen, 1975/1976; see also Stanovich, 1980), are severely damaging to the hypotheses derived from the top-down model regarding the use of graphic and contextual information by readers of different abilities. It thus seems appropriate to investigate whether there are alternative theoretical conceptions that give a better account of the results of the studies reviewed above. Stanovich (1980) has argued that the results of studies on individual/developmental differences in the use of sentence context to speed ongoing word recognition are best explained by an interactive–compensatory model of reading performance. Interactive models have been well described by Rumelhart (1977). In contrast to top-down models (where analyses start with hypotheses and then attempt to verify them by processing the stimulus) or bottom–up models (where analyses start by processing the stimulus and then proceed through higher-level encodings), interactive models assume that a word is recognized from information provided *simulta-*

neously from several knowledge sources (e.g., feature extraction, ortho-graphic knowledge, lexical knowledge, syntactic knowledge, semantic knowledge). In top-down models, semantic processes direct lower-level processes, whereas in interactive models semantic processes constrain the alternatives at lower levels but are themselves constrained by lower-level analyses. Thus, each level of processing is not merely a data source for higher levels, but instead seeks to synthesize the stimulus based on its own analysis and the constraints imposed by both higher- and lower-level analyses.

In order to explain several sets of findings in the literature on individual differences in the development of reading fluency, Stanovich (1980) added a compensatory assumption to the general interactive model. The assumption states that deficiencies in processes at a particular level in the processing hierarchy can be compensated for by a greater use of information from other levels, and that this compensation takes place irrespective of the level of the deficient processes. The interactive–compensatory model suggests a possibility that has been in-adequately explored in the reading literature, namely, that higher-level processes can actually compensate for deficiencies in lower-level pro-cesses (see Perfetti & Roth (1981) for a similar conceptualization). Thus, a reader with poor word recognition skills may actually be prone to a greater reliance on contextual factors because these provide additional sources of information. It is just this trend that is running through the empirical literature reviewed above. The younger and less-skilled readers were much slower at recognizing words out of context and showed a greater facilitation when a context was added. The idea that the degree to which contextual information will be implicated in performance is dependent upon the speed of word recognition receives support from another body of research on skilled adult readers. The inter-active–compensatory model predicts that the performance of fluent read-ers will become more dependent on context if their context-free word recognition processes are slowed by some means. Several studies have found that the contextual effects displayed by adult subjects are larger when their word recognition times are slowed by either degrading the target stimuli or using more difficult words (Becker & Killion, 1977; Forster, 1976; Massaro, Jones, Lipscomb, & Scholz, 1978; Meyer, Schvaneveldt, & Ruddy, 1975; Sanford, Garrod, & Boyle, 1977; Sperber, McCauley, Ragain, & Weil, 1979; Stanovich, 1981; Stanovich & West, 1979, 1981).

Although there is much evidence that is consistent with the interac-tive–compensatory model, a more direct test of the model's predictions is warranted. Otherwise, the support for the model will rest solely on the post hoc interpretation of the results of studies that were not designed as direct tests of the model. Such a test is attempted in the present study,

which has several unique features. The subjects of the study, second-grade children, were the youngest that have been heretofore studied using a discrete reaction-time procedure to measure the effects of a full sentence context on word recognition. This age group is probably the youngest that it is feasible to test using the precise reaction-time procedures that were employed. Nevertheless, it appeared desirable to focus on a group of subjects that were closer to the crucial initial stages of reading acquisition than were the subjects used in the other studies of sentence context effects (e.g., Perfetti et al., 1979; Schwantes et al., 1980; West & Stanovich, 1978), where the third-grade to sixth-grade age range was studied. Also, unlike all previous studies, the present experiment was a longitudinal investigation in which the children were tested both in the first half and at the very end of the school year. It was thought that this type of investigation could potentially be useful in providing converging evidence that contextual effects diminish with the development of word recognition speed and, further, that the trend could be traced within a more circumscribed age range than previously investigated. An independent variable that was investigated was the difficulty of the target words. Studies of adults (Stanovich & West, 1981) and fifth-grade children (Perfetti et al., 1979) have found that performance on more difficult words was more affected by a prior sentence context, and it was expected that this trend would be apparent in the performance of the second-grade subjects.

Previous studies have confirmed a prediction of the interactive–compensatory model, that contextual effects will be greater when word recognition is slowed. Thus, researchers have slowed word recognition either by degrading the stimulus or using more difficult words. Of course, an analogous prediction is that factors which speed word recognition will tend to diminish contextual effects. The developmental trends revealed in the studies reviewed above (and tested again in the present study) provide an indirect (i.e., correlational) confirmation of this prediction. However, it is possible to test this prediction experimentally and thus add convergent validity to the inherently correlational developmental results. Prior to the first testing, each subject was given practice at recognizing one-half of the target words out of context. The interactive–compensatory model predicts that, when tested during the first session, the practiced words would not only be recognized more rapidly, but that contextual effects would be attenuated for this set of words. The experimental manipulation of practice, in conjunction with the longitudinal nature of the study, also provides the possibility of uncovering some important aspects of the long-term effects of specific instruction. It will be possible to examine whether words that received specific practice early in the year are still named more rapidly at the end of the year, despite several intervening months in which no differential practice occurred. Also, if a residual effect of practice is present,

it will be interesting to see if it acts to attentuate context effects in the same manner as in the first testing. Finally, as in the West and Stanovich (1978) study, a neutral context condition was included, in addition to a congruous context and an incongruous context condition. This allows the overall context effect to be broken down into facilitation and inhibition components, and makes possible a test of the hypothesis that, with increases in developmental level, increases in pracitce, and/or decreases in word difficulty, contextual effects will tend to be manifested as facilitation without inhibition, a trend suggested by the data of West and Stanovich (1978).

METHOD

Subjects

The subjects were 24 second-grade children (13 females and 11 males, with a mean age of 7 years and 4 months at the first testing) recruited from two classrooms in a predominantly middle-class elementary school. In April three measures of reading ability were administered to the children. Each subject completed Reading Subtest Level I of the Wide Range Achievement Test, the Reading Subtest (sections A and B, Primary Level 1) of the Stanford Achievement Test, and a short paragraph that was read orally and was timed by the experimenter.

Stimuli and Apparatus

Sixty-three of the sentences used in the West and Stanovich (1978) study were employed as stimuli. Three were used on the practice trials and the remaining 60 stimuli were used in the experimental trials. The sentences were constructed so that their last two words were the words "the" and a noun that was highly predictable from the context that preceded it (e.g., "The pilot flew the plane"). The sentences were organized into pairs (e.g., "the pilot flew the plane" was paired with "the dog hid the bone"). The terminal word of each sentence was then deleted, and the resulting pairs of incomplete sentences were used as sentence contexts. The deleted nouns were used as target words. A sentence context and a target word were considered to be congruous when they had been derived from the same original sentence (e.g., "the pilot flew the" was congruous with the target "plane"). A sentence context and target word were considered to be incongruous when they had been derived from opposite members of the original sentence pairs (e.g., "the dog hid the" was incongruous with the target "plane"). The neutral, or no-context condition, consisted of a target word preceded by the word "the."

In order to build a word difficulty factor into the design, the 60 target words were separated into two classes of 30 words each, on the basis of word frequency and length. The 30 easy words were both shorter and

more frequent than the 30 difficult words. The mean length of the easy words was 4.0 letters, compared to 5.7 letters for the difficult words. Based on the Carroll, Davis, and Richman (1971) count of third-grade literature, the easy words had a mean frequency of 465.7, compared to 106.4 for the difficult words. The easy words were somewhat more predictable from the contexts than were the difficult words. The contexts were presented to 65 first-graders as a cloze task. Across all contexts the easy target words were predicted 47.4% of the time and the difficult target words were predicted 26.8% of the time. To enable the practice variable to be counterbalanced, two sets of 30 words were formed (arbitrarily designated sets A and B) that were balanced with respect to word difficulty. That is, words were randomly assigned to the two sets (A and B) with the restriction that each set contain 15 easy and 15 difficult words.

The contexts and target words were typed separately in Courier 72 font with an IBM Selectric II typewriter. Only the lowercase was used. The stimuli were then photographed with Kodalith High Contrast film. All the negatives were mounted in 2 × 2-in. double-glass slide mounts. Considerable care was taken to insure that the last word of each sentence context ("the") was positioned in precisely the same place on every context slide. Additional negatives that contained only the word "the" (used in the no-context condition) were mounted likewise. The slides were back projected onto a translucent screen by two Kodak projectors. One projector contained the context slides; the other contained the target slides. The images of the two projectors were aligned so that when a context and target word were simultaneously projected, the subject seated in front of the screen saw what looked like a single complete sentence. The subjects sat approximately 90 cm from the screen. A five-letter word subtended a horizontal visual angle of approximately 3.0°.

Target onset was controlled by a Vincent Associates Uniblitz shutter that was positioned over the lens of the projector that contained the target slides. When the experimenter pushed a control button, the shutter was electronically opened, and the projected image of the target item appeared. A Lafayette Instruments electronic clock (Model 544119-A, accurate to the millisecond) was started by the same push of the control button. When the subject verbally responded to the target, a voice-activated relay stopped the clock and closed the shutter. The microphone that led to the voice-activated relay was held by the subject.

Procedure

Twelve of the subjects were randomly assigned to each word set (A and B) and were practiced on only the words in that set. Practice began in early November and consisted of 15 sessions that took place on 15 consecutive school days. In the practice sessions the experimenter em-

ployed 3 × 5-in. cards on which the practice words were typed using a primer typewriter. In each session, the experimenter turned the cards over one at a time as fast as the subject read the words, until the words in the practice set had all been seen once. The experimenter provided any words that the subject named incorrectly or did not know. The first experimental testing took place on 2 consecutive days immediately following the last practice day. Nine of the original twenty-four subjects were unable to successfully complete the experimental task. They were replaced by nine new subjects who began practice in early December. Three of these subjects were unable to complete the experimental task and were replaced by three new subjects who began practice in early February.

The two experimental testing days following the practice each consisted of a block of 30 trials preceded by three practice trials. Thus, every subject responded once to each of the 60 target words. On each day subjects were tested in a session that lasted between 10 and 15 min. The subjects were asked to read aloud the contexts that appeared on the screen in front of them. After the subjects pronounced the last word of the context, which was always "the," a target word appeared. Prior to the collection of the data, the experimenter was given extensive practice in synchronizing the pushing of the target-onset button with the subject's articulation of the last "the," so that the target word appeared immediately after the subject's last articulation. The experimenter was instructed to develop a criterion so stringent that it occasionally resulted in her pressing the button during the articulation of "the," thus aborting the trial. This type of experimental error occurred equally often across the three context conditions, indicating that the criterion was consistently applied. Subjects were instructed to read the target word as rapidly as possible when it appeared. They were told that only the reading of the target word would be timed, so they were free to read the contexts at a comfortable pace.

Of the total of 60 experimental trials, 20 target words were preceded by congruous contexts, 20 by incongruous contexts, and 20 by no sentence context. Within each of these sets of 20 target words, five were easy and practiced, five were easy and unpracticed, five were difficult and practiced, and five were difficult and unpracticed. Practice set (A and B) and the assignment of words to context conditions were counterbalanced across subjects so that each word was equally often practiced and unpracticed and equally often preceded by a congruous, incongruous, or no sentence context. The ordering of trials was random, with the constraint that a context condition not occur more than three times in a row.

The 24 subjects who successfully completed the first experimental sessions were tested again (without additional practice on any of the

words during the intervening period) in late May and early June. The experimental conditions were identical to those of the first testing except that each word appeared in a different context condition than in the first experimental sessions.

RESULTS

Trials on which the subject incorrectly named the target word, trials on which the response time was greater than 3000 msec, and trials on which the response time was more than two standard deviations above the mean for that condition were scored as subject errors and were dropped from the reaction-time analysis. The mean reaction time in each condition for each subject was used in the analysis of variance. Across all subjects, the mean reaction time in each context condition, as a function of word difficulty, practice, and testing period, is displayed in Table 1. The mean percentage of errors is indicated in parentheses. Also contained in Table 1 are the magnitudes of the overall context effect (the difference between the congruous and incongruous conditions), the facilitation effect (the difference between the congruous and no-context conditions), and the inhibition effect (the difference between the no-context and incongruous conditions).

An analysis of variance on the mean reaction times indicated that the main effects of context condition, practice, and word difficulty were all significant at the .001 level, while the main effect of testing period was significant at the .01 level. The context condition × practice ($F(2, 46)$ = 4.75, $p < .025$), context condition × difficulty ($F(2, 46)$ = 12.19, $p < .001$), and context condition × testing period ($F(2, 46)$ = 4.05, $p < .025$) interactions were all statistically significant. Context effects were larger for unpracticed words, for more difficult words, and during the first testing period. The practice × testing period interaction was significant ($F(1, 23)$ = 12.54, $p < .005$), indicating that, not surprisingly, the effect of practice was greater in the first testing period (the practice effect dropped from 100 to 24 msec, and was not quite significant, $p < .15$, in the second testing period). The context × practice × testing period interaction was significant ($F(2, 46)$ = 3.95, $p < .05$). Context effects were attenuated by practice to a greater extent in the first testing period (indeed, the context condition × practice interaction was not significant in the second testing period), a result that, given the theoretical argument in the introduction, is consistent with the existence of the two-way practice × testing period interaction. The word difficulty × testing period interaction ($F(1, 23)$ = 7.32, $p < .025$) and three-way interaction between practice, difficulty, and testing period ($F(1, 23)$ = 8.87, $p < .01$) were both significant. No analysis was carried out on the error rates. However, as is clear from Table 1, the pattern of error rates mirrored that of the reaction times. Thus, the results are not obscured by a speed–accuracy tradeoff.

TABLE 1
Mean Reaction Time as a Function of Context Condition, Word Difficulty, Practice, and Testing Period

	Context condition					Overall Context effect
	Congruous	No context	Incongruous	Facilitation	Inhibition	
First testing period						
Practiced easy	669 (0.8)	765 (0.0)	749 (1.6)	96	−16	80
Practiced difficult	800 (0.0)	881 (0.8)	948 (3.3)	81	67	148
Unpracticed easy	685 (0.0)	816 (3.3)	840 (0.8)	131	24	155
Unpracticed difficult	825 (9.0)	1065 (13.3)	1186 (20.0)	240	121	361
Second testing period						
Practiced easy	658 (0.8)	711 (0.0)	718 (0.0)	53	7	60
Practiced difficult	744 (0.8)	869 (3.3)	906 (2.5)	125	37	162
Unpracticed easy	675 (0.0)	758 (0.8)	756 (0.8)	83	−2	81
Unpracticed difficult	760 (2.5)	849 (4.1)	949 (5.0)	89	100	189

Note. Mean percentage of errors is indicated in parentheses.

Planned comparisons indicated that significant facilitation effects oc-curred in three of the four conditions during the first testing period (p < .025, .07, .01, .001, for the practiced easy, practiced difficult, un-practiced easy, and unpracticed difficult conditions, respectively). During the second testing period, three conditions displayed significant facili-tation effects (practiced difficult, p < .01; unpracticed easy, p < .05; and unpracticed difficult p < .05). The 53-msec facilitation effect in the practiced easy condition did not reach statistical significance (p < .20). During the first testing period, a significant inhibition effect occurred in the unpracticed difficult condition (p < .01), and the inhibition effect in the practiced difficult condition approached significance (p < .15). In the second testing period, only the unpracticed difficult condition displayed a significant inhibition effect (p < .025).

In order to explore the relationship between the effect of sentence context and reading ability, the magnitude of the overall context effect, averaged across word difficulty and practice, was correlated with three measures of reading ability (the reading subtest of the Wide Range Achievement Test, the reading subtest of the Stanford Achievement Test, and the time to read a short paragraph). The values of these correlations for each testing period are displayed in Table 2. Five of the six corre-lations were in the direction indicating that larger context effects were associated with lower reading ability, and four of these correlations were statistically significant.

DISCUSSION

The present study extended the investigation of sentence context ef-fects to a group of subjects younger than had previously been studied with the paradigm employed. The general decrease in the size of the context effect with development, a trend that had been observed in previous experiments, was corroborated in this study which traced the performance of the same group of children as they progressed through their second year of reading instruction. The magnitude of the context effect declined considerably throughout this year of school. If, in order

TABLE 2
CORRELATIONS BETWEEN THE MAGNITUDE OF THE CONTEXT EFFECT IN EACH TESTING
PERIOD AND THREE MEASURES OF READING ABILITY

	WRAT	Stanford	Paragraph reading time
First testing period	− .36*	− .43*	.50**
Second testing period	− .22	.02	.39*

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

to make a comparison with the West and Stanovich (1978) results, the context effects for the unpracticed easy and unpracticed difficult words are averaged, we find the second-grade children displaying a 258-msec context effect in the first half of the school year. This drops to 135 msec by the end of the year and, taking the figures from West and Stanovich (1978), to 84 msec by grade 4, to 64 msec by grade 6, and to 26 msec in the fluent adult reader. Thus, the developmental predictions of the interactive–compensatory model were strongly confirmed. The predictions regarding individual differences between subjects of the same chronological age were also confirmed, but less strongly. The trends displayed in Table 2 indicated that children who were better readers tended to show smaller context effects.

The predictions regarding the manipulated variables also received clear support. Word difficulty interacted strongly with context condition. The recognition of difficult words was greatly affected by the presence of a prior sentence context, whereas easy words were much less affected. The bottom-up stimulus analysis of easy words is probably so fast that these words are identified before the relatively slower contextual processes have had time to exert their full effect, as they are more prone to do when a difficult word is presented, because in this case purely bottom-up processes take longer to analyze the stimulus (see Stanovich (1980, 1981) for a fuller discusssion). The practice factor, included to examine whether a manipulated variable could attenuate, as well as lengthen, context effects, acted as expected. Practice strongly interacted with context condition in the first testing period. Words that had been practiced displayed smaller context effects than unpracticed words. The practice effect did not carry over into the second testing period, where its magnitude was reduced to a nonsignificant 24 msec, and thus did not interact with context condition. Nevertheless, the results from the first testing period demonstrate that a manipulation of this type can mimic the tradeoff between recognition speed and the effect of context that results from long-term experience with words. The finding thus adds convergent validity to the interpretation of developmental changes in word recognition speed and sentence context effects given by the interactive–compensatory model.[1]

The pattern of facilitation and inhibition in the results was similar to that observed by West and Stanovich (1978). Contextual effects tended toward facilitation without inhibition as practice and developmental level increased, and as word difficulty decreased. Thus, as word recognition speed increases, the reader is more likely to obtain benefit when a congruous word occurs, without incurring a cost when an unlikely word occurs.

[1] It should be noted that all of the trends discussed above were also apparent when the contextual effects were expressed as a percentage of the no-context condition.

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