

MISCUE ANALYSIS OF NATIVE AND NON-NATIVE SPEAKERS

Angela Ferguson
University of Arizona, Tucson

Elisa Harding
Wilson College, Chambersburg

Kimberly Helmer
University of Arizona, Tucson

Soo Jung Suh
University of Maryland, College Park

Our investigation involves an analysis of the miscues made by both native speakers and non-native speakers of English while reading aloud in English. The results of our miscue analysis support there being one common underlying reading process in both first and second languages involving the active construction of meaning through the application of both top-down and bottom-up strategies. Language proficiency was found to influence the degree to which the different strategies were applied.

INTRODUCTION

Miscue analysis is used as a way of gaining insight into the underlying cognitive processes associated with the reading of a text aloud. Reading aloud is a complex process, with an interplay of production factors, such as performance anxiety and the application of both top-down and bottom-up processes at work. When reading, people use both top-down and bottom-up strategies to different degrees. Top-down strategies (Johnson & Johnson, 1999) concern a person's attempt to comprehend the text by focusing on what is said in a holistic, or global manner as opposed to paying attention to individual words and structures in the text as in bottom-up strategies. It should be noted that in factors such as language proficiency and whether the language is a person's first (L1) or second language (L2) affect the strategies chosen.

To some extent, miscue analysis gives researchers access into how readers use cues in the text to make inferences and predictions about what is to come (Goodman, 1996, 1997), some of which may result in the production of a miscue. They continue this process of making inferences that will either support or reject their previous hypotheses about what is to come in the text. When the readers' behavior diverges from the expected behavior, miscues result. Miscues can be categorized on the basis of their graphophonic, syntactic and semantic acceptability.

Our investigation is specifically interested in examining similarities and differences in miscues produced by both native (NS) and non-native speakers (NNSs) of English. Miscue research in the past has predominantly

included small-scale studies looking at the process children go through while reading in their L1. This study is significant for providing knowledge for an area that as of yet is relatively unexplored, namely, the process that adults go through while reading in an L2. Results of analyses support there being one common underlying reading process in both an L1 and L2. This hypothesis is supported in the research that looked at children of various nationalities and ethnic backgrounds (Renault, 1985).

LITERATURE REVIEW

Miscue analysis refers to a research tool developed by Goodman (1967) employed to investigate the underlying processes and strategies of readers through an analysis of their miscues in oral reading. Miscue analysis serves a practical function for teachers, reading specialists and other professionals in the educational profession. Traditional assessment procedures, such as reading placement exams, do not analyze learner's errors but simply provide numerical information to be applied to real-life situations. Miscue analysis, on the other hand, "provides specific information regarding a reader's strengths and weaknesses" (Goodman, 1997, p. 534). Miscue analysis can reveal more than quantitative information; it provides insight into the processes and strategies that learners utilize while reading (Goodman 1996, 1997). The quantitative number of miscues is not as important as "the meaning of the language that results when a miscue has occurred" (Goodman, 1997, pp. 534-535). Miscue analysis involves not simple tabulation of errors but attempts to analyze the underlying process in reading.

Reading and listening parallels

Miscue analysis views reading as a language process that parallels listening (Goodman & Goodman, 1994). "The behavior we call *reading* may be described as the perception and comprehension of written messages in a manner paralleling that of the corresponding spoken messages" (Carroll, 2000, p. 4). Reading is not a precise process of identifying letter-by-letter or word-by-word, but rather, as in listening, a highly "complex and active process" which involves "processing language and constructing meanings" from multiple cues from the graphophonic, syntactic and semantic systems of the language (Goodman & Goodman, 1994, p.112). In other words, reading involves the simultaneous processes of sampling a few identifying features of graphophonic cues from print and choosing the most appropriate and meaningful information from which meaning can be constructed.

Metalinguistic ability

Miscue analysis allows the investigators to assess readers' metalinguistic abilities (Francis, 1999), use of semantic, syntactic and graphophonic language cues, and prediction and confirmation strategies (Goodman & Goodman, 1994). Miscue analysis, in particular, pays attention to the following features: (1) the syntactic nature of the miscue; (2) the location

in the text in which the miscue occurs; (3) and the syntactic and semantic acceptability of the miscue within the sentence. It follows that miscue analysis will provide insight into how high proficiency readers' underlying process and strategies differ from those of low proficiency readers. Miscue analysis purports to investigate the strategies or processes employed by readers through analysis of "whether miscues are semantically acceptable with regard to the whole text or are acceptable only with regard to the prior portion of text" (Goodman & Goodman, 1994, p.107). To illustrate, proficient readers were not only found to have higher numbers of semantically acceptable miscues, but also higher rates of self-correction in response to miscues which do not fit with the preceding sentences or the whole text (Goodman & Burke, 1973).

Monitoring and predictions

The integration of all the language systems (grammatical, graphophonic, semantic and pragmatic) is necessary in order for reading comprehension to take place. Miscue analysis provides evidence that readers integrate cueing systems from the earliest initial attempts at reading. Readers sample and make judgments about which cues from each system will provide the most useful information in making predictions that will get them to meaning. To this end, readers monitor their reading by asking questions such as, "Does this sound like language?" (syntactically acceptable) and "Does this make sense in the story?" (semantically acceptable).

As readers make use of their knowledge of all the language cues, they predict, make inferences, select significant features, confirm and constantly work toward constructing a meaningful text (Wilde, 2000). Constructing textual meaning is a complex and active process. Readers must make use of their schema or background and life experience when reading (Geva & Verhoeven, 2000; Goodman, 1996). "Everything readers do is caused by their knowledge -- their knowledge of the world, their knowledge of language and what they believe about reading and the reading process" (Goodman, 1996, p. 601). So, it becomes clear that life experience plays a large role, even in the decoding process. However, NNSs, as well as NSs, may not have the same knowledge of the world, and this may influence reading comprehension (Geva & Verhoeven, 2000).

A reader's predicting and confirming strategies are evidenced in miscues that are acceptable with the text portion prior to the miscues. Such miscues often occur at pivotal points in sentences, such as junctures between clauses or phrases. At such points the author may select from a variety of linguistic structures to compose the text; the reader has similar options but may predict a structure that is different than the author's (Goodman & Goodman, 1994, p. 108).

In syntactically acceptable miscues, it can be said that the reader has successfully predicted the grammatical structure of the sentence. Maintaining the syntactic acceptability or grammaticality of the target word, regardless of semantic acceptability, is important because it enables readers to continue reading through maintaining the cohesion and coherence of the text (Goodman

& Goodman, 1994). In that respect, the importance of keeping syntactic acceptability intact accounts for the reason why many of the substitutions in miscues occur between words within the same syntactic category.

Parsing strategies are highly influenced by psycholinguistic strategies; reading is not simply a combination of world knowledge and linguistic knowledge, as Goodman (1996) points out. At the linguistic level, learners must be familiar with the graphophonic rules in order to decode the printed message. “Miscues show the degree to which readers use the graphophonic (including phonics), syntactic, and semantic/pragmatic language systems” (Geva & Verhoeven, 2000, p. 602). With different language backgrounds, “corresponding phonological, morphological, and syntactic structures in L1 and L2 may be studied to figure out whether difficulties and errors in the course of L2 reading acquisition are primarily a result of interference at one or more of these levels” (Geva & Verhoeven, 2000, p. 261).

Francis (1999) examined 4th and 6th grade bilingual (Spanish and Nahuatl) students’ self-correction patterns and metalinguistic awareness through a categorization of miscues. Francis found that self-correction usually occurs when the reader believes that a prediction has been disconfirmed by subsequent language cues. To illustrate, for subjects with low metalinguistic awareness, few self-corrections were reported, which indicates that they do not return to a miscue after the subsequent context “disconfirms” it. Thus, readers who consistently fail to return to the previous context of the miscue to reparse and establish continuity with the subsequent fragment are treating each fragment separately. Failure to self-correct substitutions of syntactically and semantically unacceptable words results in disruption of meaning, which in turn can suggest that the reader has not fully comprehended the sentence or text (Francis, 1999).

In the case where readers substituted non-words for the target form, Francis found that the grammaticality of the sentences remained intact. In other words, the non-words were similar to the target in respect to syllable number, word length, spelling and bound morphemes. Goodman and Goodman (1994) confirm that miscue evidence suggests that readers have a strong awareness of bound morphemic rules. They found that 80 percent of word substitutions retained the morphemic markings of the target.

Coll and Osuna (1990) applied miscue analysis to investigate the reading behavior of bilingual children in their L1, Spanish, as compared to monolingual Spanish children. They looked at three third-graders living in Venezuela. Two of the children were monolingual Spanish speakers, whereas one child also spoke English. The subjects read a Venezuelan folktale aloud. The procedure used to investigate the miscues contained two parts. The first part involved the researchers examining the children’s miscues while also paying attention to their use of real world knowledge and the hypotheses being formed. The second part of the procedure had the children retell the story in their own words. This helped the researchers gain more knowledge about the miscues committed by looking at the readers search for meaning.

All three participants made numerous miscues. After investigation of the quantity and categorization of miscues, the data suggested that none of the subjects were proficient readers. However, the three children were “natural users of the language,” meaning that they were using their graphophonic, syntactic and semantic systems when reading the text, but had not yet reached high levels of proficiency. The data supported the hypothesis that there is a single underlying process applied in reading, however, the degree of top-down and bottom-up strategies used by the subjects differ, with one of the monolingual students as well as the bilingual student applying top-down strategies to a greater degree. The miscues they made were semantically appropriate and their retellings of the folktale demonstrated their comprehension of the text. In conclusion, Coll and Osuna (1990) support the notion that there is one single underlying process in reading after analyzing the data they collected. This common process involves the students being active rather than passive in the reading process through the construction of meaning and the formation of predictions.

Our study examines the reading process of NSs and NNSs through the categorization and analysis of miscues produced while reading aloud. By comparing NSs to NNSs, we intend to examine how universal the underlying reading process is, as well as investigate how emerging language skills can affect this process. As compared to other miscue studies, our investigation is noteworthy due to its larger subject pool and its focus on the reading differences between adult NSs and NNSs.

METHODS

Participants

Seven adult NNSs of English of intermediate-high proficiency enrolled in the Center for English as a Second Language at the University of Arizona were the subjects in our study. The L1 backgrounds of the NNSs were Arabic, Japanese, Mandarin, Russian and Spanish. Thirteen NSs of English were also used in our study to provide a comparison group for the analysis of the NNS data. The 13 NSs were all freshman enrolled at the University of Arizona. All the NSs were from the Western or Southwestern areas of the United States. All subjects participated voluntarily.

Materials

A modified copy of an article entitled “Taboo Foods You Can Dare to Love” by Maureen Callahan (2001), which appeared in Reader’s Digest, was used (see Appendix A). The article was modified by the addition of four embedded errors. Two of these errors concerned form and two were semantic in nature. The form errors involved the word “study” being changed to “sturdy” as well as the possessive pronoun “her” being repeated twice (i.e., her her crystal bowl). The semantic errors involved the phrase “in moderation” being changed to “in excess,” and “more informed,” being changed to “less informed.” These errors were added to examine how subjects would react to

these anomalies, as well as to see if there was any conscious detection of the embedded errors. Crucially, the article selected contained a clear beginning, middle and end. This is important because a passage must have these parts in order for readers to be able to make predictions, as well as provide a contextual framework for comprehension (Y. Goodman, personal communication, September 25, 2001). In addition, a tape recorder was used to record the participants' readings.

Procedures

An initial pilot test of the instructions, reading passage and follow-up reading comprehension questions was conducted on four NSs and two NNSs. Based on the pilot study, one change was made concerning the pre-reading instructions. This was done because the pilot study showed that when three of the NSs encountered one of the embedded errors, they stopped and informed the researcher of the error, significantly disrupting their reading. Therefore, subjects were told that no typographical errors were in the text. Everything else, including the four follow-up questions, remained constant.

In the actual study, subjects were instructed to read the text aloud at a natural pace. Researchers told the subjects that they would be asked to answer comprehension questions on task completion. This was included so subjects would attend to both meaning and form. While the subjects read the text aloud, one of the researchers recorded the miscues being made on a separate copy of the article being read. After the subjects completed the reading, they orally answered the following four questions:

- 1) Did you notice anything strange concerning the grammar of the article?
- 2) Did you notice anything strange concerning the meaning of the article?
- 3) What was the main idea of the reading?
- 4) According to the article, why are nuts good for you?

The subjects' readings were also tape recorded for further analysis. In this analysis, each subject's taped-reading was listened to by two researchers as they read along with the text. When a miscue was uttered or an unnatural pause was noticed, it was noted on the text. Annotated texts were then compared and where discrepancies existed, the tape was played until a consensus was reached. The miscues were then categorized as to type (i.e., word substitution, word deletion, word insertion, etc.). These categories will be discussed in the following section.

RESULTS AND DISCUSSION

As discussed previously in the literature review, reading is an active process and miscue analysis sheds light on the dynamic nature of the reader's construction of meaning. In our study, participants were told that they would be asked comprehension questions following the reading task in order to ensure that there would be a conscious attention to meaning and not just to

form, thereby eliciting a full range of miscues.

We propose that in reading, short-term memory also plays a part in the construction of meaning. This is particularly evident in the case of NNSs as shown in our study. Their high degree of miscues such as nonword and real word substitutions, article change and deletion and morpheme deletion, suggest that there is an overarching motivation for them to construct meaning from the text, whereby strict adherence to graphemic form is unproductive. For example, in a short-term memory study by Sachs (1967 as cited in Cairns, 1999), he found that subjects retained a representation of meaning, but not the form. The results suggest that form is useful as building blocks of meaning, but once the meaning has been established it is no longer productive for short-term memory to store the structure. As a result of the form being lost, non-target utterances can thereby emerge. And in the case of the NNSs, the utterances are consistent with their developing L2 competence. In other words, their miscues reflect their burgeoning interlanguage.

Syntactically unacceptable embedded errors

“Her her” embedded error

In the sentence “But I won’t put them out in her her crystal bowl where they’ll be a constant temptation,” 12 of the 13 NSs (92%) and three of the seven NNSs (43%) corrected the passage by reading only one “her” (see Table 1). An important aspect to note is that the first “her” occurred at the end of a line and the second “her” began the subsequent line. With respect to the subjects who did not make the correction, 100 percent of NSs and 43 percent of NNSs provided evidence that their comprehension was interrupted due to the embedded error, as evident in behavior such as pausing, repetition, or slowing down (see Table 2). For example, two NSs paused after “in” (e.g. before “her”). Thus, we are hypothesizing that they had made a prediction about what was going to follow “in,” and when this prediction was not supported, they paused.

These data indicate that NNSs also attend to form in processing text. Like the NSs, some subjects showed pauses, hesitations, or even repeated the preceding preposition “in” before “her.” Thus, it can be said that the NNSs who deleted the second “her” were making predictions about the subsequent word after the initial “her” and were surprised to see another “her,” resulting in deletion of the second “her.”

“Sturdy” embedded error

Six of the 13 NS subjects (46%) corrected “sturdy” to “study,” whereas three of the NNSs (43%) corrected this error. This embedded error occurred in the following sentence, “In a sturdy of 86,000 nurses, women who munched on...” Three of the six NS corrections occurred with the reader pausing or slowing down. On the other hand, three subjects made this correction without any slowdown. Also, although seven of the NSs did not correct “sturdy” to “study,” they did pause before or after the word and several of the subjects laughed, or repeated it to be sure of what it said on the paper. In the follow-up questions, seven NS subjects commented on the misspelling in

the text. Regardless of whether the NSs overtly corrected the error, all subjects showed evidence of noticing the inappropriateness of the word, whereas the only NNSs that were affected by this embedded error were the three that corrected it to “study.”

One possible reason for all of the NS subjects and almost half of the NNS subjects noticing this error is due to the fact that “study” and “sturdy” are in different syntactic categories. As Goodman and Goodman (1994) point out, substitution errors generally occur within the same syntactic category. This could have made the error more salient than other embedded errors that are from the same syntactic category. One NS subject however did substitute “Sunday” for “study.” Despite the fact that “Sunday” is semantically unacceptable, it is syntactically acceptable and shares the same part of speech as “study.” Word substitutions such as this will be subsequently discussed.

Semantically unacceptable embedded errors

As demonstrated in Table 1 below, none of the NS or NNS participants corrected the semantically unacceptable phrases “in excess” or “less informed.” One of the semantically unacceptable embedded errors concerned “in excess” being exchanged for “in moderation.” This substitution is semantically unacceptable, because the idea behind the reading is that nuts are healthy in moderation. Thus, we hoped to see whether the subjects would be able to detect this substitution by reading the entire text, as this error occurred at the very end. Likewise, “less informed” was substituted for “more informed.” Again we substituted opposite concepts within the same semantic category and from the same part of speech. With respect to pauses or slowdowns around this embedded error, one NS paused before “in excess” with a rising intonation, two NSs paused with a rising intonation after “informed,” and two NNSs paused with a falling intonation after “informed.” Only one NNS, who was the most proficient among his NNS peers, showed pausing when reading “less,” suggesting that he noticed a gap or misfit in the sentence. Furthermore, in the follow-up questions none of the NSs or NNSs commented on “less informed,” and only one NS inquired about “in excess,” and to whether it should be “in moderation.”

Table 1: Comparison of the Corrections of Embedded Errors between the NSs and NNSs

	Her/her	Sturdy	Less informed	In excess
NSs (n=13)	12 (92%)	6 (46%)	0	0
NNSs (n=7)	3 (43%)	3 (43%)	0	0

In that respect, the NNSs’ low detection rates (14%) of the semantically unacceptable embedded errors coincide with the results of NSs

who also failed to notice the semantic unacceptability of the sentences. The semantically unacceptable embedded errors were perhaps harder to notice because the word exchanges in the phrases were syntactically acceptable coming from the same parts of speech. Our data support Goodman and Goodman's (1994) findings that readers notice syntactically unacceptable words to a greater degree than semantically unacceptable words. Although the subjects demonstrated that they understood the text through the follow-up questions, they did not catch the two semantically inappropriate structures. In contrast, the inappropriate syntactic structures were caught to a much greater extent.

Table 2: Subjects Showing Effect of Embedded Error (through pauses, slowdown, repetition, although a correction was not necessarily made).

	Her/her	Sturdy	Less informed	In excess
NSs	13 (100%)	13 (100%)	4 (31%)	1 (8%)
NNSs	3 (43%)	3 (43%)	1 (14%)	0

Embedded error statistical comparison

We ran two different two-way chi-square tests to see if there were significant differences: first, in the degree to which the groups overtly corrected the four embedded errors when reading the text, and next to examine the degree to which the group's reading in the immediate area surrounding the embedded error was affected by the presence of the error. We will first present the results for overtly correcting the errors. Our null hypothesis claims that there is no significant difference in the number of corrections of the embedded errors between the NS group and the NNS group. Our dependant variable is the number of corrections; the measurement is a frequency tally and the independent variable is L1 of the subjects. We set our alpha-level at .05, making our critical value for chi-square (χ^2) 9.488, with 4 degrees of freedom. After statistical analysis of the raw numbers we found χ^2 to be 1.46. Thus, we fail to reject the null hypothesis and can conclude that there is no significant difference between the two groups with regard to correction of the embedded errors.

Next, we analyzed the data for evidence indicating that the subjects were affected by the embedded errors through such miscues as pauses, slowdowns, or repetitions in the area immediately before or after the embedded error. Again we set alpha at .05 and had a critical χ^2 of 9.488 for 4 degrees of freedom. Our null hypothesis states that there is no significant difference between the two groups with respect to the degree to which their reading was affected by the error. After analysis we found a very small χ^2 estimated around .23. Thus, again we failed to reject the null hypothesis, finding no significant difference between the two groups.

Although the NSs did correct or notice the errors more than the NNSs, the difference was not statistically significant. Thus, we have evidence that reading in a first or second language involves the same underlying process.

Word substitutions by NSs and NNSs

In their analysis, Goodman and Goodman (1994) categorize miscues with respect to syntactic acceptability and semantic acceptability. We will use this same categorization in our analysis of the word substitutions and insertions made by the NSs and NNSs.

With respect to the nature of substitution miscues, we divided them based on the four categories: Syntactically / Semantically Acceptable, Syntactically Acceptable / Semantically Unacceptable, Syntactically Unacceptable / Semantically Acceptable, Syntactically Unacceptable / Semantically Unacceptable (see Table 3 below). Most NS word substitutions (81%) were both syntactically and semantically acceptable, which attests to the fact that they were paying attention to both form and meaning in processing the text. In the case of “the must-avoid list,” frequent substitutions were as follows: most-avoided (n=2), most-avoid (n=3). As can be seen, the substitutions did not change the meaning of the text and were also syntactically acceptable. In contrast, only 10% of the NNS substitutions were both syntactically and semantically acceptable.

Furthermore, the NSs only produced two word substitutions (13%) that were syntactically unacceptable but semantically acceptable: “unhealthily levels of a blood fat” for “unhealthy levels of a blood fat,” and “this dietary reprobates” for “these dietary reprobates.” Only 19% of the NNS word substitutions were syntactically unacceptable yet semantically acceptable. A possible explanation of the miscues can be that in the process of comprehending the text, there was incomplete lemma retrieval; the wrong syntactic form was chosen, resulting in words in the correct semantic category, but in the wrong syntactic category being chosen. In terms of syntactically and semantically unacceptable word substitutions, NSs and NNSs performed differently: NS (0%), NNS (31%). In addition, there was only one (6%) NS substitution that was syntactically acceptable yet semantically unacceptable: “respectable amounts of feuds” for “respectable amounts of foods.” It should be noted that “feuds” and “foods” share similar graphophonic features. Strikingly, 40% of the substitutions produced by the NNSs were syntactically acceptable yet semantically unacceptable. As predicted by miscue research, the NS substitutions respected the syntactic and semantic nature of the word, however, the NNS data diverge somewhat from this prediction.

The most common NS insertion concerned articles. The definite article “the” was inserted four times while the indefinite article “a” was inserted twice. An example of this insertion is found in the following example “Scientists now say that *the* approach is too simplistic.” See section 4.6 for further discussion of article usage.

Another characteristic of the NS miscues centers around the fact that

no nonsense words were produced. This indicates that the NSs were comprehending the text. The significance of this will become even more apparent once the NNS discussion is completed, because nonsense word miscues were prevalent in their data. In Table 3 only real words were analyzed, because judging a nonsense word with regard to syntactic and semantic acceptability is too problematic for the scope of this study. The production of nonsense words is evidence that they were having problems comprehending the text.

Table 3: Comparison of Acceptability of Word Substitutions

	Syntactically Semantically Acceptable	Syntactically Acceptable Semantically Unacceptable	Syntactically Unacceptable Semantically Acceptable	Syntactically Unacceptable Semantically Unacceptable
NSs (total=16)	13 (81%)	1 (6%)	2 (13%)	0
NNSs (42)	4 (10%)	17 (40%)	8 (19%)	13 (31%)

Statistical comparison of word substitutions

A chi-square test revealed significant differences between the two groups concerning the categorization of the word substitutions. After analysis, x^2 was found to be 30.12, which is larger than a critical-chi set at .001. Therefore, we have strong evidence that although the groups did not differ significantly with regard to correction and detection of the embedded errors, they did differ significantly with respect to their miscues.

Miscues reflecting only graphic resemblance

In her study on first graders' use of grammatical context in reading, Weber (1970) notes that most of the grammatically unacceptable responses, irrespective of whether they were real or nonwords, shared graphic features with the target word, rather than fit in with the preceding grammatical context. This is similar to the findings in miscue studies in which lower proficiency readers tended to make miscues which were graphically similar in word form, yet bore no semantic resemblance to the target word (Goodman & Goodman, 1994).

In the case of real word substitutions (e.g., back-> black; heart-> heat; snacks-> snakes; ate-> at; Tijeras-> tigers, I'll-> I'm), the majority (43 out of 47) were graphically similar, despite being semantically and syntactically incorrect. Likewise, in the case of nonwords (e.g., treed, ouches), 22 out of 27 words were found to be graphically similar to the target word as well.

Weber (1970) explains that miscues with graphic similarity occur

when readers are attending to the identification and decoding of graphic features of the target word and thus, neglect to consider the constraints imposed by the preceding grammatical context, which is more of a top-down processing strategy. In that respect, it can be said that in the face of multiple language cues, low proficiency readers attend to one type of information (graphic level) more than other available information (syntactic, semantic level), reflecting more of a bottom-up processing strategy. She concludes that less proficient readers are not likely to be able to efficiently integrate information from both sources.

It is worth mentioning that the nonwords produced not only looked graphically similar to the target word, but also obeyed the bound morphemic rules. Nonword substitutions were only made by the NNS participants. Nonwords such as “spillings,” “palance,” “triglyceds,” “reproperties,” “twees,” “nues,” and “treelicerces,” which occurred in lieu of real nouns all had morphemes such as “-s,” “-ies,” and “-ance,” thus exhibiting features which real noun words have. In the case of nonwords substituted for real adjectives, “direty” and “simplisitic” have morphemes such as “-y” and “-ic,” typical of adjectives. With the exception of words such as “krale,” “bosly,” and “cholesty,” which were difficult to identify the part of speech, 89% (24 out of 27) of the nonwords had morphemic markings indicating the part of speech. Similarly, in Goodman and Goodman (1994), 80 percent of the miscues kept the morphemic markings of the text. It should also be noted that most of the nonwords also were phonologically permissible in English.

Overall, the fact that nonwords still respect the bound morphemes and phonological rules in English coincides with the Goodmans’ (1994) findings that nonwords are systematic in that they retain similarities in number of syllables, word length, spelling and bound morphemes. This shows that the NNSs were aware of the bound morphemic rules and phonotactic constraints characteristic of English words.

Article use

NSs and NNSs differed in terms of article use in their miscues. In the case of NSs, articles such as “a,” or “the” were inserted where subjects saw appropriate. Article addition occurred only in two sentences: “thanks to new research,” and “Doctors now say that approach is simplistic.” In “thanks to new research,” two NSs inserted an indefinite article preceding “new,” whereas another subject added the definite article “the” before “new.” Only one subject inserted “the” before “approach” in “doctors now say that approach is simplistic.” This addition is semantically and syntactically acceptable, although the syntactic function of “that” was changed from a demonstrative pronoun to a complementizer. As can be seen, the article addition occurred in plausible slots in the sentence indicating that the NSs did so based on prediction.

In contrast, NNSs deleted, changed and added articles. Two subjects showed article deletion in “to soften (the) calorie blow” and “nuts give you (a) tremendous source,” which resulted in the ungrammaticality of the sentence.

In terms of article change, all five were changes from the indefinite article “a” to the definite article “the” (e.g., rather than focus on *the* flaw; the reputations of *the* lot of foods; rate *the* foods on the balance of factors). As shown in the examples, most of the changes except for “focus on *the* flaw” resulted in awkward expressions. The NNSs also employed article addition, as the NSs did. However, unlike NSs who inserted both “a” and “the,” the NNSs added only the definite article “the”: “cut back on *the* fat” and “whenever *the* company.” The former (e.g., “cut back on *the* fat”) was not only syntactically acceptable but also retained the meaning of the sentence. In contrast, the latter (e.g., “whenever *the* company”), despite being syntactically acceptable, resulted in partial meaning change.

To sum up, NSs employed article insertion, which was syntactically and semantically acceptable and resulted in meaning preservation of the initial sentence. In contrast, NNSs showed more variety in the use of articles: insertion, deletion and change. However, most of their miscues resulted in syntactic unacceptability or meaning change, which suggests that the NNSs’ article systems are still in their developmental stages. Interestingly, NNSs appear to favor the use of the definite article “the” instead of the indefinite article “a” which can suggest that they are processing the text with referents in mind as indicated by the use of definite article “the.” The preference for “the” could also be due to the preponderance of “the” in the English language, with it being the most frequent word. Examples include, “cut back on the fat,” in which case the preceding sentence has the phrase “he had unhealthy levels of a blood fat called. . . .” The subject probably inferred that the “fat” in “cut back on fat” was referring to “blood fat” in the previous sentence. Thus, it can be said that despite the incorrect usage of articles, NNSs do have their own systematic way of processing articles.

Morpheme addition and deletion

In terms of morpheme addition and deletion, only the bound morpheme “-ed” and “-s” were affected. The general trend for NNSs was to “simplify” a lexical item by deleting the morpheme. In the case of “-ed” and “-s,” they were dropped 92.3% of the time for the former and 65% of the time for the latter (see Table 4 below). In most cases the deletion resulted in an ungrammatical sentence with global meaning unaffected. For example, the target passage, “The reputations of a lot of foods, nuts included, are being justly rehabilitated,” was read by a Spanish speaker as, “The *reputation* of a lot of *food*, *nut* include, are being justly *rehabilitate*.” This particular sentence gave trouble to all NNSs. One Costa Rican student, who was the most proficient of the L2 learners, deleted “-s” from “reputations,” with the deletion still preserving the grammaticality of the sentence, a pattern consistent with NS data. In our study, only one NS made a morpheme related miscue: “-s” was added to “fat” resulting in “...Loewen cut back on *fats*,...” a grammatically and semantically acceptable miscue.

We believe that morphological simplification was a result in part to the cognitive demands placed on the NNS readers as the text was unfamiliar

and the readers were expected to answer comprehension questions on task completion. Because of this, morphemes may have been dropped as longer word strings are more difficult to produce as evidenced in L1 acquisition. Children begin speaking by using telegraphic speech which is marked by its lack of bound morphemes because the morphemes add little to the global meaning (Ellis, 1994); this could also be said for the NNS miscues. Additionally, morphological simplification could be attributed to phonotactic constraints where the reader's L1 phonological system influences L2 phonological production or when certain consonant clusters do not exist in the L1, causing the production of these consonant clusters in the L2 to be difficult.

Table 4: Morphological Miscues of NNSs

Native language	Plural → Sing	Sing → Plural	-ed → 0 (-ed deletion)	0 → ed (-ed addition)	Total
Arabic	1	1	0	1	3
Russian	5	0	0	0	5
Spanish 1	1	0	0	0	1
Spanish 2	5	2	6	0	13
Spanish 3	8	1	4	0	13
Japanese	2	2	1	0	5
Mandarin	4	8	1	0	13
Total	26	14	12	1	53

SUMMARY AND CONCLUSION

This study attempted to examine the processes employed by readers when reading aloud in their L1 or L2 through embedded errors and miscue analysis. First, it is interesting to note the differences between embedded errors and miscues. With regard to the embedded errors, the statistical difference between the NSs and NNSs was not significant. Both groups overwhelmingly noticed syntactic (“sturdy”) errors, yet failed to notice semantic errors (“less” for “more”). This supports the idea that both NSs and NNSs have the same underlying, fundamental processes when reading, which is actively working to construct knowledge through predictions, inferences and confirmations.

With regard to miscues, NSs and NNSs performed quantitatively and qualitatively differently, such that, a significant difference was found between the groups after a chi-square statistical analysis was performed regarding the groups' word substitutions. With regard to other types of miscues, NSs were

more likely to do whole word or phrase repetitions, whereas NNSs often repeated part of the word – typically with phonologically difficult or unfamiliar words. Even when faced with the word “triglyceride,” which both NSs and NNSs had difficulty pronouncing, they exhibited different coping strategies. NSs tended to repeat the entire word; however, NNSs repeated a fragment of the word several times.

NNSs changed the morphology of words forming ungrammatical words, yet, when NSs changed the morphology, the changes produced syntactically correct results. In addition, with respect to article use, NNSs exhibited dropping, changing and insertion of articles in ungrammatical contexts. In contrast however, NSs inserted articles only when syntactically acceptable. In terms of morpheme use, NNSs showed an overwhelming tendency toward simplification where the bound morphemes –ed and –s were dropped. However, this simplification did not affect meaning to a large degree and may be attributed to the cognitive demands of the task and phonotactic constraints.

Although the number and type of miscues produced by the groups varied greatly, all the participants were able to answer the comprehension questions about the text. Thus, a correlation between miscue production and comprehension was not present. This correlates with the findings of other studies (Mavarez, 1993). Due to the fact that the NNSs knew they would be answering comprehension questions, perhaps they focused on constructing meaning while reading the text aloud, causing form to suffer at times. Attention to both form and meaning could be too demanding at the lower and intermediate levels of language acquisition.

Furthermore, we suggest that pedagogical implications can be gleaned from our data. A multi-tiered approach to teaching reading in which different aspects such as textual comprehension, or pronunciation are the emphasis, may be more beneficial for students due to the extreme burden placed on them if they are having to attend to meaning and form. Thus, instructors can begin by having students focus on constructing meaning and at a later stage work on discrete aspects such as pronunciation. Moreover, a complete text with a clear beginning, middle and end should be read by the students in order for them to make predictions about what is to come in the reading. And finally, the simplification of texts is discouraged because beneficial cues that are necessary for the construction of meaning may be unwittingly omitted.

In conclusion, our data suggest that reading is an active, dynamic process in which readers are constantly constructing meaning. Reading should not be viewed as a passive skill as it was once purported. Support that there is a common, underlying process applied in both L1 and L2 reading is provided. However, readers apply both top-down and bottom-up strategies to different degrees. Finally, practical suggestions to language teachers were provided in an effort to better help language students develop reading fluency in an L2.

REFERENCES

- Cairns, H. (1999). *Psycholinguistics: An introduction*. Austin, TX: Pro-ed.
- Callahan, M. (2001, October). Taboo foods you can dare to love. *Readers Digest*. Retrieved Oct. 10, 2001, from <http://www.rd.com/common/nav/index.jhtml?articleId=9523970&channelId=4&subChannelId=16>
- Carroll, J. B. (2000). The analysis of reading instruction: Perspectives from psychology and linguistics. *Scientific Studies of Reading, 4*, 3-17.
- Coll, J. & Osuna, A. (1990). A comparison of reading miscue analysis between bilingual and monolingual South American third graders. *Hispania, 73*, 807-815.
- Ellis, R. (1994). *The study of second language acquisition*. New York: Oxford University Press.
- Francis, N. (1999). Self-correction patterns and metalinguistic awareness: A proposed typology for studying text-processing strategies of proficient readers. *Journal of Research in Reading, 22* (3), 304-310.
- Geva, E. & Verhoeven, L. (2000). Introduction: The development of second language reading in primary children -- Research issues and trends. *Scientific Studies of Reading, 4*, 261-266.
- Goodman, K. S. (1967). Reading: A psycholinguistic guessing game. *Journal of the Reading Specialist, 6*, 126-135.
- Goodman, K. S. & Burke, C. L. (1973). *Theoretically based studies of patterns of miscues in oral reading performance* (Contract No. OEG-0-9-320375-4269). Washington, D.C.: U.S. Department of Health, Education and Welfare, Office of Education, Bureau of Research.
- Goodman, Y. (1996). Revaluing readers while readers revalue themselves: Retrospective miscue analysis. *The Reading Teacher, 49*, 600-609.
- Goodman, Y. (1997). Reading diagnosis -- Qualitative or quantitative? *The Reading Teacher, 50*, 534-538.
- Goodman, Y. & Goodman, K. S. (1994). To err is human: Learning about language processes by analyzing miscues. In R. B. Ruddell, M.R. Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (pp. 104-123). Newark, DE: International Reading Association.
- Johnson, K. & Johnson, H. (Eds.). (1999). *Encyclopedic dictionary of applied linguistics*. Oxford, UK: Blackwell.
- Mavarez, L. M. (1993). Learning about the reading process through an inventory of miscues: Conozcamos el proceso de la lectura a través del inventario de miscues. *Lectura-y-Vida, 14*, 35-40.
- Renault, L. H. (1985). First language in developing second-language literacy: Genesis and generation for Spanish/English readers. Doctoral dissertation, Indiana University, Bloomington.
- Weber, R. M. (1970). First-graders' use of grammatical context in reading. In H. Levin and J. P. Williams (eds.), *Basic studies on reading*. New

York: Basic Books, Inc. Publishers.

Wilde, S. (2000). *Miscue analysis made easy: building on student strengths*. Portsmouth, NH: Heinemann.

APPENDIX A

“Taboo Foods You Can Dare to Love” by Maureen Callahan

Growing up, I remember my mother piling mixed nuts into a beautiful crystal dish whenever company came for cocktails. After the party, my siblings and I promptly descended on the salty leftovers, fighting over our favorites.

One day the nuts were replaced with pretzels; Mom had discovered calorie counting. The only time we saw nuts was in the company of raisins to soften the calorie blow.

Lately I’m rethinking Mom’s approach. Now that we’re less informed – thanks to new research – we can rate foods on a balance of factors, rather than focus on a flaw, such as “high in cholesterol.” The reputations of a lot of foods, nuts included, are being justly rehabilitated.

Mike Loewen, a 53-year-old pilot in Tijeras, New Mexico, happily snacks on the crunchy treats. Two years ago he had unhealthy levels of a blood fat called triglycerides. Initially, Loewen cut back on fat and stopped eating one of his favorite foods – nuts. But the doctor advised him to focus on getting healthy amounts of protein, including nuts, and not overdoing carbohydrates. “My triglycerides were cut in half,” Loewen says.

Loaded with fat, nuts often end up on the must-avoid list. Scientists now say that approach is too simplistic. “Nuts give you a tremendous source of Vitamin E, heart-healthy fats and virtually no saturated fats,” says Applegate. In a study of 86,000 nurses, women who munched on at least five ounces of nuts a week had 33 percent fewer heart attacks than those who rarely ate nuts. And a recent clinical trial finds that replacing dietary fat sources with three ounces of almonds reduced artery-clogging LDL cholesterol 12 percent, without affecting HDL or triglycerides.

So I’m renewing my mom’s original mixed-nuts tradition. But I won’t put them out in her her crystal bowl where they’ll be a constant temptation. I’m going to add them to stir-fries, quick breads and my morning cereal. The underlying theme for these “dietary reprobates” is that they’re good – in excess.