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Context constraints, prior vocabulary knowledge and on-line inferences in reading

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This study investigated whether context constraints affect inference processing differently for high and low vocabulary readers. Participants named a target word representing an inference concept which followed an inducing context sentence. Evidence for inferences involved facilitation in naming latencies for the target word when it was predictable by the context. Constraints (reduced vs. normal vs. enhanced) were determined by manipulations of the inducing context that affected the extent to which a to-be-inferred concept was predictable. Results indicated that context constraints are more important for low than for high vocabulary readers: The former benefited from enhanced constraints (i.e., probability and speed of inference processing was increased) more than the latter; in addition, reduced constraints were detrimental for low but not for high vocabulary readers.

Contexto, conocimientos de vocabulario e inferencias en tiempo real durante la lectura. El presente estudio investiga el efecto del grado de predecibilidad contextual (baja vs. media vs. alta) sobre el procesamiento inferencial en lectores con diferente nivel de conocimientos previos de vocabulario. Después de leer una frase de contexto inductora de una inferencia, los sujetos pronuncian una palabra que representa la inferencia. La facilitación (menor latencia) en el nombrado de esta palabra indica la activación de la inferencia. Los resultados indicaron que el contexto es más importante para los lectores con menor vocabulario que para los que poseen mayor vocabulario: los primeros se beneficiaron (incrementaron la probabilidad y rapidez de las inferencias) de la alta predecibilidad más que los segundos; además, la baja predecibilidad perjudicó a los primeros, pero no a los segundos.

Cognitive processes use readers' prior knowledge to interpret linguistic stimuli in reading. Available prior knowledge about the language and about the world facilitates not only comprehension of the explicit information in the text, but also the generation of inferences about implicit information (e.g., McNamara & Kintsch, 1996). Vocabulary or word knowledge is a major component of prior knowledge that has been found to be related to inferences in reading. Thus, high vocabulary readers are more likely than low vocabulary readers to draw both connective (Singer, Andrusiak, Reisdorf & Black, 1992) and elaborative (Dixon, LeFevre & Twilley, 1988) inferences in adult readers.

The aim of the present study was to investigate to what extent the beneficial influence of prior vocabulary knowledge on elaborative inferences during reading depends on the degree of contextual constraints (i.e., how much a context sentence suggests a to-be-inferred concept). This approach will be useful, first, to determine whether high vocabulary knowledge allows the drawing of inferences even when context constraints are reduced. Thus, if the facilitating effect of high vocabulary knowledge is strong, this effect should also occur with low context constraints. Second, this approach will show whether low vocabulary readers benefit from enhanced context constraints; that is, whether enhanced context constraints play a compensatory role for these readers, enabling them to perform similarly to high vocabulary readers.

More specifically, this study is concerned with a major type of elaborative inference, such as predictive inference, also called forward inference, which has received a great deal of attention in reading research (e.g., Calvo & Castillo, 1996; Fincher-Kiefer, 1995; Keefe & McDaniel, 1993; Klin, Guzmán & Levine, 1999; McKoon & Ratcliff, 1986). Predictive inferences are anticipatory representations of the likely outcomes of described events. Thus, we draw a predictive inference if, when we read that «*someone fell from a 14th story window*», we think or imagine that «*s/he died*». Context constraints in predictive inferencing refer to how much a sentence context suggests an implicit event outcome (thus, for example, the sentence «*falling from a 14th story window*» would constrain the inference «*death*» more than the sentence «*falling from a 3rd floor window*»). Context constraints have been proposed to be a critical factor in determining whether or not predictive inferences will be made on-line during reading (Graesser, Singer & Trabasso, 1994; Klin et al., 1999). Furthermore, it has been found that the time course of these inferences varies as a function of context constraints, with inferences being made earlier as constraints increase (Calvo, 2000). Accordingly, our approach regarding the role of context constraints on the contribution of prior vocabulary knowledge to elaborative inferences is relevant to an important theoretical issue.

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Manipulations of context constraints should reveal the extent to which vocabulary knowledge contributes to predictive inferencing. To examine the role of context constraints, we varied the predictability of events in our stimulus materials. In the materials we used in previous experiments (Calvo, Estévez & Dowens, 2001), the events were predictable by 82% of individuals (i.e., a .82 predictability score, according to norming studies; this would correspond to *medium* constraints). In those experiments, the subject (e.g., *the woman*; i.e., (a) in the example shown in Table 1) of the to-be-inferred action (e.g., *prayed*) was mentioned (at the end of the context) immediately before this target word. In the present Experiments 1 and 2 we increased the predictability score to .89, by including a new expression before the target word (this would correspond to *high* constraints). This additional expression referred to a relevant quality (e.g., *with devotion*; i.e., (b) in the example shown in Table 1) of the action to be inferred. Such a manipulation is useful to determine whether low vocabulary readers are able to make the inferences earlier with enhanced context constraints. In contrast, in Experiment 3, we reduced the predictability score to .56, by removing the pretarget word (e.g., *the woman*), as well as the additional expression (e.g., *with devotion*; i.e., (c) in the example shown in Table 1), from the passages that were used in the prior experiments (this would correspond to *low* constraints). Such a manipulation is useful to determine whether high vocabulary readers are able to draw inferences even with reduced context constraints.

The procedure that we used to assess these inferences involved fixed-pace word-by-word presentation of context sentences, with varying degrees of constraints. These sentences were either predictive (predicting context) or not (control context) of a likely event (see Table 1). The sentences were followed by a target word to be named by the participant. This word represented either the predictable event (inferential target) or an unlikely event (non-predictable target). Evidence for inferences involves facilitation in naming (shorter latencies) the inferential target word following the predicting context, in comparison with when the same word appears after the control context.

Table 1
Example of Materials Used in Experiments 1 to 3 (as translated from Spanish to English)

PREDICTING CONTEXT SENTENCE AND TARGET WORDS:
The woman went into the church, spoke with the priest for a few minutes and afterwards knelt down in front of the altar.
(a) [*Medium constraints*] The woman **prayed** (*) [or] **wrote** (#)
(b) [*High constraints*] With devotion, the woman **prayed** (*) [or] **wrote** (#)
(c) [*Low constraints*] **prayed** (*) [or] **wrote** (#)
CONTROL CONTEXT SENTENCE AND TARGET WORDS:
After having spoken with the priest for a few minutes in front of the church's altar, the woman knelt down to do her shoe up.
(a) [*Medium constraints*] The woman **prayed** (*) [or] **wrote** (#)
(b) [*High constraints*] With devotion, the woman **prayed** (*) [or] **wrote** (#)
(c) [*Low constraints*] **prayed** (*) [or] **wrote** (#)

Note.
(a) Calvo et al.'s (2001) experiments (.82 predictability score)
(b) Experiments 1 and 2 (.89 predictability score)
(c) Experiment 3 (.56 predictability score)
(*) Inferential target word; (#) Non-predictable target word

Norming Study to Determine Contextual Constraints

Prior to the experiments, a norming, sentence-completion study was performed to validate manipulations of context constraints in the experimental sentences (see Calvo, 2000). In this study, 156 undergraduates (different from those participating in the following experiments) were presented with each predicting or control context sentence, either in the low, medium or high constraint versions (see Table 1). For example, in the *low* constraint condition, participants were presented with the predicting context sentence *The woman went into the church, spoke with the priest for a few minutes and afterwards knelt down in front of the altar*, followed by three dots (…); in the *medium* and the *high* constraint conditions, the same sentence was followed by *The woman…*, and *With devotion, the woman…*, respectively. Then participants were asked to write the first word that came to mind to complete the sentence after the three dots (…). Thus, participants were expected to indicate «what happened next», which typically characterizes predictive inferences. The one-word predictions (or close synonyms) served as targets for the materials to be used in the following experiments. Two types of target words were selected for each context: inferential (e.g., *prayed*) and non-predictable (e.g., *wrote*).

The inferential target words represented highly likely events following the predicting context. They were mentioned by 89% of participants in the high constraint condition, by 82% in the medium condition, and by 56% in the low condition. The respective means for the same target words that were mentioned after the control contexts were 10%, 8%, and 9%. The non-predictable target words represented plausible, but unlikely, events both after the predicting and the control contexts. They were mentioned by less than 5% of participants both after the predicting sentences and the control sentences in all constraint versions. There were significant differences between the three constraint levels only for the inferential target words after the predicting contexts, $F(2, 78) = 50.76$, $p < .0001$. A posteriori contrasts (Newman-Keuls t test) showed that the probability of producing a inferential target word after the predicting contexts was significantly different for the three versions (all ps $< .05$). This confirmed the effectiveness of the context constraints manipulations.

The predicting and the control contexts were of the same sentence length (M number of words= 20.6, both contexts). The inferential target words did not differ from the non-predictable words either in number of characters ($M = 6.64$ vs. 6.67, respectively; $t(79) = -.07$, $p > .10$, *n.s.*), or lexical frequency (Alameda & Cuetos, 1995) ($M = 33.2$ vs. 35.4, respectively; $t(79) = -.19$, $p > .10$, *n.s.*).

Pre-experimental Assessment of Vocabulary Knowledge and Selection of Experimental Participants

A sample of 239 first- and second-year psychology students at La Laguna University (different from those participating in the Norming study) were administered a computer version of the Spanish multiple-choice vocabulary comprehension subscale of the PMA test (Primary Mental Abilities; Thurstone & Thurstone, 1979). This vocabulary test involves selecting a synonym from four alternatives for each of 50 target words. In the computer version, on each trial, a target word appears on a screen, with four additional words, for a maximum of 12 seconds. The participant has to press one of four keys in a keyboard, which (spatially and numerically) correspond to each of the four alternative words on the screen. When a choice is made, or if there is no response within 12 seconds, the words corresponding to the current trial disappear and the participant is asked to proceed to the following trial when he or she is ready, by pressing the spacebar. The number of correct responses provides a measure of *availability* of vocabulary. The latencies for these responses are assumed to assess *accessibility* (or speed of lexical access): The shorter the reaction time in selecting the correct meaning of the target word, the more accessible it is in the mental lexicon or memory store.

For the following three experiments, we selected three groups of 20 high vocabulary scorers and three groups of 20 low vocabulary scorers (see Table 2). They received course credit for their participation. The main criterion for subject selection was the number of correct responses in the vocabulary test. Nevertheless, in order to control for possible differences in accessibility between the high and the low vocabulary groups, we excluded those participants whose accessibility scores were above or below 2 standard deviations from the mean of his/her own group. The reason was that the number of correct responses and accessibility were negatively correlated in our pre-experimental sample (r= -.26; p<.05). Accordingly, in order to determine the independent effects of available vocabulary knowledge, the groups had to be comparable in accessibility. After this cut-off, the high and the low vocabulary groups were equivalent in accessibility for all experiments (see mean scores in Table 2; all ts <0.5, *ns*). A 2 (high vs. low vocabulary group) X 3 (Experiment) ANOVA on number of correct response scores in the vocabulary test (see Table 2) yielded a strong main effect of group, $F(1, 114)= 785.02$, $p<.0001$, but showed no interaction ($F < 1.0$), thus indicating that the groups were comparable across the experiments.

Table 2
Mean Word Knowledge[a] and Accessibility[b] of Vocabulary for each Group and Experiment[c]

	WORD KNOWLEDGE Vocabulary Group				ACCESSIBILITY Vocabulary Group			
	LOW		HIGH		LOW		HIGH	
	M	SD	M	SD	M	SD	M	SD
Experiment 1	31.6	1.5	42.0	1.8	4097	787	3998	803
Experiment 2	33.6	3.0	43.2	1.8	4209	823	4093	834
Experiment 3	33.4	1.5	43.1	1.4	4301	867	4125	841

Notes. [a]In word knowledge (number of correct responses out of 50), all differences between the low and the high vocabulary groups were significant (p<.0001). [b]In accessibility (speed of access in correct responses, in ms), no difference between groups was statistically significant. [c]Number of participants: 20 low and 20 high in vocabulary in each experiment

Experiments 1, 2, and 3: The Role of Contextual Constraints

Previous experiments (Calvo et al., 2001) have indicated that high vocabulary readers are able to make inferences 550 ms after the end of the inducing context sentence, but not 50 ms after the context, when medium constraints are used (.82 predictability score; see Table 1). In contrast, low vocabulary readers do not make inferences until after a 1,050-ms delay, with medium constraints. The aims of the present experiments were to determine: (a) for Experiment 1, whether enhanced constraints (.89 predictability score) allow readers high in vocabulary knowledge to make inferences earlier (i.e., 50 ms after the context); (b) for Experiment 2, whether enhanced constraints help those low in vocabulary knowledge to draw inferences earlier (i.e., 550 ms after the context); and (c) for Experiment 3, whether reduced constraints are particularly detrimental for low vocabulary readers, preventing them from generating the inferences that they were able to make with medium constraints (i.e., 1,050 ms after the context).

Accordingly, in the present experiments we manipulated context constraints (high: Experiments 1 and 2; low: Experiment 3). Nevertheless, we kept these experiments comparable with the previous ones regarding the interval between the end of the context and the target word (50 ms: Experiment 1; 550 ms: Experiment 2; 1,050 ms: Experiment 3), with the last word of the context sentence being always exposed for 450 ms. It follows, then, that the SOA –Stimulus Onset Asynchrony– i.e., the interval between the onset of the last word in a context sentence; e.g., *the woman*, for the example shown in Table 1) and the onset of a target word (e.g., *prayed*) was 500 vs. 1,000 vs. 1,500 ms for Experiments 1, 2 and 3, respectively.

Method

Participants

Twenty low and 20 high vocabulary readers participated in each experiment (see pre-experimental phase and Table 2).

Materials and Design

Forty short Spanish passages were used (see Calvo, Castillo & Estévez, 1999). Each passage (see Table 1 and Norming Study) was composed of (a) one predicting context sentence, (b) one non-predicting, control sentence, (c) one target word that represented the inference concept, and (d) one target word that represented a non-predictable event. On each of 40 experimental trials, each participant was presented with either a predicting or a control context sentence of each passage, followed by either an inferential or a non-predictable target word.

For each experiment, we used a 2 (Vocabulary: high vs. low) X 2 (Context: predicting vs. control) X 2 (Target: inferential vs. non-predictable) factorial design, with vocabulary as a between-subjects factor, and context and target as within-subjects variables. In the predicting condition, the target word was preceded by a context sentence suggesting a highly likely event. In the control condition, the target word was preceded by a sentence non-predictive of any particular event.

Apparatus and procedure

Sentences were presented one word at a time with a fixed-pace RSVP (Rapid Serial Visual Presentation) procedure on a computer screen: Each word (except the pretarget word, which was always visible for 450 ms) was exposed for 300 ms, plus 25 ms per letter (estimated mean word exposure across an average sentence: 418 ms), and there was a 50-ms blank interval between successive words (see Calvo et al., 1999). After the corresponding SOA interval (for the different experiments) at the end of each context sentence, the target word appeared flanked by asterisks (e.g., ** *prayed* **). Participants had to pronounce this word as quickly as they could. A microphone connected to a voice-activated relay and interfaced with the computer registered naming response latency.

A verification question was then presented on the screen on each trial, to ensure that participants were comprehending the explicit information in the context sentence. Participants responded by pressing one of two keys (*Yes* or *No*). Then the instruction to begin a new trial appeared on the screen.

Results

Comprehension of explicit information

There were no significant differences between the low and the high vocabulary groups in Experiment 1 (85.37 vs. 88.37% of verification questions correctly answered, respectively; *SD*= 6.60 vs. 7.58), Experiment 2 (86.75 vs. 89.25; *SD*= 7.12 vs. 7.99), and Experiment 3 (87.47 vs. 88.00; *SD*= 7.79 vs. 6.81). Furthermore, a 2 (Vocabulary group) X 3 (Experiment) ANOVA on comprehension scores revealed no interaction ($F < 1.0$), thus showing that the samples were comparable across experiments

Naming latencies

Mean latency scores were analyzed by means of 2 (Context) X 2 (Target) X 2 (Vocabulary group) ANOVAs. Whenever Context X Target, or Context X Target X Group interactions appeared, post-hoc analyses contrasting the predicting and the control condition were performed. If the inference concept is activated, then naming latencies for the inference target word should be shorter following the predicting context than following the control context. Activation scores (i.e., difference control - predicting; see Table 3) indicated how much time was saved in processing the target word in the predicting condition, which was assumed to reflect the inference.

Table 3
Mean Naming Latencies (in ms) for the Inferential and the Non-predictable Target Words Following the Predicting Context and the Control Context, and Activation Scores (i.e., Control *minus* Predicting), as a Function of Vocabulary Knowledge

Vocabulary	**Target**	**Predicting**		**Control**		**Activa-**
		M	**SD**	**M**	**SD**	**tion**
EXPERIMENT 1						
(500-ms SOA; .89 predictability)						
Low	Inferential	743	105	757	101	14
Low	Non-predictable	772	123	783	116	11
High	Inferential	692	115	712	129	20
High	Non-predictable	701	94	704	109	3
EXPERIMENT 2						
(1,000-ms SOA; .89 predictability)						
Low	Inferential	632	86	675	102	43*
Low	Non-predictable	695	117	712	137	17
High	Inferential	572	90	622	130	50*
High	Non-predictable	674	160	641	141	-33
EXPERIMENT 3						
(1,500-ms SOA; .56 predictability)						
Low	Inferential	690	118	694	115	4
Low	Non-predictable	689	115	696	117	7
High	Inferential	653	95	701	106	48*
High	Non-predictable	697	115	677	113	-20

Note. Positive activation scores (shorter latencies) reveal facilitation in the predicting condition; negative scores (longer latencies) show inhibition. *$p<.05$

Experiment 1

No significant effects emerged (see Table 3).

Experiment 2

The effects of context, $F(1, 38)= 4.23$, $p<.05$, and target, $F(1, 38)= 30.81$, $p<.0001$, were qualified by a Context X Target interaction, $F(1, 38)= 15.37$, $p<.001$. For the inferential target words, naming responses were 47 ms faster following the predicting context than following the control context, $F(1, 38)= 22.45$, $p<.001$. For the non-predictable words, there was a non-significant difference in the opposite direction (-8 ms; $F<1.0$). See Table 3.

Experiment 3

A borderline Context X Target interaction, $F(1, 38)= 3.81$, $p= .06$, was qualified by a three-way interaction, $F(1, 38)= 4.45$, $p<.05$. The high vocabulary participants named the inferential target words 48 ms faster following the predicting context than following the control context, $F(1, 38)= 8.06$, $p<.01$, whereas they showed a tendency to name the non-predictable target words more slowly in the predicting condition (-20 ms; $F<1.0$). In contrast, for the low vocabulary participants, there was neither significant facilitation nor inhibition ($F<1.0$). See Table 3.

Discussion

In Experiment 2 (high constraints; 1,000-ms SOA), inferences were generally drawn by both low and high vocabulary participants; in Experiment 3 (low constraints; 1,500-ms SOA) only the high vocabulary group generated inferences; in Experiment 1 (high constraints; 500-ms SOA) neither group made inferences. Taking these results together with those obtained by Calvo et al. (2001) previously, a major conclusion is that context constraints have greater importance for low than for high vocabulary readers. Our findings thus make a contribution to the argument that context constraints are a critical factor in predictive inferences (Calvo, 2000; Klin et al., 1999), in showing that the effect of context constraints varies as a function of prior vocabulary knowledge.

Thus, *enhanced* context constraints (i.e., .89 predictability score) allowed low vocabulary participants to draw inferences 500 ms earlier (i.e., in Experiment 2; whereas they drew no inferences with a .82 predictability score –*medium* constraints– in Calvo et al., 2001, under the same SOA condition). In addition, with *reduced* context constraints (i.e., .56 predictability score) low vocabulary readers no longer made the inferences at a late stage (1,500-ms SOA: Experiment 3; whereas they made inferences with a .82 predictability score –*medium* constraints– in Calvo et al., 2001, under the same SOA condition). Accordingly, either high context constraints or a long post-context interval (1,050 ms; i.e., 1,500-ms SOA) are necessary conditions for low vocabulary readers to generate inferences. Presumably, the reason for the beneficial effect of enhanced context constraints is that they help readers with a poorer mental lexicon to perform the search and selection processes involved in elaborative inferencing (Kintsch, 1988). This means that context constraints help these readers to find a word with which to represent the inference.

In contrast, high vocabulary readers could similarly make inferences in different context constraint conditions. Nevertheless, it should be noted that, for those high in vocabulary, enhanced context constraints did not further speed up predictive inferences. That is, they were not able to make inferences at the shortest post-context interval (50-ms delay; i.e., 500-ms SOA) even with enhanced context constraints (not only with medium constraints, as in Calvo et al., 2001). One possible reason for this is concerned with the elaborative nature of the processes involved in predictive inferences, which need time to be performed, regardless of the reader's capacity or knowledge. Bridging or connective inferences can be automatically generated in less than 500 ms, but not elaborative inferences (Magliano, Baggett, Johnson & Graesser, 1993; Millis & Graesser, 1994).

Our findings can be related to similar approaches to on-line elaborative inferences in adult readers (college students) as a function of individual differences in reading skill. Although the construct of reading skill is more general than vocabulary knowledge, reading skill has been assessed by means of measures involving vocabulary. Thus, Hannon and Daneman (1998) used the reading comprehension portion of the Nelson-Denny Test to separate groups of skilled and less skilled readers. The correlation between vocabulary and comprehension on this test in undergraduates is significant (r= .54; Dixon et al., 1988). Accordingly, the prior vocabulary component is likely to make a contribution to the reading skill construct. It is interesting to note the consistency between our own findings and those obtained by Hannon and Daneman (1998). Using a lexical decision measure to assess elaborative inferences, these authors also found evidence of inferences in skilled readers at a (single) 750-ms SOA; less skilled readers did not generate inferences unless the sentence context incorporated a question inducing the reader to make the inference. This implies that context constraints are a critical factor in helping less skilled (and low vocabulary) readers to draw elaborative inferences.

All approaches based on individual differences are open to alternative explanations. However, some of these can be ruled out in our study. One of them is that variations in inference processing could be due to low-level abilities such as word decoding and lexical access (see Perfetti, 1994). The fact that there were no significant differences between the low and the high vocabulary groups in accessibility speed is contrary to this hypothesis. Moreover, though vocabulary has been found to correlate with general intelligence (see Anderson & Freebody, 1986), it is unlikely that differences in intelligence could account for the relationship between vocabulary and inferences. Otherwise, low vocabulary readers should have had difficulties in comprehending explicit information, which did not occur. Furthermore, the inferential deficit for low vocabulary readers should have occurred across all conditions, regardless of post-context time and context constraints, which was not the case.

As a general implication for education, these results suggest that it is worthwhile to promote vocabulary acquisition in classroom instruction. The reason is that, even for able, mature readers who have no difficulty in comprehending explicit text, vocabulary facilitates inferential elaboration. While elaborative inferences are not necessary for a coherent representation of the propositional text-base, they are important for the representation of the mental model regarding what the text is about, and how it relates to other contents. Accordingly, elaborative inferences are an important source of information acquisition and construction that instructional programs should take into consideration. Further research is needed to determine which methods of vocabulary instruction are most effective (see Simpson & Randall, 2000).

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References

Anderson, R.C. & Freebody, P. (1986). Vocabulary knowledge. In H. Singer & R.B. Ruddel (Eds.), *Theoretical models and processes of reading* (pp. 343-371). Newark, DE: International Reading Association.

Calvo, M.G. (2000). The time course of predictive inferences depends on contextual constraints. *Language and Cognitive Processes, 15,* 293-319.

Calvo, M.G. & Castillo, M.D. (1996). Predictive inferences occur on-line, but with delay: Convergence of naming and reading times. *Discourse Processes, 22,* 57-78.

Calvo, M.G., Castillo, M.D. & Estévez, A. (1999). On-line predictive inferences in reading: Processing time *during* vs. *after* the priming context. *Memory and Cognition, 27,* 834-843.

Calvo, M.G., Estévez, A. & Dowens, M.G. (2001). *Time course of elaborative inferences as a function of prior vocabulary knowledge*. Manuscript submitted for publication.

Dixon, P., LeFevre, J. & Twilley, L.C. (1988). Word knowledge and working memory as predictors of reading skill. *Journal of Educational Psychology, 80,* 465-472.

Fincher-Kiefer, R. (1995). Relative inhibition following the encoding of bridging and predictive inferences. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21,* 981-995.

Graesser, A.C., Singer, M. & Trabasso, T. (1994). Constructing inferences during narrative text comprehension. *Psychological Review, 101,* 371-395.

Hannon, B. & Daneman, M. (1998). Facilitating knowledge-based inferences in less-skilled readers. *Contemporary Educational Psychology, 23,* 149-172.

Keefe, D.E. & McDaniel, M.A. (1993). The time course and durability of predictive inferences. *Journal of Memory and Language, 32,* 446-463.

Kintsch, W. (1988). The role of knowledge in discourse comprehension: A construction-integration model. *Psychological Review, 95,* 163-182.

Klin, C.M., Guzmán, A.E. & Levine, W.H. (1999). Prevalence and persistence of predictive inferences. *Journal of Memory and Language, 40,* 593-604.

Magliano, J.P., Baggett, W.B., Johnson, B.K. & Graesser, A.C. (1993). The time course of generating causal antecedent and causal consequence inferences. *Discourse Processes, 16,* 35-53.

McKoon, G. & Ratcliff, R. (1986). Inferences about predictable events. *Journal of Experimental Psychology: Learning, Memory and Cognition, 12,* 82-91.

McNamara, D.S. & Kintsch, W. (1996). Learning from text: Effects of prior knowledge and text coherence. *Discourse Processes, 22,* 247-288.

Millis, K.K. & Graesser, A.C. (1994). The time-course of constructing knowledge-based inferences for scientific texts. *Journal of Memory and Language, 33,* 583-599.

Perfetti, C.A. (1994). Psycholinguistics and reading ability. In M.A. Gernsbacher (Ed.), *Handbook of psycholinguistics* (pp. 849-894). San Diego, CA: Academic Press.

Simpson, M.L. & Randall, S.N. (2000). Vocabulary development at the college level. In R.F. Flippo & D.C. Caverly (Eds.), *Handbook of college reading and study strategy research* (pp. 43-73). Mahwah, NJ: Lawrence Erlbaum Associates.

Singer, M., Andrusiak, P., Reisdorf, P. & Black, N.L. (1992). Individual differences in bridging inference processes. *Memory and Cognition, 20,* 539-548.

Thurstone, L.L. & Thurstone, T.G. (1979). *Primary Mental Abilities Test*. Madrid: TEA Ediciones.