

Form and Meaning: Multiple Perspectives

James F. Lee and Albert Valdman
Editors

HH Heinle & Heinle
Thomson Learning™

United States / Australia / Canada / Denmark / Japan / Mexico / New Zealand
Philippines / Puerto Rico / Singapore / Spain / United Kingdom

Acquisition Editor: Wendy Nelson
Marketing Manager: Stephen Frail
Manufacturing Supervisor: Marcia Locke
Production Editor: Sarah Cogliano

Cover Designer: Sue Gerould/Perspectives
Compositor: Roberta Landi
Printer: Odyssey Press, Inc.

COPYRIGHT © 2000 Heinle & Heinle, a division of Thomson Learning.
The Thomson Learning Logo is a registered trademark used herein under license.

All rights reserved. No part of this work covered by the copyright hereon may be reproduced or used in any form or by any means, graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems, without the written permission of the publisher.

For permission to use material from this text, contact us:

web	www.thomsonrights.com
fax	1-800-730-2215
phone	1-800-730-2214

Heinle & Heinle Publishers
20 Park Plaza
Boston, MA 02116

UK/EUROPE/MIDDLE EAST:
Thomson Learning
Berkshire House
168-173 High Holborn
London, WC1V 7AA, United Kingdom

AUSTRALIA/NEW ZEALAND:
Nelson/Thomson Learning
South Melbourne
Victoria 3205 Australia

CANADA:
Nelson/Thomson Learning
1120 Birchmount Road
Scarborough, Ontario
Canada M1K 5G4

LATIN AMERICA:
Thomson Learning
Seneca, 53
Colonia Polanco
11560 México D.F. México

ASIA (excluding Japan):
Thomson Learning
60 Albert Street #15-01
Albert Complex
Singapore 189969

JAPAN:
Thomson Learning
1-1-1 Hitotsubashi, Chiyoda-ku
Tokyo 100 0003, Japan

SPAIN:
Thomson Learning
Calle Magallanes, 25
28015-Madrid
Espana

ISBN: 0-8384-0846-X

Printed in the United States of America
1 2 3 4 5 6 7 8 9 03 02 01 00 99

RELATIONSHIPS BETWEEN THE PROCESS OF READING, WORD INFERENCING, AND INCIDENTAL WORD ACQUISITION

Susanne Rott

University of Illinois at Chicago



Introduction

The rationale for reading as a significant source for second language (L2) learners' vocabulary development has its logical appeal. Krashen (1989, 1993), for example, argues that the elaborate properties of the lexical system cannot be learned through memorizing word lists alone but by processing and comprehending words in their various natural contexts as during reading. N. Ellis (1994) calls reading the "ideal medium" for vocabulary acquisition because the "word is frozen in time on the page, whereas in speech it passes ephemerally" (p. 40). In addition, Coady (1993, 1997; also N. Ellis 1994) argues in favor of reading as an essential source for L2 vocabulary gain because many low-frequency lexical items are encountered only in written text. He notes that low-frequency lexical items do appear in advanced and superior learners' passive and active lexical systems and that they could have gotten there only through reading. To acquire lexical items through reading as opposed to systematic practice is called "incidental word acquisition," and is the focus of the present research.

In their capacity as curriculum developers, language program directors (LPDs) have been concerned with providing L2 learners with a principled and systematic approach to lexical growth to speed up the rate of word learning and to address individual learner differences. While advances in second-language acquisition (SLA) research increasingly guide curricular decisions, research evidence about the usefulness of reading as a source of

input for learners' vocabulary development has been inconclusive. The relationship between the process of text comprehension and the process of inferring the meaning of unfamiliar words that leads to lexical acquisition is not well understood.¹ Thus the purpose of the present study is to develop a clearer picture of the relationship between reading, word inferencing, and word acquisition by examining the three issues in one research design.

Psycholinguistic Processes Involved in Learning Vocabulary from Text

One recently raised issue concerns the relationship between comprehending textual propositions and acquiring forms. Researchers have proposed that comprehension and acquisition are two processes with separate functions. Sharwood-Smith (1986) explained that the "interpretation of input will [. . .] take two distinct forms: that which specifically involves extracting meaning from all relevant information perceived by the language user [comprehension], and that which involves the mechanisms responsible for creating (or restructuring) grammatical competence [acquisition]" (p. 239). Lee and VanPatten (1995) further defined the latter "mechanisms" as "making form-meaning connections from linguistic data in the input," (p. 96) which they call "input processing." To the best of my knowledge no research studies that have explicitly examined the relationship between the processing of unfamiliar words and text comprehension have been conducted. Only one study found a significant positive correlation between the quantity of target words (TWs) learned while reading and the amount of textual propositions comprehended (Rott 1997). Findings of the investigation were based on L2 readers' recall of textual propositions and suggested that readers who comprehended text better gained more words during reading. The study, however, did not explicitly assess whether and how learners processed the TWs. The present investigation was conducted to follow up on these findings using a qualitative analysis to examine the relationship between text comprehension, word inferencing, and word acquisition.

The Reading Process and Word Inferencing

Logically there must be some relationship between the processes of constructing the meaning of a text and making meaning of specific, unfamiliar

words in that text. The nature of the relationship is, however, unclear because both processes have been investigated in four individual and separate lines of research: factors affecting text comprehension; word inferencing from context; and learners' strategic approaches both to reading and to assigning word meaning while reading.

Findings from reading research are reflected in L2 vocabulary studies. The mainly qualitative studies investigating the word inferencing process from context have identified three major factors that can have an impact on the outcome of inferencing. The investigations elicited details of text-based factors, such as learners' knowledge about the linguistic properties of an unknown word (Bensoussan and Laufer 1984; Haynes 1993; Na and Nation 1985) and context properties in which the unknown word appears (Bensoussan and Laufer 1984; Haynes 1993; Huckin and Bloch 1993; Mondria and Wit-DeBoer 1991), as well as learner-based factors, such as learners' metacognitive involvement and their strategic approach to inferring meaning (Chern 1993; Lee and Wolf 1997; Walker 1983; Wolf 1993). These factors can impede word-meaning assignment as well as have a conducive effect on it.

Ellis' (1994) model of word acquisition offers an analytical framework for the description of the mental activities involved in the word-learning process during reading. He integrates the areas of information processing and strategy use and emphasizes the readers' active involvement in the meaning assignment process, given that the reader applies word inferencing strategies with the purpose to comprehend text and not intentionally to learn vocabulary. The model comprises four factors: "(i) noticing novel vocabulary, (ii) selectively attending to it, and using a variety of strategies to try (iii) to infer its meaning from the context and (iv) to consolidate the memory for that new word" (p. 40).

It follows that reading, learners' attention to unfamiliar words, word inferencing, and the internalization of a new word are complexly inter-related processes. Until the exact nature of the relationships between these processes has been explored, it will not be possible to develop a comprehensive theory of vocabulary acquisition through reading.

Research Questions

The present study investigated three factors from Ellis' model, noticing, word inferencing strategy use, and word and text comprehension to

determine their effects on word knowledge gained through reading. The following questions guided the study:

1. Do L2 readers notice the repeated occurrence of the TW in compound nouns?
 - a. After how many exposures do readers assign meaning to a TW embedded in compound nouns?
 - b. Do readers continue to be successful with assigning word meaning after the initial correct inference?
2. Are learners' use of reading strategies related to their use of strategies to infer meaning of compound nouns?
 - a. Which strategies lead to successful word meaning assignment and to word acquisition?

The Present Study

Participants

The subjects were eight native speakers of English learning German as a foreign language at a large university in the Midwest. All subjects were enrolled in a third-semester course and can be considered low- and mid-intermediate learners. Since the data collection took place in the tenth week of the semester, it was possible to identify highly successful, average, and less-successful language learners in order to include in the study a variety of students typical of any language class. The overall class performance of three subjects could be categorized as highly successful, two as average, and three as less successful. To ensure that subjects did not have any prior knowledge of the target word (TW), a vocabulary pretest was administered. Subjects received a list of twelve German words including the TW and were asked to explain or define them in English. This was done one week before the researcher asked for volunteers to participate in the study.

Materials

The reading passage created by the researcher was fourteen sentences long. The researcher intentionally included words expected to be unfamiliar to the subjects besides, the seven occurrences of the TW, as well as complex sentence structures (subordinate clauses). Doing so should yield think-aloud protocols rich in data on the learners' thinking processes and should not result in a mere word-for-word or sentence-by-sentence translation task. The passage topic covered the German insurance system

and described various insurance policies that many Germans have (see Appendix A).

The TW, *Versicherung* (insurance), appeared seven times in the reading passage and was used as part of a compound noun in each instance, a linguistic feature that is not exclusively German but typical for the German language. Multiple exposures to the TW in a variety of compounds allowed assessing the effect of readers' awareness of the TW. In creating the word set, the second noun of the compound could not be a cognate but could be a word familiar to the subjects. For greater variety, the TW appeared in first and second position of the compound noun: *Krankenversicherung* (health insurance), *Versicherungsschutz* (insurance protection), *Versicherungsvertreter* (insurance agent), *Versicherungsmöglichkeiten* (insurance options), *Haftpflichtversicherung* (liability insurance), *Reiseversicherung* (travel insurance), and *Diebstahlversicherung* (theft insurance).

Instrumentation

A concurrent, introspective think-aloud protocol was used to gather data. It allowed for observing the subjects' cognitive processes (Ericsson and Simon 1993) as they read the text for meaning and attempted to assign meaning to unknown lexical items. In order to receive the most "natural" data, the think-aloud was unobtrusive. Only as subjects stopped verbalizing their thoughts did the researcher ask them to continue to say everything aloud. Additional data were collected during the debriefing, at which time subjects were asked to look back at the passage and recall the meaning of each TW or assign meaning if they had not done so during the initial reading. To determine vocabulary acquisition, subjects received an index card with the decontextualized TW and were asked to explain the meaning of the word in English. This was done immediately after they completed the think-aloud and was repeated two weeks later.

Data Analysis

To address the first research question, criteria were created to establish noticing of the TW. A TW was counted as noticed when learners (a) attempted to provide an English equivalent of the TW; (b) when learners made a comment about comprehension or miscomprehension of the TW; or (c) when learners demonstrated cognitive awareness of the importance of the TW for the passage by rereading it or making a comment about its reoccurrence.²

To address the second research question, the transcribed think-aloud protocols were first analyzed for the reading strategies learners used to comprehend the passage. The strategy classification employed was adopted from previous studies (Block 1986; Carrell 1989; Young and Oxford 1997), which presented rubrics of local and global strategies (see Appendix B). Next, the think-alouds were analyzed for word inferencing strategies. Instances in which the TWs occurred were examined in detail to assess learners' specific approaches for assigning meaning to unfamiliar words. The same strategy classification was used for word inferencing as for the analysis of reading strategies.

Results

Individual learner profiles were created. Table 1 provides a summary of each subject's reading and word inferencing strategy usage, the number of times each strategy was employed, the number of correct inferences, and the degree of awareness of the TW. Moreover, subjects are identified as successful, average, or less-successful classroom learners. Data analysis revealed three profiles of learners whose overall approach to reading and word inferencing was distinct: four learners used mainly local strategies; one learner used mainly global strategies; and three learners used a combination of local and global strategies. The following section will first present a summary of readers' mental activities, focusing on their awareness of the TWs and the effect of multiple exposures on learning. We next provide examples of learners' strategic approach to assigning word meaning and, finally, show which strategies led to successful inferences and acquisition. English translations of the input passage will be provided in round brackets.

Noticing, Inferencing, and Acquisition

Table 2 (p. 265) provides an overview of the number of TWs noticed, the number of correct inferences, and immediate and delayed word knowledge gain. The protocols showed that each reader noticed the TW in several contexts (4–7 times) by attempting to infer meaning, commenting on comprehension, or rereading the TW. Noticing was apparently not strategy-dependent. At least one learner from each profile group (local, global, combination) noticed all seven TWs. Noticing was somewhat related to the learners' overall success in the language class in that the three successful learners and the one average learner indicated noticing all seven TWs. In addition, the successful learners made not only the greatest number of

Table 1
Subjects' Strategy Use

Subject	Reading Strategies		Word Inferring Strategies	
	Local Strategies	Global Strategies	Local Strategies	Global Strategies
F (less-successful learner)	<p>attempts to translate every word</p> <p>skips words</p> <p>breaks lexical items into parts (does not lead to inference)</p> <p>monitor: questions meanings of words</p>		<p>inferences using immediate context (correct): 2*</p> <p>demonstrates awareness of TWs but does not infer meaning: 3</p> <p>breaks TW into its two components: 1</p> <p>skips TW (no allocation of conscious awareness): 1</p>	
A (average learner)	<p>attempts to translate every word</p> <p>skips words</p> <p>breaks lexical items into parts (does not lead to inference)</p> <p>monitor: questions meaning of words</p>	<p>mentions plan to gain information during reading: "we will find out"</p>	<p>inference using immediate context (conceptually correct but does not assign explicit meaning to the TW): 1</p> <p>breaks TW into its two components: 2</p> <p>tries different word categories: 1</p> <p>skips TW (no allocation of conscious awareness): 3</p>	

*Numbers indicate how many times the strategy was used out of 7 possible instances.

(continued)

Table 1 (continued)

Subject	Reading Strategies		Word Inferencing Strategies	
	Local Strategies	Global Strategies	Local Strategies	Global Strategies
M (less-successful learner)	<p>attempts to translate every word</p> <p>skips words</p> <p>uses grammatical knowledge (does not lead to inference)</p> <p>monitor: questions meaning of sentences</p> <p>monitor: questions meanings of words</p>		<p>using immediate context (correct): 1</p> <p>use of grammatical knowledge: 3</p> <p>demonstrates awareness of TWs but does not infer meaning: 1</p> <p>skips TW (no allocation of conscious awareness): 2</p>	
H (successful learner)	<p>skips words</p>	<p>mentions plan to gain information during reading: "some of these words I cannot relate to them; I have to skip out and put them into context"</p>	<p>using immediate context (correct): 1</p> <p>use of grammatical knowledge (aids inferencing of ensuing six TWs): 2</p> <p>transferred knowledge from first inference (correct): 6</p>	

L (successful learner)

mentions plan to gain information during reading: "we will find out when we keep on reading"
 uses inferences and draws conclusions

use of background knowledge: 7
 conceptual inferences (four correct, one incorrect) elaborating on the context without assigning exact meaning to the TW: 5
 lexically correct inferences: 2

C (less-successful learner)

(attempts to comprehend every word)
 rereading of unfamiliar words
 monitor: questions meaning of a clause or sentence
 monitor: questions meaning of words

speculates beyond information given in the text (based on misinterpretation of graphemic clues)
 uses inferencing and draws conclusions (based on accessing the wrong schema)

using immediate context (correct meaning assignment): 1
 demonstrates awareness of TWs but does not infer meaning: 2

use of background knowledge: conceptual inferences, circumlocution of the meaning of the TW (incorrect): 4
 attempt to integrate information from previous encounter with the TW to make meaning of the present TW (unsuccessful): 1

(continued)

Table 1 (continued)

Subject	Reading Strategies		Word Inferencing Strategies	
	Local Strategies	Global Strategies	Local Strategies	Global Strategies
R (average learner)	skips words use of grammatical knowledge (does not lead to inference)	attempts to integrate textual information from previous ideas	demonstrates awareness of TW's but does not infer meaning: 4 breaks TW into its two components in combination with other strategies: 3	use of background knowledge: conceptual inferences, circumlocution of the meaning of the TW (two correct, one incorrect): 3
K (successful learner)	skips words monitor: questions meaning of words	integrated textual information (successful)	grammatical knowledge (conceptually correct inference): 1 skips TW after rereading previous encounters (noticing but no meaning assignment): 1 transferred knowledge from inference of the fifth TW: 2	transferred knowledge from inference from first TW (one correct one incorrect) in combination with background knowledge to assess the logic of the context: 2 integrating information from previous encounter with the TW leading to correct meaning assignment: 1

Table 2
Summary Table of Subjects' Cognitive Efforts

Subject	Noticing	Correct Inferences		Acquisition	
		Lexical	Conceptual	Immediate	Delayed
Local Strategy Users					
F (less successful)	6	2 (1, 6)	—	1	—
A (average)	4	—	1 (3)	—	—
M (less successful)	5	—	1 (1)	7	—
H (successful)	7	7 (1-7)	—	7	—
Global Strategy User					
L (successful)	7	2 (1, 2)	4 (3-6)	3	—
Combination Strategy Users					
C (less successful)	6	1 (1)	—	—	—
R (average)	7	—	2 (1, 5)	2	—
K (successful)	7	3 (5, 6, 7)	3 (1, 2, 3)	7	yes

Notes: Summary is based on 7 TW occurrences. Numbers in parentheses under the category Correct Inferences indicate which encounter is referenced.

correct inferences but also consecutive inferences. All but one of the average and less-successful learners inferred the meaning of the TW the first time they encountered it. But for subsequent encounters, they inferred meaning only sporadically in the remainder of the text. Likewise, as learning was assessed immediately after reading, three of the eight learners (two successful and one less-successful learner) recalled the meaning of the TW in all seven instances. Three readers recalled only some TWs (1-3 times), and two readers did not recall any. Only one learner who had noticed the TW at each encounter and was able to infer all words immediately after reading demonstrated productive word knowledge two weeks later. This learner, K, will be discussed in detail later.

Reading Strategies, Word Inferencing Strategies, and Acquisition

Unlike previous research that showed that type of strategy use is related to a particular proficiency level (Hammadou 1991; Lee and Wolf 1997; Wolf 1993; Wolff 1987), the individual learner profiles created from the current think-aloud protocols placed these third-semester learners (low- to mid-intermediate level) into three distinct groups of strategy users. Four readers who had difficulties decoding content and text structure relied heavily on morphosyntactic word features (local strategy users),

characteristic for beginning learners. Three readers, though experiencing similar comprehension difficulties, used morphosyntactic and schema knowledge as well as intersentential context (local and global strategy users), characteristic for intermediate learners. The one reader who accessed the necessary background and schema knowledge (global strategy user) used strategies characteristic of advanced learners and native speakers. Successful text comprehension and word inferencing were not, in this study, associated with a particular group of strategy users. In both groups of local and combination strategy users one reader was successful while the others were less successful with text comprehension and TW meaning assignment.

The profiles of the learners all suggest that there is a strong relationship between reading and word inferencing strategies. Learners' strategic approaches to constructing meaning of the input passage reflected their use of strategies while making meaning of the unfamiliar TW. As shown in Table 1, all learners' use of reading strategies for passage comprehension was consistent with their use of word inferencing strategies. Due to the consistency of comprehension and word inferencing strategies, the following analyses focus only on the latter.

Local strategy users. Only one of four local strategy users, H, was a successful classroom learner. Learners F, M, and A, who were average or less-successful learners, approached constructing their discourse models with a word-for-word translation. Like the subjects in Bensoussan and Laufer (1984), these learners failed to recognize or make meaning of many of the words in the passage. They used but few local strategies (skipping unknown words predominated) without much success. Their meaning assignments depended heavily on the recognition and comprehension of words in the immediate context of the TW. Learner M, for example, made the following inference from local context:

Input Passage: Alle Deutschen haben Krankenversicherung . . .

(All Germans have health insurance . . .)

Learner Discourse: all Germans have medical insurance that's what I am guessing from Kranken.

Learner F, also using the immediate context of the TW, made two lexically correct inferences. Learner M was able to infer the meaning of the first TW, and learner A inferred a conceptually acceptable meaning of the third TW.

The learners repeatedly expressed the vagueness of their guesses. Learner A questioned her comprehension of the sentence that introduces the concept of insurance agents:

Input Passage: Für diese Gesellschaften arbeiten Versicherungsvvertreter. (Insurance agents work for these companies.)

Learner Discourse: oh no Gesellschaften companies . . . maybe, I don't know eh work Versicherungsvertreter which is maybe the workers . . . maybe.

Furthermore, these local strategy users recognized the TW as a compound noun. M verbalized the following:

Learner Discourse: another . . . it got the same beginning as the other word but it is changed in the end.

Learner A, for example, replaced the TW with a placemaker in combination with the second noun of the compound saying aloud:

Input Passage: Versicherungsmöglichkeiten (insurance options/possibilities)...

Learner Discourse: something possibilities.

Learner M used his metalinguistic knowledge about features of the German language hampered his word inferencing process. He expressed his frustration with the TW *Versicherungsmöglichkeiten* (insurance options/possibilities) and German compound nouns explaining:

Learner Discourse: from my experience I guess that is one of those German words which express an entire phrase like a feeling, like those governmental words.

This experience with “long German words” seems to have rather discouraged him from attempting to infer word meaning because he mentioned several times “again, it’s too long.” It is clear that word acquisition will not take place if a learner intentionally skips TWs. This finding is similar to one in Lee (1999), who found that comprehension difficulties impeded processing past tense morphology and that certain reading strategies (i.e., skipping unknown words) circumvented processing morphology.

Learner H, who also used mainly local strategies for reading comprehension and word meaning assignment, used fewer strategies overall but was more successful than the other local strategy users. The only reading

strategy he used was to skip unfamiliar words, but, in contrast to learners A, F, and M, he recognized more words and comprehended the majority of the text propositions. Learner H approached word inferencing with an analysis of the grammatical features of the TW. He correctly comprehended words in the immediate context of the TW and recognized it as a compound noun by pausing between the two nouns while rereading it.

Input Passage: Krankenversicherung (health insurance).

Learner Discourse: Kranken [pause] versicherung...

Demonstrating intratextual awareness of the reoccurrence of the TW, he used the knowledge gained during the first encounter at every subsequent encounter, even as he failed to comprehend the content of some propositions. At each encounter, he separated the TW from its compound, translating it with two nouns. As he encountered a second part of the compound that he did not recognize, he translated it with the place-marker “something.”

Input Passage: Versicherungsschutz (insurance protection)...

Learner Discourse: something with insurance again.

During the debriefing that followed the think-aloud protocol, learner A was not able to give the meaning of any of the TWs. Learner F gave only the first TW correctly. Learners M and H gave the correct meanings of all seven TWs. Two weeks later, however, none of these learners could recall the meaning of the TW, not even the two who assigned correct meaning to all seven compound nouns.

Global strategy user. Learner L was the only subject to approach text comprehension and word inferencing using mainly global strategies. Five times, learner L related textual information to her own knowledge about the topic, elaborated on the passage, and rephrased the context of the TW.

Input Passage: Für diese Gesellschaften arbeiten Versicherungsvertreter. (Insurance agents work for these companies.)

Learner Discourse: Versicherungsvertreter—probably people who have been trained to handle this kind of stuff.

Learner L was instantly satisfied with her broad conceptual inferences and did not attempt to gain the exact lexically correct meaning. She did,

however, indicate her awareness of the vagueness of her inferences adding several times “probably” and “sounds like.” For two TWs she used the lexically correct English translation. It is questionable, however, whether she made the form-meaning connection between the TW *Versicherung* and the English equivalent *insurance* because she incorrectly used *insurance* also for another noun, *Gesellschaft*, which means *company*, as well as for the TW. Moreover, she was not able to apply the TW knowledge she had gained through repeated correct inferences to make meaning of the seventh TW. After the think-aloud, when asked to recall the meaning of the TW, she again circumscribed the meaning of TWs one, two, and four. Learner L failed to supply the meaning of the TW two weeks after the reading treatment.

Combination of local and global strategy users. Learners C, K, and R approached reading comprehension and word inferencing with local as well as global strategic sources. Interestingly, they each represent a different type of classroom learner. While they all noticed the TWs in the passage, the number of correct inferences is low for the less-successful and average learners but quite high for the successful learner.

Although learner R used local as well as global strategies, he did not integrate these knowledge sources but rather used them independently for individual TWs. Using a local strategy, namely to question a word’s meaning, learner R demonstrated awareness of four TWs by verbalizing “no idea.” A second local strategy he used was to break the TW into its components which, in his case, did not help him to assign meaning as the following example shows.

Input Passage: Die meisten Leute haben auch eine Haftpflichtversicherung. (Most people also have liability insurance.)

Learner Discourse: Versicherung... um, most people have, um Haftpflichtversicherung.

During three TW encounters learner R used his background knowledge or elaborated on the input passage, a global strategy, to assign meaning to the TW. Recognizing words from the context, he circumscribed conceptually an incorrect meaning of the TW.

Input Passage: Für diese Gesellschaften arbeiten Versicherungsvetreter. (Insurance agents work for these companies.)

Learner Discourse: for this Gesellschaften maybe Versicherung is some kind of benefit many people have to work for this.

In two contexts he inferred meaning correctly and in one incorrectly. Looking back over the passage during the postreading debriefing, the learner made two conceptually correct inferences. Two weeks later learner R could not, however, recall the meaning of the TW.

While learners K and R used the local strategy of skipping unknown words, learner C attempted to comprehend every word. Learner C took twice as long to complete the think-aloud than the other learners because he reread individual words repeatedly. Even so, he did not infer correct word meaning. Learner C integrated information gained through the use of local and global strategies (in contrast to Learner R). He correctly inferred the lexical meaning of the TW, applying the schema of illness and recognizing the word *Krank* (sick) in the immediate context. Four other inferences were based on incorrectly interpreted textual clues (mostly graphemic misinterpretations) and the wrong schema. For instance, he misinterpreted the idea that insurance companies provide protection (*Versicherungsschutz*) as doctors giving people shots. Moreover, his elaboration of the text was based on stringing together words and imposing an interpretation on them. For example, he recognized the words *viel Geld* (a lot of money) and *arbeiten* (to work) and interpreted them as follows:

Input Passage: Dafür gibt es große Gesellschaften, die diesen Schutz anbieten. Das kann oft sehr viel Geld kosten. Für diese Gesellschaften arbeiten Versicherungsvertreter. (There are big companies which offer this kind of protection. This protection can often be expensive. Insurance agents work for these companies.)

Learner Discourse: these Gesellschaften [companies] it's like a worker maybe they work odd hours or something or maybe they don't make much money maybe Versicherungsvertreter maybe that means they don't make a lot of money.

Although subject C continuously monitored his inferencing process, expressing several times his insecurity about his inferences with “maybe,” he appeared to be satisfied with his inferences saying “OK. I go on.” At the fifth TW encounter, however, he assessed that he had miscomprehended the text and verbalized that his discourse model did not make any sense.

Input Passage: Die meisten Leute haben auch eine Haftpflichtversicherung. Sie hilft, wenn man etwas von einer anderen Person kaputt macht, wie z.B. wenn man in einem Geschäft eine teure Vase zerbricht. (Most people have liability insurance. It covers, if one breaks something of another person, for example, in case one breaks an expensive vase in a store.)

Learner Discourse: it's a visiting doctor I think . . . oh they may get a visiting doctor for a vase . . . oh no.

Demonstrating awareness of the reoccurrence of the TW, he reread previous encounters with the TW but was not then able to integrate the information to make sense of the present context.

Input Passage: Für diese Gesellschaften arbeiten Versicherungsvertreter... Da die Deutschen auch oft Abenteuerurlaube machen, schließen sie eine Reiseversicherung ab. (Insurance agents work for these companies . . . Because Germans often go on adventure trips they sign up for travel insurance.)

Learner Discourse: Reise vacation Versicherung oh, so up here . . . Versicherungsvertreter and I thought that meant that they don't make much money, so perhaps that means they go on vacation with people that don't make much money.

At this point he gave up the attempt to make sense of the rest of the passage. During the debriefing learner C was seemingly exhausted, not being able or willing to look back in the text and assign meaning to the TWs. Learner C did not acquire the TW.

Learner K started out using local strategies that lead her to a conceptually correct inference of the first TW. She used words from the context of the TW and analyzed the TW for its graphemic feature, translating *Krankenversicherung* (health insurance) as "sickness security." Her inference was apparently influenced by recognizing the graphemic feature of "-sicherung" from *Versicherung* as a form of *Sicherheit* (security) which she had encountered and comprehended correctly in the previous sentence. Learner K then applied this knowledge in order to make meaning of TWs two and three. While the transfer of the conceptually correct inference of security made sense in both contexts, it made less sense in the context of TW four. At that point, she applied her background knowledge and

displayed intratextual awareness by looking at previous encounters with the TW, but ultimately decided to skip the fourth TW. She then continued reading and gathered information from the ensuing context, arriving at the lexically correct translation of the TW by saying aloud,

Learner Discourse: OK, OK so *Versicherung* might be insurance.

Although her use of “might” suggests insecurity about her inference, she transferred the lexically correct meaning to the following two encounters with the TW without hesitation. When she was asked after the think-aloud to recall the meaning of the TWs, she used the lexically exact meaning in all instances (including the first three and the fourth, which she had skipped) and explicitly mentioned that she had inferred the correct meaning as she had encountered the fifth TW. Learner K was unique among the eight subjects in that two weeks later she was the only one to recall the meaning of the TW.

Learner K’s profile conforms to Ellis’ (1994) strategic information processing model of word acquisition. It provides further details about the possible stages involved in learning a word: (i) the reader noticed the TW during the first encounter and each reoccurrence, (ii) attempted to infer meaning in each instance by (iii) using various local and global strategies, and (iv) demonstrated through a production test that she had internalized the word. Concerning the relationships between the individual stages, this reader interacted in depth with the text through a problem-solving approach by deriving meaning “on the basis of knowledge of language (target, native, or other) and of the situation [content of the text]” (Bialystock 1983, p. 105). She noticed linguistic features of the TW, recognizing it as a compound noun, and gained conscious conceptual understanding of its literal meaning by using background knowledge as well as local and intrasentential context.

Discussion

The impetus of the present study was to develop a better understanding of the mental processes involved in and the relationships between reading comprehension, noticing and assigning meaning to unfamiliar words, and word acquisition. The investigation discovered that for a small group of intermediate readers of German a combination of factors affects productive word knowledge gained as a result of reading.

All learners noticed most of the TWs; in 42 out of 49 possible encounters, the learners demonstrated noticing. Interestingly, all learners made an acceptable inference (i.e., exact or conceptual) of the word's meaning at their first encounter with it. But only two learners continued successfully to assign meaning in consecutive encounters, whereas four learners assigned meaning from varied encounters only. In other words, repeated noticing and correct-meaning assignment did not automatically result in knowledge transfer to ensuing encounters.

Although several learners could identify the meanings of the TWs, only one retained that knowledge two weeks later. This result is somewhat surprising, but it does lend support to the notion that word learning during reading is a cumulative, incremental process (e.g., Nagy, Anderson, and Herman 1987). This one reader noticed the compound feature of the TW during the first encounter, continued to notice the TW during consecutive encounters, but gained complete understanding only while processing the TW for the fifth time. Without question, multiple encounters during reading were crucial for this learner's acquisition of the TW. Via repeated encounters, the learner accumulated syntactic and semantic information about the TW. And yet, this learner was unique among the eight who participated in the study. Like this learner, two others assigned correct meanings to all seven targets immediately after performing the think-aloud. Unlike this learner, they could not identify the meaning of the TW two weeks later. These readers' think-alouds did not confirm the positive effect of multiple encounters with an unfamiliar word on lexical growth as suggested in the L1 and L2 literature (e.g., Jenkins, Stein, and Wysocki 1984; Nagy, Anderson, and Herman 1987; for a summary of early studies: Nation 1990; Rott 1999).³ The number of subjects involved in the present study, however, is not sufficient to make conclusions on the issue of multiple exposures. Future research should seek to find more learners who acquire the target (i.e., retain it two weeks after exposure) and analyze their reading and word inferencing profiles for similarities.

The protocols further revealed that these L2 readers relied heavily on lexical recognition for text reconstruction. Present data lend support to Laufer's (1992) suggestion that the nature of the threshold for reading comprehension is not exclusively but largely lexical and that text comprehension requires about 95 percent vocabulary coverage. During their meaning construction of the passage local strategy users focused on word recognition and word inferencing and were only minimally concerned

with understanding the larger concepts of the passage, that is, comprehension of individual ideas consisted of and depended on the number of familiar words and did not involve higher-order thinking skills for overall text understanding. Conversely, the learner who approached text comprehension and word inferencing with merely global strategies was concerned only with understanding the text on a conceptual level, focusing on neither familiar nor unfamiliar linguistic details. Her text and TW comprehension depended on the availability of background knowledge of the individual propositions that were activated by recognizing keywords from the passage. Those learners who combined the use of local and global strategies paid attention to linguistic detail and attempted to assimilate it with their conceptual understanding of textual ideas. Their comprehension depended on the correct recognition of the words in the context of the TW, the activation of the correct schema, and the availability of background knowledge.

With respect to the relationship between text comprehension, word inferencing, and lexical growth, the think-aloud data support the hypothesized distinction between the processes of comprehension and acquisition (Sharwood-Smith 1986). Even though all learners demonstrated TW recognition in multiple instances, all but one did not retain word knowledge. The two processes are indeed related (Lee and VanPatten 1995) in that they both initially deal with making meaning (of text or words). Yet, integration of words into the learner's lexicon apparently requires further processing as summarized in Hulstijn's (1992) "mental effort hypothesis." The two learners who successfully used only local or only global strategies seemed to interact less with the text either by simply transferring word knowledge (neglecting concept comprehension) or by being satisfied with a conceptual understanding (neglecting to assign concise meaning to the TW form).

These observations lend some support to Robinson's (1995) analysis of recent studies that incidental learning can be either a data-driven accumulation of instances or a conceptually driven process accessing schema in long-term memory. We can support his contention using the data on noticing and the data from the immediate postreading assessment of word learning. All learners noticed the TWs but did so in a variety of ways. Learners engaged a variety of word inferencing strategies and were successful in many ways. Even so, the data also suggest that Robinson's assertion may need refining. Only one learner retained word knowledge beyond two weeks. Is long-term word acquisition a data-driven or a conceptually driven process?

Conclusion and Implications

The most obvious limitation of the present study is its small number of subjects. While observations from this qualitative investigation cannot be translated into generalizations, they highlight the individual variation characteristic of language learning. Data from the present study suggest that describing incidental vocabulary gain as a “by-product” of reading really does not capture the range of cognitive processes involved in meaning assignment and word learning. The learner profiles suggest the following relationships, all of which are subject to further research:

1. There seems to be no relationship between simply noticing the recurrence of an unfamiliar word and long-term word knowledge gain. Noticing does not appear to result automatically in learning.
2. There seems to be no causative relationship between multiple exposures and long-term word knowledge gain. Long-term gains appear to be related to whether multiple encounters lead to an accumulation of additional information about an unfamiliar word.
3. Greater word learning seems to be related to greater text comprehension. Comprehending text, however, does not automatically result in productive word knowledge.
4. The types of text comprehension strategies learners employ are related to the types of strategies they use to infer word meaning.
5. Successful word inferencing seems to be related more to assigning meaning successfully to the words surrounding the TW than it is to the type of strategies used to infer word meaning.

Pedagogical implications from the present study are limited. But present observations suggest a need for a greater awareness and understanding on the part of the teacher as well as the student regarding comprehension problems when reading L2 texts. Findings warrant that language instructors need to be cognizant that learners with different approaches and with varying degrees of success in reading and word inferencing attend the same class. Although the trainability of reading and word inferencing strategies (Kern 1989) is inconclusive, learners need to reflect on their strategy use and to assess their individual success. Therefore language students need to engage in reading on a regular basis to receive repeated opportunities to assess their abilities and eventually increase their lexicon during reading.

Notes

1. To date, research lacks a refined definition of incidental word acquisition that includes a description of the cognitive mechanisms involved in assigning meaning to unfamiliar words during reading and storing lexical items in memory. Incidental vocabulary acquisition has been described as a “by-product” of reading comprehension, as learning while performing another task (e.g., Nation 1990; Schmidt 1995), or “in negative terms as the accidental learning of information without the intention of remembering that information” (Hulstijn et al. 1996, p. 327). The common thread running through these definitions is that they treat word gain during reading as a product. Such operationalization suggests that incidental word learning is a rather “unpredictable” process (Paribakht and Wesche 1996, p. 157) in which the L2 reader’s role is that of a passive “recipient” of word knowledge, while being actively involved in reading text for meaning.
2. Regarding the relationship between learners’ strategic approach to information processing, learning, and retrieval of new linguistic items, Robinson (1995) summarizes that there is a differential effect for data-driven and conceptually driven information processing. Both require conscious attention to the unfamiliar form in the input. But while data-driven processing results in the accumulation of instances leading to acquisition and in “automatic activation of previously attended information” (p. 317) during retrieval, conceptually driven processing involves accesses to schema and long-term memory leading to learning and requiring attentional control for retrieval.
3. The limited effect of exposure frequency could have been due to the treatment passage that was created for this investigation. Encountering an unfamiliar word seven times in the relatively short passage (twenty-four sentences) might have caused additional problems to make meaning of the TW and might have added to the readers’ frustration. Usually multiple encounters with the same word happen over several paragraphs within one text or while reading different texts over a period of time.

Works Cited

- Bensoussan, Marsha, and Batia Laufer. 1984. Lexical Guessing in Context in EFL Reading Comprehension. *Journal of Research in Reading* 7: 15–32.

- Bialystock, Ellen. 1983. Inferencing: Testing the "Hypothesis Testing" Hypothesis. In *Classroom-Oriented Research in Second Language Acquisition*, edited by Herbert W. Seliger and Michael Long, 105–123. Rowley, MA: Newbury House.
- Block, Ellen. 1986. The Comprehension Strategies of Second Language Readers. *TESOL Quarterly* 20: 463–494.
- Carrell, Patricia L. 1989. Metacognitive Awareness and Second Language Reading. *Modern Language Journal* 73: 121–134.
- Chern, Chiou L. 1993. Chinese Students' Word Solving Strategies in Reading in English. In *Second Language Reading and Vocabulary Learning*, edited by Thomas Huckin, Margot Haynes, and James Coady, 67–85. Norwood, NJ: Ablex Publishing Corporation.
- Coady, James. 1993. Research in ESL/EFL Vocabulary Acquisition: Putting It in Context. In *Second Language Reading and Vocabulary Learning*, edited by Thomas Huckin, Margot Haynes, and James Coady, 3–23. Norwood, NJ: Ablex.
- _____. 1997. L2 Vocabulary Acquisition through Extensive Reading. In *Second Language Vocabulary Acquisition*, edited by James Coady and Thomas Huckin, 273–290. Cambridge, UK: Cambridge University Press.
- Ellis, Nick. 1994. Consciousness in Second Language Learning: Psychological Perspectives on the Role of Conscious Processes in Vocabulary Acquisition. *AILA Review* 11: 37–56.
- Ericsson, Anders K., and Herbert A. Simon. 1993. *Protocol Analysis: Verbal Reports as Data*. Cambridge, MA: MIT Press.
- Hammadou, Joan. 1991. Interrelationships among Prior Knowledge, Inference, and Language Proficiency in Foreign Language Reading. *Modern Language Journal* 75: 27–38.
- Haynes, Margot. 1993. Patterns and Perils of Guessing in Second Language Reading. In *Second Language Reading and Vocabulary Learning*, edited by Thomas Huckin, Margot Haynes, and James Coady, 46–66. Norwood, NJ: Ablex.
- Huckin, Thomas, and Joel Bloch. 1993. Strategies for Inferring Word Meaning in Context: A Cognitive Model. In *Second Language Reading and Vocabulary Learning*, edited by Thomas Huckin, Margot Haynes, and James Coady, 153–180. Norwood, NJ: Ablex.

- Hulstijn, Jan H. 1992. Retention of Given and Inferred Word Meanings: Experiments in Incidental Vocabulary Learning. In *Vocabulary and Applied Linguistics*, edited by Pierre J. L. Arnaud and Henri Bejoint, 113–125. London: MacMillan.
- Hulstijn, Jan H., Merel Hollander, and Tine Greidanus. 1996. Incidental Vocabulary Learning by Advanced Foreign Language Students: The Influence of Marginal Glosses, Dictionary Use, and Reoccurrence of Unknown Words. *Modern Language Journal* 80: 327–339.
- Jenkins, Joseph R., Marcy L. Stein, and Kathrine Wysocki. 1984. Learning Vocabulary through Reading. *American Educational Research Journal* 21: 767–787.
- Kern, Richard G. 1989. Second Language Reading Strategy Instruction: Its Effects on Comprehension and Word Inference Ability. *Modern Language Journal* 73: 135–149.
- Krashen, Stephen. 1989. We Acquire Vocabulary and Spelling by Reading: Additional Evidence for the Input Hypothesis. *Modern Language Journal* 73: 450–464.
- _____. 1993. *The Power of Reading*. Englewood, CO: Libraries Unlimited.
- Laufer, Batia. 1992. How Much Lexis Is Necessary for Reading Comprehension? In *Vocabulary and Applied Linguistics*, edited by Pierre J. L. Arnaud and Henri Bejoint, 133–145. London: Macmillan.
- Lee, James F. 1999. On Levels of Processing and Levels of Comprehension. In *Advances in Hispanic Linguistics: Papers from the 2nd Hispanic Linguistics Symposium*, edited by Javier Gutiérrez-Rexach and Fernando Martínez-Gil, 42–58. Somerville, MA: Cascadilla Press.
- Lee, James F., and Bill VanPatten. 1995. *Making Communicative Language Teaching Happen*. New York: McGraw-Hill.
- Lee, James F., and Darlene Wolf. 1997. A Quantitative and Qualitative Analysis of the Word-Meaning Inferencing Strategies of L1 and L2 Readers. *Spanish Applied Linguistics* 1: 24–64.
- Mondria, Jan-Arien, and Marijke Wit-DeBoer. 1991. The Effects of Contextual Richness on the Guessability and the Retention of Words in a Foreign Language. *Applied Linguistics* 12: 249–267.
- Na, Liu, and I. S. P. Nation. 1985. Factors Affecting Guessing Vocabulary in Context. *RELC Journal* 16: 33–42.

- Nagy, William, Richard C. Anderson, and Patricia A. Herman. 1987. Learning Word Meanings from Context during Normal Reading. *American Educational Research Journal* 24: 237–270.
- Nation, I. S. P. 1990. *Teaching and Learning Vocabulary*. New York: Newbury House.
- Paribakht, Sima T., and Majory Wesche. 1996. Enhancing Vocabulary Acquisition through Reading: A Hierarchy of Text-Related Exercise Types. *Canadian Modern Language Review* 52: 155–178.
- Robinson, Peter. 1995. Review Article: Attention, Memory, and the “Noticing” Hypothesis. *Language Learning* 45: 283–331.
- Rott, Susanne. 1997. The Effect of Exposure Frequency and Reading Comprehension on Incidental Vocabulary Acquisition and Retention through Reading for Learners of German as a Foreign Language. Ph.D. diss., University of Illinois at Chicago.
- _____. 1999. The Effect of Exposure Frequency on Intermediate Language Learners’ Incidental Vocabulary Acquisition and Retention through Reading. *Studies in Second Language Acquisition* 21 (4).
- Schmidt, Richard. 1995. Consciousness and Foreign Language Learning: A Tutorial on the Role of Attention and Awareness in Learning. In *Attention & Awareness in Foreign Language Learning*, Technical Report no. 9, edited by Richard Schmidt, 1–65. Hawai’i: University of Hawai’i at Manoa, Second Language Teaching and Curriculum Center.
- Sharwood-Smith, Michael. 1986. Comprehension Versus Acquisition: Two Ways of Processing Input. *Applied Linguistics* 7: 239–255.
- Walker, Laura J. 1983. Word Identification Strategies in Reading a Foreign Language. *Foreign Language Annals* 16: 293–299.
- Wolf, Darlene F. 1993. The Relationship between Word Class and Word Meaning Inferencing Strategies in Foreign Language Reading. Paper presented at AILA, Amsterdam.
- Wolff, Dieter. 1987. Some Assumptions about Second Language Text Comprehension. *Studies in Second Language Acquisition* 9: 307–326.
- Young, Dolly J., and Rebecca Oxford. 1997. A Gender-Related Analysis of Strategies Used to Process Written Input in the Native Language and Foreign Language. *Applied Language Learning* 8: 43–73.

Appendix A

Treatment Passage (In the student version of the treatment passage, the TWs were not highlighted.)

Was tun die Deutschen für ihre Sicherheit?

Alle Deutschen haben Krankenversicherung, d.h. sie können einen Arzt besuchen, auch wenn sie arbeitslos sind oder nur wenig Geld verdienen. Aber da das Leben immer komplexer and vielseitiger wird, brauchen immer mehr Leute zusätzlichen Versicherungsschutz. Dafür gibt es große Gesellschaften, die diesen Schutz anbieten. Das kann oft sehr viel Geld kosten. Für diese Gesellschaften arbeiten Versicherungsvertreter. Sie haben kein Büro, sondern gehen von Haus zu Haus and besuchen Leute. Dabei erklären sie den Leuten welche Art Versicherungsmöglichkeiten es gibt. Die meisten Leute haben auch eine Haftpflichtversicherung. Sie hilft, wenn man etwas von einer anderen Person kaputt macht, wie z.B. wenn man in einem Geschäft eine teure Vase zerbricht. Dann bezahlt die Gesellschaft für die Vase. Da die Deutschen auch oft Abenteuerurlaube machen, schließen sie eine Reiseversicherung ab. Falls sie z.B. von einem Hubschrauber aus den Bergen gerettet werden müssen, oder wenn ihr Gepäck gestohlen wird, bekommen sie das Geld von der Gesellschaft zurück. Aber gestohlen wird nicht nur im Ausland. Das passiert auch in Deutschland, besonders Fahrräder and Photoapparate werden oft gestohlen. Deshalb haben viele Leute eine Diebstahlversicherung für wertvolle Gegenstände.

Appendix B

Strategy Classification Scheme

Strategy	Definition
<i>Local Strategies:</i>	
States understanding of words/vocabulary.	The reader acknowledges comprehension based on knowing all the words.
Skips specific, unknown words.	The reader states that he/she skipped a word that was not known.
Breaks lexical items into parts.	The reader breaks words and phrases into smaller units to figure out the word/phrase.
Uses cognates between native language (NL) and foreign language (FL) to comprehend.	The reader expresses ease of understanding because of words that look and mean the same in the NL/FL.
Solves vocabulary problems.	The reader uses context, a synonym, or some other word-solving behavior to understand a particular word.
Questions meaning of a word.	The reader does not understand the meaning of a particular word.
Questions meaning of a clause or sentence.	The reader indicates that he/she does not understand the meaning of a portion of the text.
Uses knowledge of syntax and punctuation or other grammar.	The reader expresses awareness of grammar, syntax, and other parts of speech or punctuation.
Monitors reading pace and reading behavior.	The reader makes reference to slowing down, rereading, or perhaps reading on in spite of not understanding some things. The reader mentions specifically that he/she went back and read something again, or the reader indicates using information that is more than a sentence away.
Paraphrases	The reader rewords the original wording of the text.
<i>Global Strategies:</i>	
Skims, reads heading, subtitles.	The reader previews text to get a general idea of what the article is about before actually reading the text.
Anticipates content.	The reader predicts what content will occur in succeeding portions of text.
Recognizes text structure.	The reader distinguishes between main points and supporting details or discusses the purpose of information or notes how the information is presented.

(Continued)

Appendix B: Strategy Classification Scheme (*Continued*)

Strategy	Definition
Integrates information.	The reader connects new information with previously stated content.
Reacts to the text.	The reader reacts emotionally to information in the text.
Speculates beyond the information in the text.	The reader has a thought that goes beyond the information contained in the text.
Acknowledges lack of background knowledge.	The reader states lack of familiarity with or knowledge about the text topic.
Reads ahead.	The reader specifically mentions reading ahead as he/she reads.
Visualizes.	The reader indicates that he/she had a mental image.
Identifies main idea.	The reader related major points of paragraph or passage.
Uses inference or draws conclusion.	The reader indicates that he/she guesses based on information in text and own knowledge.
Uses background knowledge.	The reader states a familiarity or knowledge about the text topic.

Sources: Adapted from Block, 1986; Carrell 1989; and Young and Oxford 1997.