

Lexical inferencing in reading L2 Russian

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Abstract

This study describes how intermediate-level first language English readers of Russian as a second language deploy lexical inferencing and other strategies when reading informational texts. Fifth-semester students of Russian performed think-alouds while reading two texts; one written for the general adult reader, and the other meant for school-age children. Reader think-alouds were transcribed and coded for strategy use and lexical inferencing. Results rank the frequency of reader strategy use and show trends in how readers vary their strategy use depending on the text type. Readers' difficulties in using context as well as phonological and morphological analysis for inferring the meaning of unknown words are analyzed both quantitatively and qualitatively. Implications of these results for selecting texts and for scaffolding these selections are considered.

Keywords: Russian, lexical inferencing, reading strategies

This study seeks to describe the kinds of reading and lexical inferencing strategies that intermediate-level English readers of Russian as a second language (L2) use in constructing meaning from informational texts. While similar questions have been addressed in the considerable body of research on L2 reading, these studies have focused on speakers of various languages reading L2 English or on English first language (L1) speakers reading more commonly taught European languages. Little research has explored these questions for L2 Russian; yet, the specific natures of readers' L1 and L2 have been shown to affect L2 reading differently. Hamada and Koda (2010) have found this true for phonological processing; Wesche and Paribakht (2010) have shown it for readers' use of lexical inferencing strategies; Bernhardt (2010) has documented it for the relative contributions that grammar and lexical knowledge make to L2 reading comprehension.

This study focuses on intermediate-level learners reading two kinds of informational texts in Russian: one written for the general adult reader, and the other meant for school-age children. What kinds of strategies do readers use to infer the meaning of unknown words in L2 Russian, and do they differ depending on the type of informational text? Although the focus of this study is reader lexical inferencing strategies, such inferences are just one part of the array of skills and knowledge sources that readers integrate when comprehending texts. Bernhardt (1991), Birch

(2007), Grabe (2009) and Koda (2005) have described how L2 readers activate lower-order skills and sub-skills (alphabetic decoding, phonological recoding, lexical access, and morphological analysis) and higher-order skills (syntactic decoding, comprehension of deictic devices and anaphora, awareness of discourse, and genre rules). Bernhardt (2010) has emphasized how adult readers' individual factors (L1 literacy, L2 proficiency, topical background knowledge, motivation, interest, strategy use, etc.) work in compensatory ways as the readers make sense of an L2 text. The number of skills and other factors affecting reading comprehension and the lack of research about their possible interactions for L2 Russian led the researcher to design this study of lexical inferencing strategies as a broad descriptive investigation, a first step toward establishing a baseline of knowledge on questions pertinent to the reading of L2 Russian.

Background

Lexical Inferencing

L2 readers use a range of knowledge sources to infer the meanings of unknown words (Bengeleil & Paribakht, 2004; de Bot, Paribakht, & Wesche, 1997; Fraser, 1999; Haastруп, 1987, 1991; Morrison, 1996; Nassaji, 2003b; Paribakht & Wesche, 2006; Wesche & Paribakht, 2010). These include contextual cues (a single word from the immediate context, the immediate context, and context beyond the immediate sentence), word-level knowledge (phonology, orthography, and derivational morphology), sentence-level knowledge (parts of speech, sentence meaning, sentence syntax, and punctuation), discourse-level knowledge (global use of the text, genre conventions, textual schemata, and style and register), and background knowledge.

For lexical inferencing the relative contributions of these knowledge sources for different L1 and L2 combinations at different levels of L2 language proficiency remain an area of ongoing research. While Clarke and Nation (1980) advocated that English as a Second Language (ESL) readers should primarily use context to determine the meaning of unknown words, studies have shown that for L2 readers context alone is not that helpful (Frantzen, 2003), even for lexically-skilled readers (Nassaji, 2006).

The relationship between readers' language proficiency and the number and types of strategies they use in reading is a complex one. Davis and Bistodeau (1993) found that less proficient L2 readers often use word-level and bottom-up strategies when reading, although Nassaji (2003a) has cautioned against trying to separate out lower-level (i.e., word-level) from higher-level (i.e., context) strategies, since even among highly proficient ESL students "lower-level word recognition, phonological and orthographic processing skills reliably differentiated skilled from less-skilled ESL readers" (p. 270). Even L2 readers who combine knowledge sources may have a difficult time determining the meanings of unknown words. Mori (2003) found that even when English learners of L2 Japanese had access to both morphological cues and sentence-level context cues, they still had a very difficult time determining the exact meanings of unknown words. Bengeleil and Paribakht (2004) found that intermediate and advanced ESL readers used similar kinds of knowledge sources (i.e., sentence-level, word-level, discourse-level, world knowledge and L1 knowledge) and contextual cues while inferencing, although the intermediate group used multiple knowledge sources more often and in more varied combinations than more

proficient participants. This finding is in accord with O'Malley and Chamot's (1990) observations that learners with weaker language knowledge tend to use more and more varied strategies. Haastrup (1991) found that a threshold of L2 proficiency and lexical knowledge is needed before lexical inferencing becomes possible.

In a cross-linguistic study of readers' lexical inferencing in their L1 and L2, Paribakht and Wesche (2006) showed that English L1 readers and Farsi L1 readers, when reading non-words in texts in their native languages, attempted to make inferences about target words 99% of the time. English L1 readers' inferences were fully successful in 89.3% of cases and Farsi L1 readers' in 79% of cases. With English L2 texts, the same Farsi L1 speakers, who had advanced L2 English, attempted inferencing 79% of the time, but were much less successful at it, achieving complete success 11% of the time, and partial success 11% of the time.

Wesche and Paribakht (2010) expanded this study with data from French L1 speakers reading in French and English. When inferencing non-words in native-language texts, French L1 speakers had full success 62.8% of the time, and partial success another 11.5% of the time. When reading in their L2, full success at lexical inferences fell to 31.1%, while partial success grew to 20.5%. In contrast to the Farsi readers, French speakers reading L2 English were significantly more successful at inferencing, although they still made incorrect inferences about half the time. Thus, even for advanced ESL readers, whose L1 is typologically close to English, inferencing is of much more limited utility than it is for native speakers.

Wesche and Paribakht (2010) noted that their three types of readers (English L1, Farsi L1, and French L1) used sentence-level knowledge sources the most when making lexical inferences in both their L1 and L2 reading. They noted differences in percentages of the use of other knowledge sources in lexical inferencing. English L1 readers used word-level, discourse-level, and world-knowledge sources about equally (16.8%, 16.1% and 18.8% respectively) while Farsi L1 readers used word knowledge very little in their L1 reading (3.8%), and only slightly more in their L2 reading (8.4%), with French speakers using word knowledge frequently in their L1 reading (29.3%) and significantly less in the L2 reading (16.5%). In discussing the details of word-level knowledge sources, Paribakht and Wesche (2006) pointed out that English native speakers used homonymy (i.e., phonetic or orthographic similarity between words) as a first guessing strategy 7% of the time, while Farsi L1 speakers used it 1% of the time in both their L1 and L2 readings. The aforementioned finding suggests that English speakers learning an L2 may have a tendency to overuse homonymy, which the researchers note is closer to a word retrieval strategy than an inferencing strategy.

Reading L2 Russian

While there is pedagogical literature about teaching reading in Russian (Garretson, 1984; Ingram, 1984; Keefe, 2004; Kulibina, 2001; Rosengrant, 2000), about measuring learner outcomes in reading (Rifkin, 2005; Thompson, 1996), and about readers' glossing preferences in online reading (Gettys, Imhof, & Kautz, 2001), only one empirical study documents specifics of reading strategies for L2 Russian. Comer and Keefe (2000) had 13 fourth-semester and 6 sixth-semester students of Russian read two short newspaper articles in an on-line format where readers could check the meaning of any word in the texts as long as they first attempted to guess the selected

word's meaning and checked one of four possible reasons for their guess. Readers were accurate in their guesses only about 12% of the time, although guesses were contextually possible an additional 47% of the time. The researchers were surprised that about 7% of incorrect guesses seemed to be based on grapheme similarity (*золот* [golod = hunger] understood as related to *город* [gorod = city]), which can be considered a type of homonymy.¹ Their data collection instrument allowed learners to pick from only four strategies for each guess (knowledge of a related Russian word accounted for 9% of guesses; knowledge of a related English word accounted for 2%; context accounted for 48%; other reasons accounted for the remaining 42% of guesses). Comer and Keefe (2000) analyzed the relationship between guesses and the reader's selected reasons and concluded that learners had poor guessing strategies and that they frequently mismatched strategies to lexical items. The researchers also noted that the Russian newspaper texts used in their research may have caused readers to use more bottom-up reading strategies, since Russian articles have a less predictable structure than analogous English articles, because Russian articles often mix reporting with editorial comments in ways that English journalistic writing does not.

The current study revisits and expands Comer and Keefe (2000) in several ways. It uses informational texts, whose topics and transparent structures should increase readers' chances to use real-world and non-textual knowledge in inferring the meaning of unknown words. It draws participants from a single pool; those studying at the fifth-semester level who should have enough language proficiency to draw on multiple knowledge sources when inferring the meanings of unknown words. It uses a different methodology to get a fuller picture of how readers deal with L2 Russian texts.

Before going into the methodological details of the current study, one should explain how certain features of Russian vocabulary should allow readers to use phonological and morphological analysis when inferring the meanings of unknown words.

Russian Vocabulary

Cubberly (2002) notes that the sources for Russian vocabulary are either external (e.g., borrowed words, calques) or internal (i.e., derived from combinations of Russian or Church Slavonic prefixes, roots, and suffixes). Since the 18th century borrowings have mainly come from European languages (German, French, and English). When borrowed, a word is fit into Russian's sound system and nearly always transliterated into the Cyrillic alphabet. Generally, when an English speaker decodes the Cyrillic letters and processes a borrowed word phonologically, the English or foreign equivalent is easily recovered (e.g., *институт* in transliteration is *institut*, [i.e., institute]). Thus, if L2 readers recognize the word in a text as a borrowing, they should be able to use phonological decoding to infer the word's apparent meaning. Not all borrowed or international words are easily recognized or decoded, however (Comer & Keefe, 2000; Heien, 1984), especially when a single English letter is spelled with two Cyrillic ones (e.g., *export* = *экспорт* [eksport]) or where international words have picked up a Russian derivational morphological suffix (e.g., to export = *экспортировать* [eksportirovat'] where the suffix *-irova-* marks the word as a verb, and the *t'* marks the verb form as an infinitive).

L1 English learners of Russian have an advantage in comprehending these borrowed or international words, since English has supplied the bulk of them into Russian in recent times (Comrie, Stone and Polinsky, 1996; Levchenko, 1975). Furthermore, since the majority of loan words from other European languages have entered Russian only since the 18th century, they have undergone little semantic shifting. Thus, for English readers of L2 Russian the issue of “false friends” (i.e., words that look alike in the two languages but have different meanings) poses few problems.² There are issues with borrowed words for L1 English speakers, for example: *магазин* [*magazin* in transliteration] was borrowed into Russian from French with the meaning *store* and not from English with the meaning *magazine*.

The other major source of Russian vocabulary is native and Church Slavonic roots, prefixes, and suffixes that are used in a highly consistent manner to cover the language’s core vocabulary. For example, the Russian noun for *city* is *город* [*gorod*], while the adjective *city* or *urban* is *городской* [*gorodskoi*], built on the noun plus the adjective morpheme *–skoi*. This strategy is also sometimes used in coining new words. For example, the Russian word for *airplane* is *самолёт* [*samolet*] from *сам* [*sam* = self, auto] + *лёт* [*let* = fly]. While the practice in ESL teaching has perhaps been to deemphasize morpheme analysis as a strategy for inferring word meaning (Clarke & Nation, 1980), using derivational morphology to guess word meanings in Russian has been and remains a widely recommended strategy for recognizing and learning new words (Browning, Hart & Solovyova, 2001; Davis & Oprendeck, 1972). Keefe (2004) found that instructors teaching Russian at the advanced level ranked this as the most frequent classroom activity for having students infer the meaning of unknown words.

Research Questions

1. What strategies do readers of L2 Russian exhibit when dealing with informational texts and inferring the meaning of unknown words, and which ones do they use most frequently? Are strategies used consistently across text types?
2. How effectively do readers deploy phonological and morphological analysis in guessing word meaning? What trends can one observe in readers’ use of these knowledge sources in inferencing?

Methods

Participants

Twelve student volunteers at a large Midwestern university in the US, enrolled in a fifth-semester Russian class in Fall 2009 or Fall 2010, participated in this study. Their average age was 21.5 (range: 20–30); six participants had been to Russia for an average stay of six weeks (range: 2-8 weeks). Five students reported using Russian at least once a week outside of class with Russian-speaking friends (average: 1.6 hrs; range: .5 to 3.5 hrs). All participants had English as their L1, and they chose English for thinking aloud. The names used in this article are all pseudonyms.

Eleven volunteers had completed four semesters of Russian language study at the institution where the study was conducted, while the twelfth participant had completed only the third and fourth semesters. Russian language instruction at the institution uses a communicatively oriented approach where students receive instruction in all modalities plus language structure. Although the participants had not formally studied Russian word formation, phonological and morphological analysis is a regular part of classroom instruction when dealing with new vocabulary. Furthermore, learners encounter features of Russian's word formation system (i.e., general meanings of prefixes and consonant mutations) during grammar instruction on common topics (conjugation patterns, verbal aspect pairs, and verbs of motion).

Texts

The current study uses informational texts about common features of Russian life (the Moscow metro and tea-drinking) so that readers have opportunities to draw on background knowledge for understanding the text and inferring the meaning of specific words. Since text complexity can have an impact on reader comprehension and processing, parallel informational texts were selected: one from a book written for school-aged children (Shironina, 2009), and the other from encyclopedia entries written for the general adult reader (Dzhakeli, Tsanova & Urushadze, 1978; Golubev & Iakobson, 1974; "Samovar," 2009). The texts written for school age children are less syntactically complex and more conversational in style. The texts written for the general adult reader are syntactically denser and adhere rigidly to the norms for formal expository writing. Readers in fifth-semester Russian could find both types of text challenging to read, and the level of difficulty of the text might push the readers to use a greater variety of reading strategies.

The informational texts from Shironina (2009) were used in full, while the selections from the adult encyclopedias were shortened and adjusted so that they would cover the same thematic material as the children's texts. The children's texts were reproduced exactly for this study including illustrations, captions and sidebar text; the adult encyclopedia entries were formatted similarly to the children's texts and were illustrated with the same pictures and captions from the children's texts. All four texts (Children's Tea, Children's Metro, Encyclopedia Tea, Encyclopedia Metro, hereafter CT, CM, ET, and EM respectively) were reviewed by a native speaker of Russian who found no stylistic or other problems with them. The participants were randomly assigned to two groups: Group 1 read the CM and ET texts, while Group 2 read CT and EM texts. Thus, each participant read two texts (one from the children's source, one from the encyclopedia source) on different topics and the order of presenting texts varied.

To account for difficulty differences between the four texts, Flesch Reading Ease indices were calculated using a formula modified for Russian by Osborneva (2005).³ According to the calculated indices, the CT text is easiest (53.70), the CM and ET texts are of greater, but roughly equal, difficulty (27.16 and 29.67, respectively) and the EM text is the most difficult (-1.71). Thus, participants in Group 1 read texts that were almost at the same level of difficulty, while Group 2 read two texts that were quite different in terms of difficulty. This information is summarized in Table 1.

Table 1. *Groupings of readers, texts, and text difficulty*

Group	Readers	Texts	Modified Flesch Rating
1	Daniel ^R	Children Metro (CM)	27.16
	George	Encyclopedia Tea (ET)	29.67
	Henry		
	Mark ^R		
	Mary ^R		
	Nora		
2	Ann	Children Tea (CT)	53.70
	Beth	Encyclopedia Metro (EM)	-1.71
	Harriet ^R		
	Jane ^R		
	Melissa		
	Simon ^R		

Note. Flesch ratings were calculated according to the formula modified for Russian by Osborneva (2005). ^R = participant had been to Russia.

Procedures

For this descriptive study, the researcher used the open-ended data collection technique of the concurrent, non-metacognitive think-aloud, where participants are encouraged to voice all their thoughts as they try to make sense of a text.⁴

Participants met individually with the researcher for two sessions that were held no longer than one week apart. Participants worked individually in a soundproofed room while the researcher recorded and monitored their progress remotely. At their first session, participants signed the written consent form and completed a background survey. The researcher explained that the goal of the study was to investigate how much students could learn about a topic by reading an informational text in Russian. Participants received training in the think-aloud procedure (Pressley & Afflerbach, 1995) by listening to a recorded sample think-aloud and then by completing a three-minute sample think-aloud with a short Russian text drawn from an intermediate-level textbook. Participants were allowed to ask questions about the procedure at any time during the training.

Since background knowledge and text schemata are important factors for how readers comprehend texts (Schueller, 2002), participants completed a brainstorming activity before the think-aloud. Participants were told the topic of the reading (i.e., “The Moscow Metro” or “Tea and tea-drinking in Russia”) and then were given up to three minutes to state everything they knew about the topic, imagining that they were talking with a group of elementary school pupils in the United States about the subject. If the participants went silent during the three-minute period, the researcher prompted them to recall any films or pictures related to the topic. After the brainstorming activity, participants read the texts. After twenty minutes of reading, they were allowed access to a paper bilingual dictionary for 10 minutes to look up any words that they wanted. During all thirty minutes with the text, the participants spoke their thoughts aloud. The researcher monitored the think-aloud remotely in order to prompt participants who went silent for more than 30 seconds with the questions “What are you looking at now? What are you

thinking now?" After the reading period, the subjects put the text away and completed a recall protocol in English. Upon completing the second reading session, participants were paid for their time. The recorded think-alouds were transcribed by the researcher.

Table 2. *Reader lexical strategies*

Type of Strategy	Specific Strategy	Abbreviation
Unknown Words	Reader explicitly mentions that a word is unknown.	1: Unknown Word
	Reader notes the text's repetition of an unknown word.	2: Repeated Unknown
	Reader comments on the importance of looking the word up.	3: Look-up needed
	Reader explicitly states intention to skip a word.	4: Intentional Skip
Unexplained Guessing	Reader guesses word meaning or refines a previous guess correctly or incorrectly, but does not indicate reasoning.	5: Unexplained Guess
	Reader renders a specific word with a more generic term.	6: Generic Substitution
	Reader seems to recognize the word, but in the wrong meaning for the context.	7: Wrong for Context
	Reader gists the meaning of a sentence or paragraph, but does not connect individual words with meanings.	8: Gist Sentence
Reasoned Guessing	Reader guesses word by sound or phonology ("That sounds like ..."; "I bet that's a cognate.>").	9: Phonology Analysis
	Reader guesses a word by morphological analysis (i.e., connecting it to other related words with the same stem or by noting word parts such as prefix or suffix).	10: Morphology Analysis
	Reader references sentence or paragraph level context in guessing word meaning.	11: Context Reference
	Reader refers to non-textual information (illustrations or world knowledge) in guessing a word meaning.	12: Extratextual
Metalinguistic Comment	Reader recovers or attempts to recover the dictionary form.	13: Dictionary Form
	Reader classifies the word or makes meta-linguistic comment about word or its form.	14: Metalinguistic

Coding of Transcripts

After reviewing the think-aloud transcripts for the kinds of strategies readers used, the researcher created a classification system of reader strategies (see Table 2), which cluster into four main groupings (unknown words, unexplained guessing, reasoned guessing, metalinguistic comments).

The first grouping has to do with unknown words: a reader states that a word was unknown (Strategy 1); a reader notices the repetition of an unknown word in the text (Strategy 2); a reader expresses the intention to look up a specific word during the dictionary phase (Strategy 3); and a reader states a decision to move on without resolving the meaning of an unknown word (Strategy 4). The second grouping clusters around unexplained guesses: a reader offers a meaning for an unknown word without explaining (Strategy 5); a reader substitutes a more generic word for a specific word in the text (e.g., the text mentions *железо* [zhelezo = iron], but readers infer *metal*—Strategy 6); a reader recognizes a word, but in a meaning inappropriate for the context (e.g., mistaking a homonym like *свет* [svet= light or world or high society]—Strategy 7), and a reader simply offers the gist of a sentence without tying meanings to individual words (Strategy 8). The third grouping clusters around specific strategies for inferring the meaning of an unknown word: a reader uses phonological analysis (Strategy 9) or morphological analysis (Strategy 10); a reader explicitly invokes sentence- or paragraph-level context (Strategy 11); a reader uses real world or extratextual knowledge (Strategy 12). The final grouping clusters around metalinguistic comments: a reader attempts to reconstruct the dictionary form of the word encountered in the text (Strategy 13); and a reader makes metalinguistic comments about a word, such as its part of speech or its grammatical form (Strategy 14).

The researcher coded the pre-dictionary portion of each think-aloud transcript for these strategies and identified a total of 1709 instances of strategy use. When categorizing readers' lexical inferences, the researcher identified strategies used no matter whether they were correct or appropriate for the lexical item. A single lexical item might evoke multiple strategies from a reader, and each of these was coded separately. Twenty percent of the instances of strategy use were selected at random and categorized independently by a second rater. The interrater agreement was .78.⁵

Results

Research Question 1: Reading and Inferencing Strategy Use

Table 3 presents the overall frequency of strategies used, by number of instances, as a percentage of the total usage, and a ranking of strategies used from most to least frequent. Unexplained guesses (Strategy 5) were the most common, accounting for approximately 23% of all strategies used. The next most frequent strategies were noting that a word was unknown (15.33%), offering a sentence-level gist (14.86%) and verbalizing the intention to skip the unknown word (13.4%).

Of specific inferencing strategies, morphological analysis was most frequent (8.84%), followed by phonological analysis (4.92%). Use of extra-textual or real world knowledge to solve a vocabulary problem was infrequent (1.93%), and use of sentence- or paragraph-level context was

the least frequent strategy, with only 7 instances found in this data set (.41%). Together specific inferencing strategies accounted for about 16% of all strategy use.

Table 3. *Instances of reading and inferencing strategies, counts, percentage, and rank*

Strategy Grouping	Specific Strategy	Instances	%	Rank
Unknown Word	1: Unknown Word	262	15.33	2
	2: Repeated Unknown	35	2.05	10
	3: Look-up Needed	46	2.69	9
	4: Intentional Skip	229	13.40	4
	Subtotal	572	33.47	
	5: Unexplained Guess	396	23.17	1
Unexplained Guessing	6: Generic Substitution	34	1.99	11
	7: Wrong for Context	70	4.10	8
	8: Gist Sentence	254	14.86	3
	Subtotal	754	44.12	
Reasoned Guessing	9: Phonology Analysis	84	4.92	7
	10: Morphology Analysis	151	8.84	5
	11: Context reference	7	0.41	14
	12: Extratextual	33	1.93	12
Metalinguistic Comment	Subtotal	275	16.09	
	13: Dictionary Form	21	1.23	13
	14: Metalinguistic	87	5.09	6
	Subtotal	108	6.32	
	Totals	1709	100.00	

Table 4. Means (and standard deviations) of strategy instances by group and texts

Strategy	Group 1 (n=6)		Group 2 (n=6)	
	CM	ET	CT	EM
1: Unknown Word	9.67 (4.68)	10.67 (7.74)	14.33 (9.85)	9.00 (5.73)
2: Repeated Unknown	1.33 (1.51)	1.67 (1.63)	1.33 (1.75)	1.50 (1.76)
3: Look-up Needed	2.50 (4.72)	2.00 (3.03)	1.00 (.63)	2.17 (2.93)
4: Intentional Skip	12.67 (9.14)	6.00 (6.84)	8.00 (5.76)	11.50 (4.46)
5: Unexplained Guess	19.50 (9.46)	16.17 (14.01)	17.00 (7.54)	13.50 (3.99)
6: Generic Substitution	3.17 (2.48)	1.00 (1.27)	1.33 (1.21)	0.17 (0.41)
7: Wrong for Context	2.83 (0.75)	5.33 (4.03)	2.33 (1.37)	1.17 (.98)
8: Gist Sentence	8.17 (8.40)	15.00 (10.75)	5.67 (4.27)	13.50 (5.39)
9: Phonology Analysis	4.83 (2.32)	3.00 (2.53)	2.83 (1.83)	3.17 (2.40)
10: Morphology Analysis	6.17 (5.88)	6.83 (8.16)	10.17 (6.31)	2.50 (2.07)
11: Context reference	0.33 (0.52)	0.17 (0.41)	0.50 (0.55)	0.17 (0.41)
12: Extratextual	2.33 (3.27)	1.33 (1.63)	1.00 (1.10)	0.83 (1.17)
13: Dictionary Form	0.17 (0.41)	0.67 (0.82)	2.17 (2.32)	0.50 (.84)
14: Metalinguistic	3.17 (2.64)	3.33 (2.50)	3.83 (3.31)	4.17 (2.14)

Note. CM = Children's Metro, ET = Encyclopedia Tea, CT = Children's Tea, EM = Encyclopedia Metro

Table 4 shows the mean number of instances of strategy use by text, which allows us to contrast strategy use within groups and between groups. Readers in Group 1 displayed similar frequency of strategy use in reading the CM and ET texts, except on three points. When reading the ET text, they made almost twice as many sentence-level gists (Strategy 8) and were almost twice as likely to pick a contextually inappropriate meaning of a word (Strategy 7) while they verbalized their intent to skip unknown words half as often (Strategy 1).

Readers in Group 2 showed more variability in their strategy use between the two texts. When reading the EM text, they showed a marked decrease in the use of generic substitutions for specific textual words (Strategy 6) and a fourfold drop in uses of morphological analysis

(Strategy 10) and in references to dictionary forms (Strategy 13). They made considerably fewer references to recognizing a word as unknown (Strategy 1) and they offered fewer unexplained guesses for unknown words (Strategy 5). On the EM text readers more than doubled the number of their sentence-level gists (Strategy 8).

Both groups of readers were similar in that they made more sentence-level gists (Strategy 8) when reading the encyclopedia texts than when reading the texts written for children. Both groups made fewer unexplained guesses (Strategy 5) and generic substitutions (Strategy 6) when reading the encyclopedia texts.

Research Question 2. Effectiveness of Phonological and Morphological Analysis

Readers resorted to phonological analysis 84 times on a total of 52 different words (see Table 5). It was a possible strategy for 33 of those words and a suitable strategy for 30 of them.⁶ For those 30 items, readers made 54 inferences and got the correct meaning 42 times. Overall, this strategy worked over 50% of the time, and when used on well-suited words, it worked 78% of the time. Readers were successful using phonological analysis with words such as *арка* [arka = arch], *аромат* [aromat = aroma], *линия* [liniia = line], *мозаика* [mozaika = mosaic], as well as on words like *бульварный* [bul'varnyi = boulevard-adjective] and *тропический* [tropicheskii = tropical], where the international word acquires a Russian-specific derivational ending (e.g., *tropicheskii* is from *tropika* = tropics plus the adjectival ending *-skii*).

Table 5. *Instances of phonological analysis by suitability and outcome of inference*

Suitability	Instances	Distinct Words	Outcome of Success	Inferencing Failure
Unsuitable	24	19	1	23
Partially Suitable	6	3	0	6
Suitable	54	30	42	12

Note. Suitability categorizes the fit between the strategy and the specific lexical item. Success refers to the number of instances where readers use the strategy to correctly infer a word's meaning; failure refers to the number of instances where readers use the strategy but fail to come to a correct inference about the word's meaning.

Phonological analysis should have been more helpful to readers on several words found in the texts. For example, three readers recognized the words *эксплуатация* and *эксплуатационный* [ekspluatatsiia and ekspluatatsionnyi = exploitation- noun and adjective] as likely "cognates," but they could not come up with a meaning for the word. Readers sometimes did not take full advantage of phonological analysis even when it is a helpful strategy. For example, two readers questioned if *дельфин* [del'fin = dolphin] had to do with "Delphi"; three readers wondered whether *датоми* [datami = dates -instrumental plural] meant "data" or "dates"; one wondered if *камелия* [kameliia = camellia] could mean "camel."

For non-borrowed words, phonological analysis by itself had very limited application in Russian, and some readers used it inappropriately. Four different readers mistook the noun *количество* [kolichestvo = quantity] for *collective* or *collection*; three readers used homonymy (i.e., phonetic

or possibly graphic similarities) to guess that the verb *существовать* [suchshestvovat' = to exist] meant *to feel* [чувствовать chuvstvovat' in Russian] or *to travel* [путешествовать puteshestvovat']. Even with borrowed words, one reader noted the string *тру* [tru] in the word *конструкция* [konstruktsiya = construction] and wondered if the word was related to the word *трудный* [trudnyi = hard].

Table 6 summarizes the readers' 151 uses of morphological analysis for inferring a word's meaning. Readers used this strategy inappropriately only six times, on six different lexical items. In 63 instances readers used this strategy on 37 different lexical items where this strategy could give only a partial cue to word meaning (e.g., *заключить*—за [za - prefix] + *ключ* [kliuch=key; cf. Latin: cludo] + *ить* [it' - infinitive ending] = to conclude, to lock up). While readers correctly broke such words into their component parts in 21 instances, this helped them access a correct word meaning in only five instances. In the remaining 82 instances, readers used word formation strategies on 48 different lexical items, where this strategy gave an effective cue to word meaning (e.g., *подземный*—под [pod - prefix: under] + *зем* [zem - ground, earth] + *ный* [nyi - adjective ending] = underground). With words of this type, readers got correct meanings in 39 instances, partial meanings in 10, and in a further 18 they accurately chunked word elements, even though that did not help them infer the word's meaning. Overall, this strategy got readers to the correct meaning only 29% of the time; although when it was well-suited to the lexical item, this strategy got readers to the correct meaning roughly 48% of the time.

Table 6. *Instances of morphological analysis by suitability and outcome of inferencing*

Suitability	Instances	Distinct Words	Outcome of Inferencing	
			Partial Success	Complete Success
Unsuitable	6	6	0	0
Partially Suitable	63	37	2	5
Suitable	82	48	10	39

Note. Suitability categorizes the fit between the strategy and the specific lexical item. Partial success reflects the number of instances where readers use the strategy to get an approximate word meaning; complete success refers to the number of instances where readers use the strategy to infer the word's exact meaning.

Morphological analysis was more helpful to readers when it was applied to words from closely connected word families. For example, in both the CT and ET texts when readers encountered the word *напиток* [napitok- a drink, beverage (noun)], six of them noted the word's connection to the verb *пить* [pit' = to drink], but only some successfully processed the noun suffix. Readers of the CT text encountered the word in the phrase *один из самых популярных напитков* [odin iz samykh populiarnykh napitkov = one of the most popular drinks], which elicited comment from four different readers: three were reasonably certain that *напиток* was the noun *drink*. One reader Jane offered: "it might be a popular drink or ... it's got that root *пить*." Harriet wondered: "it's one of the most popular drinks *напитков* like... to drink? or to finish drinking?" and Simon commented: "drinks um because first I didn't realize that. But *пить* is to drink and ... um... *ов* is genitive plural." A fourth reader summarized: "I don't know maybe something with drinking." In the ET text Mark easily identified the word "напиток, *пить* um... I think *напиток* is a drink." In a different context in the ET text, Daniel noted the word has to do with drink, but questions

“drinking or drinkers,” showing that he knew the word was a noun but couldn’t figure out whether the *-ок* [-ok] signified a person or an activity.⁷

While readers were relatively successful on the word family *пить-напиток* [pit’-napitok = to drink - a drink], they struggled with their inferences on calqued words like *рукописях* [rukopisiakh = manuscripts-prepositional plural] where some could divide the word into morphemes, correctly recognize the base meanings of the morphemes, but still could not identify the English equivalent for the word. For example, Mark commented “рук ... making me think of hand or arm or something and *пися* makes me think of writing,” and Daniel reasoned “so рук hand *пись* could be written... so like handwritten, or hand-designed.”

Discussion

Strategy Use

The data show that readers use a broad range of reading and lexical inferencing strategies when working on texts, and at times they can use strategies to infer the meaning of unknown words. Despite some use of phonological and morphological analysis, other kinds of reader behaviors (e.g., rendering a specific word with a more generic term; using sentence or paragraph level context for guessing word meaning; using extratextual knowledge to infer the meaning of a word; recovering the dictionary form of a textual word) are rare in the data set. The use of sentence- or paragraph-level context is much rarer than was found in Comer and Keefe (2000) and Wesche and Paribakht (2010), and it is surprising that students in this study make so little explicit use of sentence- and paragraph-level context in attempting to figure out the meaning of unknown words.

One possible reason for the low incidence is that the researcher only counted instances when readers tied an inference to an explicit reference to sentence- or paragraph-level context. For example, when Beth read the sentence *Чай сначала пили лишь в царских и боярских хоромах, потому что этот напиток был очень дорогим* [At first tea was drunk only in the tsars’ and boyars’ chambers because this drink was very expensive], she struggled over the word *боярских* [boyarskikh = boyar] and wondered whether this could refer to a person. She read on and then summed up: “So I guess at the beginning tea was only drunk by tsars and I am assuming ... other rich people because it was really expensive.” Using the sentence-level context (i.e., tea was expensive), Beth interpolated that the word *boyarskikh* must refer to rich people. It seems likely that readers made implicit use of context more frequently than explicit references. For example, when Melissa wondered if *дельфин* [del’fin = dolphin] meant “Delphi,” but dismissed that possibility saying: “These don’t look anything Greek to me,” she was probably using context implicitly to make that judgment. Thus, readers may have used context more than has been detected here. The implicit use of context may also be one factor motivating readers’ unexplained guesses.

Incidents of explicit use of extratextual knowledge to solve a vocabulary question are low because, although readers did often reference background knowledge as they read parts of the text and offered a gist of sentences, they seldom used this knowledge to infer the meaning of specific unknown words. It may be that, despite the pre-reading brainstorming activity, readers

could still construct textual meaning only by using bottom-up strategies. Also there may have been just too many unknown words in the texts for them to make effective use of their background knowledge for inferring word meaning. Mark, for example, in brainstorming about the Moscow metro, explicitly mentions the fact that it has a central ring line and other lines branching out from it. However, when he read the CM text and came across that notion reflected in the word forms *ветку* - *веток* [vetku = branch-accusative singular; vetok = branches-genitive plural], he did not associate the word *ветка* [vetka= branch-nominative singular] with the word *branch*. It may be that all four texts used in the study were too hard for readers to “see the forest through the trees” and so they could not use context and extra-textual knowledge to solve specific vocabulary problems.⁸

When we examine the difference in average strategy use within the two groups, we can see that gisting (Strategy 8) seems to vary depending on text type, increasing when participants read the denser encyclopedia texts. This is quite noticeable for Group 2 readers where the EM text was much more challenging than the CT text. Group 2 readers used specific lexical inferencing strategies (such as morphological analysis) markedly less when they read the EM text. It appears that on the more accessible CT text Group 2 readers could afford to use a bottom-up vocabulary inferencing strategy like morphological analysis. In contrast, on the EM text readers abandoned that strategy. Further studies should examine whether gisting and inferencing strategies indeed have a compensatory relationship dependent on text difficulty.

In Table 4 one should note as well the large standard deviations for Strategy 5 (Unexplained Guesses), Strategy 8 (Gisting), and Strategy 10 (Morphological Analysis). This suggests that even when reading the same text readers varied widely on their use of strategies. Although the readers in this study had virtually the same basic Russian language instruction, they approached reading in Russian very differently. In addition, one also notes that individual readers can vary their patterns of strategy use significantly. For example, Simon used morphological analysis only three times with the EM text, but 18 times with the CT text. Mary made 12 remarks about looking up specific words in the CM text, but only 2 such references when reading the more challenging ET text.

Phonological analysis

Phonological analysis for readers at this level seems to work well, especially when they apply it to appropriate words. The strategy becomes problematic when readers use it inappropriately, particularly when they suggest a word meaning based on homonymy. It seems possible that English speakers draw on homonymy when dealing with an unknown word, since in English spelling similarities are often a strong clue as to how to pronounce an unknown word and spelling differences play such a large part in disambiguating English words (e.g., meat-beat vs. meet-beet; hoping-hopping vs. coping-chopping). If English readers habitually use word shape as a helpful word recognition strategy, then we may need to make them aware that word shape (e.g., *существовать* [suchshestvovat' = to exist], *чувствовать* [chuvstvovat' = to feel], *путешествовать* [puteshestvovat' = to travel]) is usually not effective in Russian for determining word meaning, even if it can be very helpful and reliable in predicting declensional and conjugational classes.

Morphological Analysis

While readers attempt morphological analysis to determine word meaning more often than any other inferencing strategy, it has only limited utility for them, and their success rate even with words well-suited to the strategy does not exceed 50%. On the other hand, readers were able to see the morpheme components of words, and that suggests that as their vocabulary expands they may become more efficient with this strategy. It may be that for readers at this level, morphological analysis works best only on word families with closely connected meanings, such as *напиток-пить* [napitok = a drink – pit' = to drink]. As a strategy for inferring the meaning of words, actual morpheme analysis may not be helpful for calques like *заключить* [zakliuchit' = to conclude] or *рукопись* [rukopis' = manuscript], where the English equivalent is built on Latin roots and prefixes. Although not helpful as a word inferencing strategy, morphological analysis may offer helpful mnemonics for learning words, since it invites readers to engage in the deep processing that is one key step for word learning (Fraser, 1999; Hulstijn, 2001).

These results show that intermediate readers of L2 Russian tap a range of knowledge sources in lexical inferencing similar to that of ESL readers, although not with the same frequency (de Bot, Paribakht & Wesche, 1997; Paribakht and Wesche, 2006; Wesche and Paribakht, 2010). There are multiple reasons for these differences. Although these learners are in their fifth semester of language study, they are considerably less experienced than the ESL learners in the other studies. Since the L2 Russian readers know fewer of the words in the text, it is harder for them to make inferences for the many unknown words. This would confirm Haastrup's conclusion (1991) that learners must reach a threshold in language proficiency before they can infer the meanings of unknown words efficiently.

This study has several limitations: first, the open-ended nature of the think-aloud does not allow us to make comparisons among all the participants, since not everyone comments on the same words or phrases. Second, the concurrent non-metacognitive think-alouds do not allow us to detect implicit use of reading strategies, and so some strategies may go undercounted. Third, in examining reader strategies, the study does not take into account how specific text factors, other than intended audience, may interact with reader's choices of strategies or the effectiveness of their application. The data here hint that the transparency of the syntax of a phrase where readers encounter an unknown word may play a role in their ability to infer word meaning. For example, the three readers who guess that *напиток* [napitok] means the noun *drink* when they read the phrase *один из самых популярных напитков* [odin iz samykh populiarnykh napitkov = one of the most popular drinks] seem to benefit from the clear syntax of the context and the fact that the construction mirrors English. In contrast Daniel, when dealing with the same word in a different context, cannot be certain enough about the surrounding syntax to know if the word refers to a person or to an activity. Lastly, some variability in reading strategies may be due to the nature of the texts: substituting a more generic word for a specific one depends on the text using very specific terminology, guessing the wrong meaning of a word for the context also depends on the number of homonyms in a specific text.

Conclusions and Pedagogical Implications

We can draw several pedagogical implications from the data in this study. Readers at even the intermediate level of Russian language study continue to need instruction in how to use reading and inferencing strategies effectively. Developers of reading instructional materials for this level in Russian should include such instruction, especially in helping learners develop skills in using context and background knowledge effectively to infer the meaning of individual words. In addition to this, future materials should develop learners' sophistication with regard to when and how to use phonological and morphological analysis in inferring word meanings. Among other specific problems to be addressed, readers may need instruction and practice in situations where English single consonants map to Russian diagraphs (English *x* = Russian *кс*; English *j* and *g* = Russian *дж*) and where English vowels and vowel combinations are expressed differently in Cyrillic transcription (English *oi* > Russian *ya*). Furthermore, instruction should push readers to check their phonological analysis with the local context where the word appeared in the text to verify that the strategy has produced a useful and logical meaning. For the nonnative reader, it is just as possible that Russian borrowed the word *камелья* [kameliia] as the name for the flower *camellia* as for the animal *camel*. Explicit use of context should help readers resolve the correct equivalent.

This strategy instruction should supplement, not replace, existing materials that scaffold learners' global comprehension of the text, grammatical parsing, and other linguistics skills (Barcroft, 2002; Wesche & Paribakht, 2000). Strategy instruction and this linguistic scaffolding should ideally be integrated with activities for getting readers to discuss, comment on, and write about texts and their informational content by using the procedural model for reading described by Swaffar, Arens, and Byrnes (1991).

Future research can build on these findings to ask more specific questions about measuring text readability in Russian and about how text features such as grammar and syntax interact with readers' use of strategies for inferring the meaning of unknown words. Future research would also want to track whether strategy instruction has uniform benefits for readers or whether readers will use it selectively.

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Notes

1. This finding was unexpected since grapheme similarity is not a reliable strategy for word inferencing in Russian, unless the grapheme string overlaps completely with the word's morpheme structure. Thus, while *город* [gorod - city] and *голод* [golod - hunger] share five

letters, the root morphemes (g-r-d and g-l-d) here are different, and adult native Russian speakers are unlikely to sense a semantic connection between them. In contrast native speakers easily recognize a shared root morpheme even when the morpheme is spelled differently (for example, *город* [gorod – city], *град* [grad – city (stylistically marked)], *горожанин* [gorozhanin – city-dweller]).

2. Offord and Gogolitsyna (2005) list 68 “false friends” between English and Russian, while a comparable reference work lists 330 “false friends and partial false friends” between English and Spanish (Batchelor and Pountain, 2005). While neither work’s lists claim to be comprehensive, the lists suggest that English readers of Spanish will encounter false friends more frequently than English readers of Russian.

3. Osborneva (2005) modified the Flesch (1948) formula to take into account that Russian words tend to be longer than English ones and have more syllables. Her formula is: $K = 206.836 - (60.1 * (\# \text{ of syllables} / \# \text{ of words})) - (1.3 * (\# \text{ of words} / \# \text{ of sentences}))$. While Flesch ratings for texts normally range from 100 (most accessible) to 0 (accessible to readers with higher education), one text in this study rates a difficulty level of -1.71. Although imperfect, Osborneva’s modification of the Flesch formula, nevertheless, provides a measure to rank the texts used in this study.

4. This study uses concurrent, non-metacognitive think-aloud protocols to track readers’ use of strategies and knowledge sources since this technique has been used extensively in reading research since the 1980s both with L1 readers (Cote, Goldman, & Saul, 1998) and L2 readers (Block, 1986; Davis & Bistodeau, 1993; Ghaith, 2003; Horiba, 2000; Kern, 1994). Yoshida (2008) and Bowles (2010) have found that the process of concurrent, non-metacognitive thinking aloud does not distract readers’ attention from the task of reading.

5. Initially, the coding scheme included two additional strategies related to unexplained guessing (a reader refines an initial guess about a word and a reader recognizes a word incorrectly). These three categories accounted for much of the disagreement between the researcher and the second rater, so it was decided to collapse the categories into a single “unexplained guessing” grouping (strategy 5). This increased the interrater agreement from .67 to .78.

6. In the second research question, the classification of whether or not a word is “suitable,” and “partially suitable” or “unsuitable,” for phonological or morphological analysis was made by the researcher alone. While there is some subjectivity in this determination, the following general principles were applied. For phonological analysis, international and borrowed words that have similar meaning to current English usage were considered “suitable.” International and borrowed words whose meanings in Russian are slightly different from current English usage were thought of as “partially suitable,” while native Russian words whose sound structure would give no clues to meaning were labeled “unsuitable.” For morphological analysis, native words with high frequency prefixes and suffixes that retain their typical meanings were considered “suitable,” while Russian words calqued from Latin or Greek, or words whose usage reflected a transferred meaning, were considered “partially suitable.” Native words whose meanings are now distant from their constituent morphemes (i.e., прибор [pribor - from pri- to and bor - take] = apparatus) and international words were considered “unsuitable.”

7. While *-ок* (-ok) is exclusively a noun suffix in Russian, it can be used either to show actor (*игра* [igra=game] – *игрок* [igrok = player]) or an object (*звон* [zvon = ringing, peal] – *звонок* [zvonok = bell, a phone call]).

8. The participants may have struggled with these texts and the task in this study because they are different from their usual reading activities, which, at the participants' institution, tend either to be getting the gist of an authentic text (with little or no glossing) or intensive reading of an authentic text that has been extensively glossed. The reading task in this research study may have been the first time where the participants had to read a completely unglossed authentic text and try to understand not just the gist, but also the meanings of specific words, while unpacking the grammar of the text.

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