Arabic semantic priming for homographs does not result in a boost to all related material

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Abstract

Purpose – The aim of this study was to examine whether, when a person reads, there is a boost to all material related to the context in Najdi Arabic (NA) as was found in English in was found in Rodd *et al.* (2013). The study employs Arabic language features of orthographic style and diglossia to answer the research question.

Design/methodology/approach – Forty-two participants were asked to come on two sessions to complete a reading task, a filler task and a word recognition task. The word recognition task included 14 homographs that could mean one thing in Modern Standard Arabic and another in NA.

Findings – The findings show that the assumption that all related materials are ready to be used when readers are exposed to the context is not valid for the two Arabic variants.

Research limitations/implications – One limitation of this study was that the participants were all female.

Originality/value – The findings could help writers write better texts to help individuals who struggle with reading comprehension whether it is because of dyslexia, Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD) as when researchers understand how priming works, they might be able to help readers in their reading fluency and comprehension (Rodd *et al.*, 2016). This could be by producing better texts to comprehend or using semantic priming in classroom setups.

Keywords Context, Modern standard Arabic, Najdi Arabic, Psycholinguistics, Semantic priming

Paper type Research paper

Introduction

Most research on the topic of priming has investigated it through the English language. Thus, generalized conclusions, such as there being a boost to *all* material related to the context, have been drawn as was found in Rodd *et al*. (2013). Ambiguous words which are words that are written and pronounced in the same way but have different meanings, such as "pen," "bank," "jam" and "spade" have been investigated by Rodd *et al*. (2013). Despite these words carrying two different meanings, those meanings were in the same register, which was English. To our knowledge, no previous work has tested two registers. Although two research papers have examined Arabic and priming, neither used the feature of diglossia in Arabia to test priming or investigate whether there was a boost to *all* the material related to the context. The two Arabic studies that examined priming, Mountaj *et al*. (2015) and Ibrahim and Aharon-Peretz (2005), did not employ diglossia or use two registers in their research. Although Mountaj *et al*. (2015) mentioned ambiguity based on diglossia, the aim of that study was not to address the question of what affected priming or whether there was a boost to the material related to the context. Instead, they focused on answering whether Moroccan Arabic was sensitive to priming. Ibrahim and Aharon-Peretz (2005) used semantic priming as a tool to conduct two experiments that aimed to examine whether Arabic speakers processed Modern Standard Arabic (MSA) as a first language or a second language. To do so, they examined participants in Western Galilee who had learned colloquial Arabic at home and MSA as well as Hebrew in the second grade at school. The results showed that although MSA and colloquial Arabic are both from the same origin, participants stored MSA as a second language in their cognitive system. The present study examined whether there was a boost to *all* material related to a certain context in the two Arabic verities, Najdi Arabic (NA) and MSA. It has been reported earlier by Rodd *et al*. (2013) that there was a boost to all the related material on English data but will it apply to diglossic languages such as Arabic? We tested the understanding of homographs that hold one meaning in MSA and another in NA.

Ambiguity

Lexical ambiguity can refer to polysemy, homonyms, homophones and homographs (Rodd, 2018). When the different meanings of an ambiguous word are related in one sense, then the words are polysemes. Rodd (2018) gives the example of the word "run." This word can mean "the act of running in the street" or "running an election" or even "running a film." One can see that those different meanings are related to one another in a sense that something is "going"; however, the reader or listener processes each meaning differently. Homonyms are words that carry different meanings but those meanings are not related to one another. That is, they do not have the same origin and it was a historical "accident" in language where one word has two unrelated meanings (Rodd, 2018, p. 3). An example of this is the word "bark" which has two distinct meanings one referring to "the noise a dog makes" and the other is "the tree cover." Since both meanings are different and do not share an origin, in dictionaries, those words will be in two different entries. Homophones are words that only share pronunciation and may vary in spelling (Rodd, 2018). Examples of homophones are words like "bark" as well as words like "meat/meet" and "two/to." Those words are ambiguous only in spoken interactions because if they were spelled, it would be easy to identify the word as they are written in a different way. Homographs are words that share their spelling and do not share their pronunciation. They are words that look the same but are pronounced and mean different things, for example, the English words "bow"/baʊ/and "bow"/bəʊ/. This phenomenon is present in Arabic and essential for this research as the participants in this research paper had to identify Arabic homographs.

Semantic priming and processing ambiguity

One question debated among psycholinguists relates to how individuals process or understand ambiguous words. To study this phenomenon, priming is used. Priming helps in reading comprehension and fluency (Rodd *et al.*, 2016). Semantic priming helps readers choose the intended meaning of a word in a text. Researchers such as Simpson and Burgess (1985), Light and Carter-Sobell (1970), Rodd *et al.* (2016), Duffy *et al.* (1988) and Rodd *et al.* (2013) have conducted studies to understand what affects semantic priming. There are four factors that are discussed to have an influence on what affects the priming process. The first view, as supported by Simpson and Burgess (1985), Rayner and Duffy (1986), Duffy *et al.* (1988), Twilley *et al.* (1994) and Mason and Just (2007), examines word frequency as a factor in the realization of ambiguous words. The second view, as described in works by Light and Carter-Sobell (1970), Kellas *et al.* (1988), Masson and Freedman (1990), Rayner *et al.* (1994) and Binder and Morris (1995), proposed that the second encounter of an ambiguous word is what speeds up its recognition. In Rodd *et al.* (2016), the proposed factor that affects the realization process of ambiguous words is recent experience with that word. The fourth view argues for the importance of context, which can be found in Duffy *et al.* (1988), Rodd *et al.* (2013) and Blott *et al.* (2022). The discussion also looks at memory and its role in that process. However, more recently, work on this topic has focused on investigating the role of word frequency and context, as Gilbert *et al.* (2019) pointed out.

Research conducted by Foss *et al.* (1968) and Conrad (1974), among other examples of earlier research examining context and its relationship to processing ambiguous words, is not novel. Context refers to discourse surrounding a word or a paragraph that could help in understanding it (Merriam-Webster, n.d.). However, discussion on the matter has not only focused on whether context played a role in the processing of ambiguous words, it has also looked at *how* individuals process those ambiguous words when context is present. There are three hypotheses related to the topic: the selective access hypothesis, the nonselective access hypothesis and the weak selective access hypothesis (Schvaneveldt *et al.*, 1976). The selective access hypothesis suggests that semantic context helps individuals process one meaning of an ambiguous word over another in a certain context. The nonselective access hypothesis proposes that initially, *all* meanings of ambiguous words are accessed and the contextual information is used later on to determine the intended meaning. Finally, the weak selective access hypothesis stands in the middle, suggesting that *all* meanings related to the context are accessed and the meaning is determined based on the contextual information provided. If the context is missing, access is no longer selective. Duffy *et al.* (1988) discuss two models that help in processing ambiguous words which are the selective access model and the exhaustive access model. Under the selective access models, the assumption is that when a reader is faced with information that disambiguates the ambiguous word, then the only meaning accessed is the related meaning to the information provided. Whereas with the exhaustive access model, all the meanings of the ambiguous word are accessed even with disambiguating information. The exhaustive access model includes the autonomous access model and the reordered access model. The autonomous access model looks at context as a factor that has no influence on the processing of ambiguity unless the context has strong items that could affect the recognition process. Whereas the reordered access model proposes that context affects the processing of ambiguous words as it makes the related meaning more available. This means that even if the meaning related to the context is less frequent, it will still be accessible as long as it is related to the context.

The conversation regarding context also examines how effective it is in processing ambiguous words. Rodd *et al.* (2013) suggested that context plays a significant role in the realization of ambiguous words, that there is a boost in the recognition process, and that *all* material related to that context is ready to be used. When the participants in Rodd *et al.* (2013) were given the ambiguous word "fan," the results showed that 30–40% of the participants

associated the word with "sports" and "tennis" rather than "cooling" or "summer" because the prime used a context that had to do with sports. This is said to be because of a boost to *all* related material. In other words, a prime not only affects the target word but *all* the related words that could fit that semantic context or text. Thus, the reader does not get the meaning of the word itself in isolation, but *all* meanings related to that context are "ready" to be used. In this research, we used Arabic language features of orthographic style and diglossia to investigate this claim using homographs that carry one meaning in MSA and another in NA.

The processing of ambiguous words cannot be discussed without also discussing memory, particularly, working memory and episodic memory. The traditional idea of working memory is represented as slots that carry items until those items are needed and then individuals retrieve them (Miller, 1966). However, since working memory capacities differ between individuals, thus it is used to investigate individual differences in processing ambiguous words and not to theorize about processing words in general. Working memory and its role in processing ambiguous words is beyond the aim of this research and is not discussed here.

Episodic memory has long been a topic of discussion in attempts to understand how readers process ambiguous words. Working memory refers to events stored temporarily in the memory (Tulving, 1972, p. 386). When a person experiences a personal event, this event is referred to as an episodic memory (Mayes and Roberts, 2002). Curtis *et al.* (2022) conducted research to examine the role of episodic memory. They built an assumption based on the findings of Gaskell *et al.* (2019), whose results showed that sleeping enhances the priming effect. Curtis *et al.* (2022) argued that this might be because of memory. They conducted three experiments, as they assumed that since sleep enhances priming, and that is probably an effect of memory, priming does not solely affect ambiguous words but also words that carry one meaning. Their results showed that priming had an effect on non-homonyms. They also found that context-specific meanings remained for long periods of time. One interpretation of this research is that episodic memory plays a role in the realization of some homographs.

When investigating semantic priming, the most frequently used methods include processing complexity tasks, ambiguity detection and priming methods (Simpson, 1994). More recently, Jennifer Rodd refers to her methodology as either "word recognition" or "recognition method." In those, she would present the participants with a context and later on, after a filler task, the subjects of her research were asked to take a word association task in which they had to give meaning to words. Some of the words in the word association task were ambiguous and others were not. The context presented, the prime, could be an audio as it was the case in Rodd *et al.* (2016) and Gilbert *et al.* (2019) or a text as it was with Gaskell *et al.* (2019). The same method of presenting a context to the subjects of the study will be followed in this research. After the filler task, they will be asked to give the meaning of some ambiguous words and other words that carry one meaning. This research is not a replica of Gaskell *et al.* (2019) as in that study the time between the priming task and the word association task was 12–24 h since the aim of that study was to see the influence of sleep on priming.

Arabic language

Arabic is the official language in the Arab world and is used in around 25 countries. In Arabic, there are 25 consonants and 6 vowels (Abu- Rabia, 2019). Three of those vowels are long and three are short. The short vowels are represented as diacritics, which are written either on top of the text or under it (Abu-Rabia and Saliba, 2008). These diacritics are often dropped in writing. In Arabic, words can be written with shallow orthography by using diacritics to represent the short vowels in the word (Azzam, 1989). Words can also be written with deep

orthography by dropping short vowels. By doing so, the grapheme does not represent the phoneme. More advanced readers are said to have a better ability to comprehend words without the use of short vowels, while children who are starting to learn to read require diacritics (Mountaj *et al.*, 2015). This is why diacritics are found only in Quranic verses and poetry or when teaching children to read (Baluch, 1992).

Vowelized texts may help readers with comprehension, and if the text is not vowelized, context can help readers understand the meaning of words. This is because Arabic is a homographic language (Abu-Rabia, 2012). Homographs refer to words that are written in the same way but have different pronunciations and meanings. For example, in Arabic, the set مذهب/muðahab/, which means "gilded," and مذهب/maðəhab/, which means "doctrine," are homographs. They are pronounced differently and are supposed to be written differently using different diacritics. However, since people tend to drop diacritics when writing in Arabic and use deep orthography, words look the same when they are not supposed to. Other examples of Arabic homographs are عقد/ʕuqad/, which means "knots," عقد/ʕaqəd/, which means "contract," عقد/ʕiqad/, which means "necklace," مشكلة/muʃəkilah/, which means "problem," مشكلة/muʃakalah/, which means "mixed," سلطة/salatʕah/, which means "salad" and سلطة/sulətʕah/, which means "power or rule."

In Ferguson (1959), the term "diglossia" was introduced and used to refer to situations in which two varieties of the same language are used but each variety has a distinctive function. In the Arab world, two varieties of Arabic are used depending on context. Saudi Arabia is like other Arabic countries in its use of diglossia. Different varieties of Arabic are used in different parts of the country. In Najd, for instance, people tend to use NA in their day-to-day communication. Diglossia is important in this research because some words are homographs in Arabic due to diglossia; some words carry one meaning in MSA and another in the regional dialect. An example of this is نصير/nasʕir/, which means "supporter" in MSA, and نصير/nəsʕir/, which means "we become" in NA. The context of MSA or NA helps individuals retrieve the MSA meaning or the NA meaning. This is important because, in Arabic, diglossia could help in understanding what affects semantic priming. Arabic can help us understand whether there is a boost to material related to the context because of homographs that mean one thing in MSA and another in NA.

It is important to note that until recently, users of the Arabic language did not use regional non-standard Arabic in a written form; written non-standard Arabic has become common with the advent of social media. Before this, non-standard Arabic was used in spoken interactions only, which is why there are individual differences when people write the same word in the regional dialect. This should not affect the subjects of this study. First, since Arabic language users use deep orthography, this results in the loss of the case ending. That is, as discussed in the Arabic orthography part of the literature review, people tend to use deep orthography and drop vowelization, so they have words that lose their case. For example, a sentence that translates to "Ahmed went to school" written in shallow orthography would be "أحمد ذهب الى المدرسة"/ʔaħəmadon ðahaba ʔila ʔaləmadərasati/, while in deep orthography, it is written "أحمد ذهب الى المدرسة"/ʔaħəmad ðahab ʔila ʔaləmadərasah/. By dropping vowelization and case, the only thing that indicates that this sentence is in MSA is the vocabulary used. That is, since the word used is "ذهب"/ðahab/, the reader knows that this word is in MSA and the context is MSA, whereas if the word was "راح"/ra:ħ/and the sentence was "أحمد راح المدرسة"/ʔaħəmad ra:ħ ʔiləmadərasah/, then the reader knows that it is in colloquial Arabic and that the context is colloquial. The loss of case in Arabic orthography and the use of specific vocabulary indicate the use of colloquial Arabic for readers in general and the participants of this study in particular.

As previously mentioned, NA is a variety of Arabic used in Najd in Saudi Arabia. Since this paper investigates the understanding of NA homographs, it is important to discuss what

NA refers to. When studying language variations in the Arab peninsula and the Gulf region, Versteegh (2014) divided these variations into four groups, which he described as the Bedouin dialects: the Syro-Mesopotamian desert, the south of Jordan, the Negev and the Sinai. He argued that these dialects originated because of two movements, one from central Arabia and the other from southern Mesopotamia. Thus, there was a continuum of language in the Arabic peninsula because of how people used to move from one place to another. However, this understanding of what language is like in the region is not sufficient to investigate language use since people in modern times do not move from one place to another, as they live in civilized cities. There could be a continuum that ties these language varieties together; however, the region is too wide and thus the language variations are too large for them to be investigated as four parts only.

Ingham (1982) classified the dialects in the region into four other classes: the north-east Arabian dialects, south(west) Arabian dialects, Hijazi dialects and northwest Arabian dialects. NA in this classification was part of the northeast Arabian dialects. It was seen as part of the speech of the Aniza and Shammar tribes. Speakers of Kuwaiti Arabic, Bahraini Arabic and other languages from the Gulf were considered speakers of the Aniza tribe dialect, whereas Bedouins in Iraq, Syro-Mesopotamia and Jorden spoke the Shammar dialect. However, this definition is overly broad and cannot be used to describe the language users examined in this paper.

Al-Sweel (1987) explained how NA was considered the variety spoken in the middle part of Saudi Arabia. He attempted to put a geographical border on it by explaining that NA was spoken in the region from Yemen to the southern borders of Jorden and from Alhasa Oasis to the Hijaz Mountains in the east. However, for the purpose of this study, NA refers to the language spoken in the Riyadh region. As discussed earlier, there is a continuum in the languages used in the region, so it is important to draw a clear line on what NA refers to. This should not propose a linguistic problem, as dialects have been examined depending on geographical areas before, as was the case in Al-Sweel (1987). After defining where NA was spoken, he moved on to examine Qassimi Arabic only, which indicates that his definition was also too wide to be applied.

In the present research, homographs from different registers (i.e. MSA and NA) were used to investigate the role of context in boosting *all* material related to the context. By using the Arabic language features of diglossia and orthographic style, priming could be explored from a different angle, which could lead to more information that can help in understanding this phenomenon and how ambiguous words are processed. The participants in this study were presented with a reading task, a prime and a word recognition task that had homographs used in the priming stage and homographs that were not used in the priming stage. The hypothesis was that if the participants were exposed to a prime and they gave the appropriate answers to that prime, then there was a boost to *all* the material related to the prime. If they did not, then there might not be a boost to *all* the related material.

Research question
This research paper aimed to answer the following research question:

RQ1. Does semantic priming result in a boost to material related to the context in the case of Arabic homographs?

H0. Semantic priming does not result in a boost to material related to the context.

H1. Semantic priming results in a boost to material related to the context.

Methodology

Participants

A purposeful sampling approach was used in this research. The participants were 84 female university students from Princess Nourah bint Abdulrahman University, an all-female university, who spoke both NA and MSA. The participants' ages ranged from 18 to 24. The participants were selected based on two criteria: they had taken the general aptitude test in MSA and were born, raised and living in Riyadh (see Appendix A for the background questionnaire and its English translation). The recruitment period started on the 19th of September 2023 and ended on the 2nd of November 2023. The participants were divided into two groups, a control group and an experimental group. They have been given a written consent form (see Appendix B for the consent form and its English translation). The participants were told that the research was about reading styles and not about processing homographs as that could have affected the results of the study.

Materials

The participants took a word recognition task that included 14 homographs that carried one meaning in MSA and another in NA. Table 1 shows the homographs used in this study. The numbers of these homographs are used throughout the study to refer to the homographs.

The homographs used in this research were of different lengths but were all short, four to six letters. Previous work has shown that the length of a word might push readers to skip reading that word as 10-letter words are either skipped or have longer fixated times

Word number	Word in Arabic alphabet	MSA word in IPA transcription	Meaning in MSA	NA word in IPA transcription	Meaning in NA
1	نجيب	/naʤib/	Adjective: Good	/nəʤib/	Verb: We bring
2	كبر	/kibr/	Adjective: Arrogance	/kubur/	Adjective: Same age
3	نصير	/nasˤir/	Adjective: Supporter	/nəsˤir/	Verb: Become
4	سفه	/safih/	Adjective: foolish	/səfah/	Verb: Ignored
5	عجه	/ʕudʒah/	Noun: Omelette	/ʕadʒah/	Noun: Middle of the storm
6	حنا	/ħana/	Verb: He was good to me	/ħina/	Noun: We
7	سمح	/samaħa/	Verb: Allowed	/samħ/	Adjective: Nice person
8	صحيح	/sˤaħiːħ/	Noun: Correct	/sˤəħajħ/	Adjective: Mentally challenged person
9	عد	/ʕud/	Verb: Come back	/ʕid/	Verb: Count
10	أبي	/ʔabjun/	Adjective: Something that makes us proud	/ʔabi/	Verb: I want
11	لابد	/la buda/	Adjective: Must	/labid/	Adjective: Oily hair
12	حكم	/ħakim/	Adjective: Wise man	/ħukum/	Adjective: Exactly
13	خل	/xil/	Noun: Friend	/xal/	Verb: Leave it
14	قوم	/qawəm/	Noun: People	/quːm/	Verb: Wake up

Source(s): Table by authors

Table 1.
Numbering used to represent homographs

([Rayner *et al*., 2011](#)). To ensure that the length of the words did not prevent readers from reading them, the homographs presented to the participants were of different lengths. More on the process of choosing those homographs can be found in the "Validity" section. [Table 2](#) summarizes the data analysed in this research.

Procedure
The tasks were paper-based; therefore, the participants needed to come to class to complete them. The participants were asked to complete all the tasks individually and not use any online sources or discuss it with other participants. Having a control group was important in this research as there was no data that showed the recognition of the homographs in Arabic thus a baseline had to be established. The participants from the control group were asked to come once. They were asked to sign a consent form written in English to prevent any unwanted priming effect, fill in the English background questionnaire and complete the word recognition task on the same day. When completing the word recognition task, the participants were asked to write the first meaning that comes to their minds when reading the homograph. The participants were asked to sit quietly and not to share their answers. The researchers did not monitor the time in this case as those tasks were not time-sensitive because there was not a priming stage.

The participants from the experimental group had to come on two different days and were assigned a number and were asked to keep use it both sessions as it will be used to track their answers. The participants began by completing a language background questionnaire, which was adapted and translated from an online webpage from Wisconsin University

	Group	Number of words in task	Number of participants	Total number of words to analyze
1	Control group	14	42	280
2	Experimental group	Day 1: 14 Day 2: 14 Total: 28	42	560
3	Total			840
1	Control group	14	42	280
2	Experimental group	Session 1: 14 Session 2: 14 Total: 28	42	560
3	Total			840
1	Control group	14	42	280
2	Experimental group	Session 1: 14 Session 2: 14 Total: 28	42	560
3	Total			840
1	Control group	14	42	280
2	Experimental group	Session 1: 14 Session 2: 14 Total: 28	42	560
3	Total			840
1	Control group	14	42	280
2	Experimental group	Session 1: 14 Session 2: 14 Total: 28	42	560
3	Total			840

Source(s): Table by authors

Table 2.
Data size

(Student Questionnaire on Language Background, Writing Across the Curriculum) (2019). They were then presented with a reading task, which acted as a prime, followed by a filler task and a word recognition task in which they were asked to provide the meanings of homograph words.

On Day 1, they were exposed to a prime in NA and then given a reading task (see Appendix C for the NA reading task, its English translation and IPA transcription), followed by a filler task. They were then asked to complete a word recognition task (see Appendix D for the NA word recognition task). In the reading task, the participants were exposed to a text similar in length to the number of words used in the texts used by Rodd *et al.* (2016). They were asked to read it silently before moving to the filler task. In the filler task, they were asked to answer a question and were given 10 min to do so. As for the word recognition task, it was self-paced as they do not need to be rushed or timed to finish the task as was found by Gaskell *et al.* (2019). On Day 2, they were exposed to an MSA prime and then given a reading task (see Appendix E for the MSA reading task, its English translation and IPA transcription), followed by a filler task. After that, they were asked to complete a word recognition task (see Appendix F for the MSA word recognition task). All the tasks were similar to Day 1. In both word recognition tasks, the participants were asked to supply the meanings of words, some of which were homographs and some of which were not. The participants were given 20 min to finish all three tasks. Fourteen homographs were used in this study. Of these, seven were presented in the priming stage, in the texts, and the other seven were not. The aim of this was to determine whether the priming stage affected the realization of *all* the homographs related to the context. In other words, did the prime result in a boost to *all* the material related to the prime in the case of Arabic varieties? If the results did not point to that, could we determine whether recent exposure to the words had played a role in the realization of those homographs in a specific context? Figure 1 summarizes the process that was followed to answer the research question.

All the data collected was analyzed using SPSS. The meaning the participants gave to the homographs were recognized as NA meaning, MSA meaning, not applicable or not related. The coding scheme included two different slots for not applicable and not related as judgment on those could differ. That is, as will be discussed in the "Validity and Reliability" section, some homographs had a meaning that can be used in both registers like the word/xal/which is used in both registers as "vinegar." Also, the word/ʔabi/was a word that carry two meaning in MSA one being the meaning used in the priming stage which was "something that makes us proud" and another which is "my father." Those meanings were coded as "not applicable" as they were valid meanings but they were not applicable to this research only as they do not show an effect of the prime. However, it was important to track whether those meanings were given or not and if they could have affected the results. As for the "not related" meanings, this was used as a label when the participants gave meanings that were not accurate. Thus,
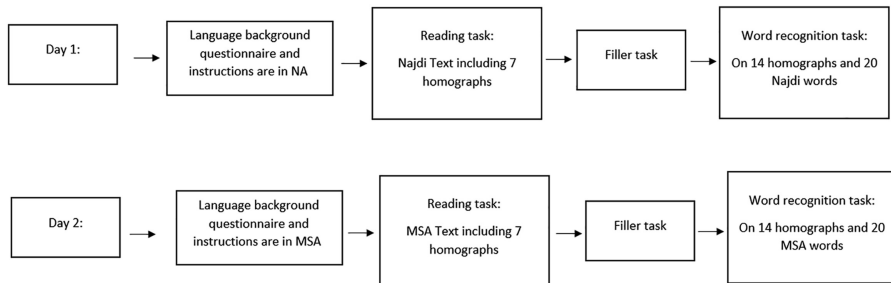

Figure 1.
Summary of methodology followed

Source(s): Figure by authors'

recording the answers more specifically was needed for this research. There were no missing data as the researchers ensured that all the submitted answers were complete. Table 3 summarizes the coding scheme followed in this research.

Validity and reliability
This section discusses the measures taken into account to ensure the validity and reliability of the research. There is no single specific measure that guarantees a study is valid (Vacha-Hasse *et al.*, 1999), but enough information should be presented to readers to judge the validity of the research. As Zumbo and Chan (2014) suggested, it is a continuous process that ensures that the instrument used presents valid findings. In this research, the priming tool—the NA and MSA texts—was designed specifically for this research. Both texts were written for the purpose of conducting the study using the same number of words as in Rodd *et al.* (2016). To ensure how appropriate the texts were for testing the research questions and whether there were any problems with them, they were revised by Arabic linguists. Two Arabic grammarians who were faculty members at the Arabic Teaching Institute for Non-Arabic Speakers at Princess Nourah bint Abdulrahman University were consulted.

The homographs used were chosen specifically for this research. As stated earlier, this research examined homographs in NA and MSA, and there were no existing data that could be used to investigate the appropriateness of those homographs. They are the result of three years of analyzing words and everyday texts to choose the most appropriate ones to test. Three linguists from the Applied Linguistics Department at the College of Languages at Princess Nourah bint Abdulrahman University were consulted on these words. All three of the linguists were faculty members in the department; two of them held a Ph.D. in applied linguistics and one held a master's degree. All the linguists were NA speakers from different parts of Najd who also used MSA. Only 14 homographs were used because of the primacy of homographs of two registers. The criteria for choosing the homographs included that those homographs had to have one meaning in MSA and another in NA. The NA meaning should not root back to the MSA meaning in any way, in other words, it is not derived from MSA. The homographs should be used by different age groups and not popular in a certain age group only. Some words were excluded from the study for various reasons. For example, the homographs هبة/hibah/, which means "a grant" in MSA, and هبة "habbah," which means "ubiquitous" in NA, were excluded because the NA meaning was used by a certain age group and this could affect the findings. It is important to note that of those 14 homographs that will be used in this research four homographs are not only homographs but also ambiguous words which are/xal/,/ħəna/ and/ħakam/. The homograph in MSA/xil/and in NA/xal/could also look like the word/xal/which means "vinegar" in MSA and in NA. Also, the word/ħəna/ could be identified as the natural plant that locals use to die their hair and hand. Lastly, the homograph/ħukum/in NA and/ħakim/in MSA can also be realized as/ħakam/which is used in NA and MSA. However, in linguistics, this is a different case because those words here are ambiguous words not homographs as they are words that are not ambiguous because of the way they are written but because of word meaning. To try to disambiguate those words for

Category	Code
NA meaning	1
MSA meaning	2
Not applicable	3
Not related answer	4
Source(s): Table by authors	

Table 3.
Coding scheme used in this research

the participants, they have been used in the texts. That is, those words were purposefully presented in the texts and disambiguated to help the participants reach the intended NA or MSA meaning as Rodd *et al.* (2013) found that when an ambiguous word is presented in a text, it would help the readers retrieve the meaning related to that context later on. This could affect the participants understanding by either retrieving the MSA meaning or the NA meaning depending on the text, the prime, they were used with. If a participant chose to provide the meaning present in both registers and answered "vinegar" for example, it was judged as a "not applicable" meaning because it did not show an MSA understanding nor did it show an NA understanding of the word. This could be important in future research that looks at the dominance of the word but this is beyond the scope of this research.

The last measure taken to ensure the validity of the validity of the research was having a filler task. Light and Carter-Sobell (1970), Kellas *et al.* (1988), Masson and Freedman (1990), Rayner *et al.* (1994) and Binder and Morris (1995) were all criticized by Rodd *et al.* (2016) because their results were built on having the participants take the tasks shortly after being exposed to the prime, which meant they were judged as studies that measured repetition priming rather than semantic priming. To avoid this being an issue in the present research, a filler task was presented to the participants after they completed the reading task. They were asked to complete the filler task in detail before continuing with the word recognition task.

Dörnyie (2007) explained that reliability predicts having consistent results when the same tool is used with a different population. The results from an instrument should be consistent through time, items and groups (Mellinger and Hanson, 2020). When having latent variables in research, the Cronbach's alpha method of measuring reliability is widely used (DeVellis, 2017). In Nunnally (1978), it was established that for a research to be acceptable in its reliability, it should score a 0.70 in Cronbach's alpha test. In this research, a Cronbach's alpha test was run on the data using SPSS. The results of that test showed a 0.74 score which is acceptable according to Nunnally (1978). Thus, one can assume that this research was reliable. This entails that the results could be generalized and that external validity was established for this research.

Results
Using SPSS, the frequency of the NA meanings and the MSA meanings were calculated. Since the data analysed compared the answers of the same group on two different days, a paired samples *t*-test was run to interpret the results (Larson-Hall, 2016). Table 4 shows the

Homograph	NA frequency (%)	MSA frequency (%)	Not applicable frequency (%)
1	97 (77%)	29 (23%)	
2	97 (77%)	28 (22.2%)	1 (0.8%)
3	118 (93.7%)	7 (5.6%)	1 (0.8%)
4	115 (91.3%)	10 (7.9%)	1 (0.8%)
5	118 (93.7%)	9 (6.3%)	
6	115 (91.3%)	4 (3.2%)	7 (5.6%)
7	91 (72.2%)	31 (24.6%)	4 (3.2%)
8	44 (34.9%)	81 (64.3%)	1 (0.8%)
9	74 (58.7%)	50 (39.7%)	2 (1.6%)
10	99 (78.6%)	27 (21.4%)	
11	19 (15.1%)	106 (84.1%)	1 (0.8%)
12	43 (34.1%)	62 (49.2%)	21 (16.7%)
13	117 (92.9%)	8 (6.3%)	1 (0.8%)
14	92 (73%)	34 (27%)	
Source(s): Table by authors			

Table 4.
Frequency of NA meaning and MSA meaning

frequency in which the participants have given the NA meaning in comparision to the MSA meaning for each homograph on Days 1 and 2.

A paired samples *t*-test that measured the answers given to the homographs on Days 1 and 2 of the experiment showed a statistically significant difference at $p \leq 0.05$ between the means depending on the group (Day 1, Day 2) for the homographs (1, 2, 3, 7, 8, 9, 10, 12, 13, 14) and the totals. The *t*-value ranged between 2.35 and 10.62, and the words were all statistically significant on Day 2. Table 5 summarizes these findings.

The results showed no statistical significance in the findings of the homographs (4, 5, 6 and 11), which correspond to the homographs/safih/in MSA or/səfah/in NA,/ʕudʒah/in MSA or/ʕadʒah/in NA,/ħana/in MSA or/ħina/in NA and la buda/in MSA or/labid/in NA. The following results show the frequency with which each meaning was given by the participants in the different groups. The results showed that homographs 4, 5 and 6 (/safih/in MSA or/səfah/in NA,/ʕudʒah/in MSA or/ʕadʒah/in NA and/ħana/in MSA or/ħina/in NA) carried the NA meaning more frequently, while homograph 11,/la buda/in MSA or/labid/in NA, carried the MSA meaning more frequently. Table 6 shows the answers given by the participants in the different groups.

Table 7 shows the homographs that have been discussed in the "Validity and Reliability" section in "Methodology" section as words that might present problematic results as they are not only homographs but also ambiguous words. The problematic answers have been

Homograph	Group	Mean	SD	*t*	df	Sig
1	Day 1	1.07	0.26	6.72	41.00	*0.00
	Day 2	1.60	0.50			
2	Day 1	1.02	0.15	6.45	41.00	*0.00
	Day 2	1.57	0.55			
3	Day 1	1.02	0.15	2.35	41.00	*0.02
	Day 2	1.14	0.35			
4	Day 1	1.02	0.15	1.67	41.00	0.10
	Day 2	1.12	0.33			
5	Day 1	1.02	0.15	1.43	41.00	0.16
	Day 2	1.07	0.26			
6	Day 1	0.95	0.22	1.00	41.00	0.32
	Day 2	1.02	0.41			
7	Day 1	1.05	0.38	4.34	41.00	*0.00
	Day 2	1.40	0.54			
8	Day 1	1.36	0.53	5.07	41.00	*0.00
	Day 2	1.79	0.42			
9	Day 1	1.21	0.47	4.63	41.00	*0.00
	Day 2	1.67	0.53			
10	Day 1	1.00	0.00	7.39	41.00	*0.00
	Day 2	1.57	0.50			
11	Day 1	1.76	0.48	1.64	41.00	0.11
	Day 2	1.90	0.30			
12	Day 1	1.43	0.50	4.47	41.00	*0.00
	Day 2	1.83	0.38			
13	Day 1	1.00	0.00	3.11	41.00	*0.00
	Day 2	1.19	0.40			
14	Day 1	1.07	0.26	7.82	41.00	*0.00
	Day 2	1.71	0.46			
Tot	Day 1	16.00	1.08	10.62	41.00	*0.00
	Day 2	20.60	2.29			

Source(s): Table by authors

Table 5.
Means, SDs and paired sample *t*-tests of Days 1 and 2

The participants did not give the NA meaning to all the homographs after they were primed with the NA text. They also did not give the MSA meaning to all the homographs after they were exposed to the MSA text. Thus, it is evident that when testing Arabic homographs of two varieties, there was not a boost to *all* the homographs related to the context they were given.

The research question addresses the claim made by Rodd *et al*. (2013) that when a person is influenced by a prime, it results in a boost to *all* the material related to that prime. That is, based on Rodd *et al*.'s (2013) results, the researchers concluded that context is important in the realization of ambiguous words, however, there was not a boost to *all* the material related to that context. Since this paper examines homographs of different varieties, and those language varieties or registers, function in different contexts, the claim can be tested from a different angle. The results here contradict the results of Rodd *et al*. (2013), as the participants did not define all the homographs in relation to the prime given. So, is this a case of language differences between English and Arabic? Future research should not only focus on the role of context in the realization of ambiguous words but should also examine different languages to investigate whether there is a boost to *all* the related material, as is the case in English (Rodd *et al*., 2013), or whether there is not a boost to *all* the related material, as shown in the Arabic language. This is important, as it could help us understand the role of context in the realization of ambiguous words.

Curtis *et al*. (2022) argued that because of episodic memory, context-specific meanings last for a longer period of time. The context-specific meaning is not solely applicable to ambiguous words but also to non-hyponyms. They proposed that because of context, certain meanings become available as a result of episodic memory. Memory plays a role in realizing meanings that are appropriate to that context, and this is short-lived; hence, there is no shift in the lexical–semantic representation. The results from this research show that the participants did not realize all the homographs in their NA meaning on Day 1 or in their MSA meaning on Day 2. Thus, the assumption that context-specific meanings are ready to be used because of the earlier experience of episodic memory in NA can be ruled out. Since the realization that the homographs did not match the context they were in, this indicates that not *all* the context-specific meanings were activated. When proposing that episodic memory does not influence context-specific meanings, this implies that in NA, context-specific meanings are not waiting to be enabled by the context to be retrieved. This does not suggest that episodic memory does not play a role but that more research should be conducted to investigate the topic with the Arabic language.

In this study, four homographs were not influenced by the prime:/safih/in MSA or/ səfah/in NA,/ʕudʒah/in MSA or/ʕadʒah/in NA,/ħana/in MSA or/ħina/in NA and/la buda/ in MSA or/labid/in NA. As discussed earlier, of those four homographs, two were presented in the priming stage while the other two were not, which could mean that the reason for these conflicting results might be the effect of word frequency and not recent experience. If recent experience was what played a role in the processing of those homographs, then it would be expected that only the homographs that were not presented in the texts would show statistically none significant results. As shown in Table 6, the participants gave the same answers on Days 1 and 2. The realization of three homographic words—/safih/in MSA or/səfah/in NA,/ʕudʒah/in MSA or/ʕadʒah/in NA and/ħana/in MSA or/ħina/in NA—was in their NA meanings on Days 1 and 2, regardless of the variety used in the priming stage. The comprehension of one of those four homographs,/la buda/in MSA or/labid/in NA, was in the MSA meaning on both days. Having consistent results could lead us to conclude that the participants might have given the most commonly used meaning for those words. In other words, word frequency might have played a role in the realization and comprehension of these four homographs and context did not have the intended effect.

An important issue to discuss is related to the findings of the words mentioned in the "Validity" section in the "Methodology" section. As discussed, there are three homographs that could have presented troubling results which were/xal/,/ħəna/and/ħakam/. Those three homographs carry another completely different meaning that can be used in both registers, MSA and NA. This, as was discussed in the "Validity and Reliability" section, was determined as a case of ambiguity and not homographs. So, when analyzing the data, when the participants have given the meaning that is used in MSA and NA, the meanings were judged as "Not applicable." However, was that enough to not hamper the data? Did those words problems present a difficulty in understanding the data? Probably not, as the data showed, there were a few participants that have given those "ambiguous" or "inapplicable" meanings to the homographs. That is, as the findings in Table 7 report, no participants have realized the word/ xal/as "vinigar" on days 1 and 2 of the experiment and only one participant gave the "non-applicable" meaning of "vinigar" from the control group. As for the word/ħəna/, the same table reflects that only two participants realized the word in the "non-applicable" meaning on Day 1 and by the control group, and three participants have done so too on Day 2. Finally, for the word/ ħakam/, the only time this "non-applicable" meaning was used was by the control group. That is, 50% of all the participants in the control group gave the unrelated meaning to the contexts when they were not presented with a context and other than that they have given a related meaning that fits the primed context. This could mean that although it might be the most frequently used meaning however, context played a role in its realization by the participants in the experimental group and by that strengthening the argument of the importance of context in the comprehension of homographs. However, most importantly, the results tell us that it might be safe to assume that the use of those words did not affect the results of the research as the majority of the participants did not give the "non-applicable" meaning after being primed.

The findings from this research can also be used to support the reordered access model to explain the processing of lexical ambiguity. In line with Duffy *et al.* (1988), this study found that it was not only prior knowledge about the ambiguous word meaning that plays into processing, but also context. Thus, both factors, prior knowledge and context, play a role in the realization and processing of homographs and in lexical access. In a neutral context, the more frequently used meaning is activated, whereas in a context that holds the subordinate meaning, the less frequently used meaning is activated (Duffy *et al.*, 1988). This is because it is the meaning that is related to the context and thus the readers have shifted their understanding from the ambiguous homographs to the meaning that is best suitable to the context. This is reflected in Table 5 which shows that there were statistical differences between the homographs (1, 2, 3, 7, 8, 9, 10, 12, 13, 14). However, context alone does not play this role as word frequency also has an influence on the processing of homographs as is shown in Table 6. The table shows that not homographs were affected by context and that readers still processed some homographs in the more frequently used meaning.

Proposing that context did not influence readers in realizing the homographs in their intended meaning implies that context alone cannot be used to disambiguate a homograph. The importance of this study and its findings lies in its possible ability to determine the impact of context on the comprehension of unvowelized homographs by native speakers, which contributes evidence to the literature on this topic. The findings might help writers write better texts for dyslexic individuals and children learning how to read, who can have a smoother experience comprehending what they read. In conclusion, the results showed that semantic priming had an influence on realizing and comprehending the unvowelized homographs of two registers by native speakers. Context, to a certain extent, played a role in the meaning comprehended by the participants. However, context did not result in a boost to *all* the information relevant to that context, which should be considered when writing texts.

Although these are just pieces of the puzzle and a full understanding of the topic cannot be claimed, based on the findings, the importance of context in disambiguating homographs is evident. When compiling texts, writers should use words appropriate to the context and consider whether the words in use are frequently used, as this will help readers in their reading experience and result in a better overall understanding of the text.

Moving on to discuss what the results say regarding the use of NA in writing and whether it is moving into a standardized version of it. It was discussed in the "Arabic Language" section in the Literature review, since NA is a regional dialect, it is not standardized. Thus, it was put into consideration that the written forms of the NA text and NA words might not be understandable hence they might have an effect on the results. When looking at Table 4, one would find that three of the 14 homographs were processed in the NA meaning more frequently than the MSA meaning. This could suggest that users of NA are standardizing the dialect so that it is realized faster than the MSA format of words. This is important in Sociolinguistics studies and beyond the scope of this research thus more research should be done to investigate it.

One limitation of this study was that the participants were all female. This is a result of cultural norms that impact the education system in Saudi Arabia, where universities are segregated by gender. This raises the question of whether this affected the results of this study. There is no definite answer to that question; however, previous research has not reported differences between males and females in being semantically primed. Rodd *et al.* (2016) discussed the effect of age on semantic priming, and Gaskell *et al.* (2019) discussed the effect of sleep on semantic priming, but no comments were made on gender as a factor. Another limitation was the primacy of homographs that carry one meaning in NA and another in MSA. That is, basing the research on 14 homographs was risky and as a solution, a larger number of participants were asked to participate in the study. By doing so, a total of 840-word meanings were analyzed. That is, to compensate for not having a large number of NA and MSA homographs, more participants were asked to participate in the study and thus more words were analyzed. As a result of the primacy of homographs, some homographs in NA and MSA did not match their part of speech. As Table 1 shows, some homographs matched their part of speech while others did not.

Future research should focus on gender differences and report whether there are differences between males and females being semantically primed. Another recommendation is to use eye tracking to investigate the topic. This might provide more information regarding selection access. The results could lead us to understand the strengths of the three hypotheses discussed in the literature review: the selective access hypothesis, the nonselective access hypothesis and the weak selective access hypothesis as the results do not support the selective access hypothesis as context did not help disambiguating all the meanings. The results also do not support the nonselective hypothesis or the weak selective hypothesis. Context did not help in accessing all the meanings and readers then found the most appropriate meaning to the context as word frequency played a role in the processing of homographs. Future research could also investigate the role of episodic memory in processing ambiguity. It should also investigate the possible standardization of NA.

To summarize, context, to a certain extent, played a role in which homograph meaning was comprehended by the participants. However, the impact of context did not result in a boost to *all* the information relevant to that context, which should be taken into consideration when writing texts. This contradicts the claims made by Rodd *et al.* (2013). This study should not be used as evidence to undermine the importance of context; rather, it demonstrates that context, as a priming tool, does not result in a boost to *all* the related material to the context.

References

Abu-Rabia, S. (2012), "The role of morphology and short vowelization in reading morphological complex words in Arabic: evidence for the domination of the morpheme/root-based theory in reading Arabic", *Creative Education*, Vol. 3 No. 4, pp. 486-494, doi: 10.4236/ce.2012.34074.

Abu-Rabia, S. (2019), "The role of short vowels in reading Arabic: a critical literature review", *Journal of Psycholinguistic Research*, Vol. 48 No. 4, pp. 785-795, doi: 10.1007/s10936-019-09631-4.

Abu-Rabia, S. and Saliba, F. (2008), "The role of roots and phonological patterns in reading Arabic among dyslexic & normal native Arabic readers", *Australian Journal of Learning Difficulties*, Vol. 13 No. 2, pp. 115-144, doi: 10.1080/19404150802380589.

Al-Sweel, A.A.I. (1987), "Verbal and nominal forms of Najdi Arabic", *Anthropological Linguistics*, Vol. 29 No. 1, pp. 71-90, available at: http://www.jstor.org/stable/30028090

Azzam, R. (1989), "Orthography and reading of the Arabic language", *Reading and Writing Disorders in Different Orthographic Systems*, Vol. 52, pp. 203-218, doi: 10.1007/978-94-009-1041-6_12.

Baluch, B. (1992), "Reading with and without vowels: what are the psychological consequences?", *Journal of Social and Evolutionary Systems*, Vol. 15 No. 1, pp. 95-104, doi: 10.1016/1061-7361(92)90039-g.

Binder, K.S. and Morris, R.K. (1995), "Eye movements and lexical ambiguity resolution: effects of prior encounter and discourse topic", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 21 No. 5, pp. 1186-1196, doi: 10.1037/0278-7393.21.5.1186.

Blott, L.M., Hartopp, O., Nation, K. and Rodd, J.M. (2022), "Learning about the meanings of ambiguous words: evidence from a word-meaning priming paradigm with short narratives", *PeerJ*, Vol. 10, e14070, doi: 10.7717/peerj.14070.

Conrad, C. (1974), "Context effects in sentence comprehension: a study of the subjective lexicon", *Memory and Cognition*, Vol. 2 No. 1, pp. 130-138, doi: 10.3758/bf03197504.

Curtis, A.J., Mak, M.H., Chen, S., Rodd, J.M. and Gaskell, M.G. (2022), *Word-Meaning Priming Extends Beyond Homonyms*, doi: 10.31234/osf.io/s9jyp.

DeVellis, R.F. (2017), *Scale Development: Theory and Applications*, 4th ed., Sage, Thousand Oaks, CA.

Dörnyie, Z. (2007), *Research Methods in Applied Linguistics: Quantitative, Qualitative, and Mixed Methodologies*, Oxford University Press, Oxford.

Duffy, S.A., Morris, R.K. and Rayner, K. (1988), "Lexical ambiguity and fixation times in reading", *Journal of Memory and Language*, Vol. 27 No. 4, pp. 429-446, doi: 10.1016/0749-596x(88)90066-6.

Ferguson, C.A. (1959), "Diglossia", *WORD*, Vol. 15 No. 2, pp. 325-340, doi: 10.1080/00437956.1959.11659702.

Foss, D.J., Bever, T.G. and Silver, M. (1968), "The comprehension and verification of ambiguous sentences", *Perception and Psychophysics*, Vol. 4 No. 5, pp. 304-306, doi: 10.3758/bf03210520.

Gaskell, M.G., Cairney, S.A. and Rodd, J.M. (2019), "Contextual priming of word meanings is stabilized over sleep", *Cognition*, Vol. 182, pp. 109-126, doi: 10.1016/j.cognition.2018.09.007.

Gilbert, R.A., Davis, M.H., Gaskell, M.G. and Rodd, J.M. (2019), "The relationship between sentence comprehension and lexical-semantic retuning". doi: 10.31234/osf.io/qvaud.

Ibrahim, R. and Aharon-Peretz, J. (2005), "Is literary Arabic a second language for native Arab speakers?: evidence from semantic priming study", *Journal of Psycholinguistic Research*, Vol. 34 No. 1, pp. 51-70, doi: 10.1007/s10936-005-3631-8.

Ingham, B. (1982), "North east Arabian dialects", *Kegan Paul*, Vol. 115 No. 1, p. xxv, 208.

Kellas, G., Ferraro, F.R. and Simpson, G.B. (1988), "Lexical ambiguity and the timecourse of attentional allocation in word recognition", *Journal of Experimental Psychology: Human Perception and Performance*, Vol. 14 No. 4, pp. 601-609, doi: 10.1037/0096-1523.14.4.601.

Larson-Hall, J. (2016), *A Guide to Doing Statistics in Second Language Research Using SPSS and R*, Routledge, Exeter, Devon.

Light, L.L. and Carter-Sobell, L. (1970), "Effects of changed semantic context on Recognition Memory", *Journal of Verbal Learning and Verbal Behavior*, Vol. 9 No. 1, pp. 1-11, doi: 10.1016/s0022-5371(70)80002-0.

Mason, R.A. and Just, M.A. (2007), "Lexical ambiguity in sentence comprehension", *Brain Research*, Vol. 1146, pp. 115-127, doi: 10.1016/j.brainres.2007.02.076.

Masson, M.E. and Freedman, L. (1990), "Fluent identification of repeated words", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 16 No. 3, pp. 355-373, doi: 10.1037/0278-7393.16.3.355.

Mayes, A. and Roberts, N. (2002), "Theories of episodic memory", in *Episodic Memory: New Directions in Research*, Oxford University Press, Oxford, pp. 86-109.

Mellinger, C.D. and Hanson, T.A. (2020), "Methodological considerations for survey research: validity, reliability, and quantitative analysis", in *Linguistica Antverpiensia, New Series – Themes in Translation Studies*, Vol. 19, doi: 10.52034/lanstts.v19i0.549.

Merriam-Webster (n.d.), Context. In Merriam-Webster.com dictionary, available at: https://www.merriam-webster.com/dictionary/context (accessed 20 June 2024).

Miller, G. (1966), "The magical number seven, plus-or-minus two or some limits on our capacity for processing information", in *Brain Physiology and Psychology*, University of California Press, Berkeley, pp. 175-202.

Mountaj, N., El Yagoubi, R., Himmi, M., Lakhdar Ghazal, F., Besson, M. and Boudelaa, S. (2015), "Vowelling and semantic priming effects in Arabic", *International Journal of Psychophysiology*, Vol. 95 No. 1, pp. 46-55, doi: 10.1016/j.ijpsycho.2014.12.009.

Nunnally, J.C. (1978), *Psychometric Theory*, 2nd ed., McGraw-Hill, New York.

Rayner, K. and Duffy, S.A. (1986), "Lexical complexity and fixation times in reading: effects of word frequency, verb complexity, and lexical ambiguity", *Memory and Cognition*, Vol. 14 No. 3, pp. 191-201, doi: 10.3758/bf03197692.

Rayner, K., Pacht, J.M. and Duffy, S.A. (1994), "Effects of prior encounter and global discourse bias on the processing of lexically ambiguous words: evidence from eye fixations", *Journal of Memory and Language*, Vol. 33 No. 4, pp. 527-544, doi: 10.1006/jmla.1994.1025.

Rayner, K., Slattery, T.J., Drieghe, D. and Liversedge, S.P. (2011), "Eye movements and word skipping during reading: effects of word length and predictability", *Journal of Experimental Psychology. Human Perception and Performance*, Vol. 37 No. 2, pp. 514-528, doi: 10.1037/a0020990.

Rodd, J. (2018), *Lexical Ambiguity*, The Oxford Handbook of Psycholinguistics, pp. 95-117, doi: 10.1093/oxfordhb/9780198786825.013.5.

Rodd, J.M., Lopez Cutrin, B., Kirsch, H., Millar, A. and Davis, M.H. (2013), "Long-term priming of the meanings of ambiguous words", *Journal of Memory and Language*, Vol. 68 No. 2, pp. 180-198, doi: 10.1016/j.jml.2012.08.002.

Rodd, J.M., Cai, Z.G., Betts, H.N., Hanby, B., Hutchinson, C. and Adler, A. (2016), "The impact of recent and long-term experience on access to word meanings: evidence from large-scale internet-based experiments", *Journal of Memory and Language*, Vol. 87, pp. 16-37, doi: 10.1016/j.jml.2015.10.006.

Schvaneveldt, R.W., Meyer, D.E. and Becker, C.A. (1976), "Lexical ambiguity, semantic context, and visual word recognition", *Journal of Experimental Psychology: Human Perception and Performance*, Vol. 2 No. 2, pp. 243-256, doi: 10.1037/0096-1523.2.2.243.

Simpson, G.B. (1994), "Context and the processing of ambiguous words", in Gernsbacher, M.A. (Ed.), *Handbook of Psycholinguistics*, Academic Press, pp. 359-374.

Simpson, G.B. and Burgess, C. (1985), "Activation and selection processes in the recognition of ambiguous words", *Journal of Experimental Psychology: Human Perception and Performance*, Vol. 11 No. 1, pp. 28-39, doi: 10.1037/0096-1523.11.1.28.

Student questionnaire on language background. Writing Across the Curriculum (2019), available at: https://dept.writing.wisc.edu/wac/student-questionnaire-on-language-background/

Tulving, E. (1972), "Episodic and semantic memory", in Tulving, E. and Donaldson, W. (Eds), *Organization of Memory*, Academic Press.

Twilley, L.C., Dixon, P., Taylor, D. and Clark, K. (1994), "University of Alberta norms of relative meaning frequency for 566 homographs", *Memory and Cognition*, Vol. 22 No. 1, pp. 111-126, doi: 10.3758/bf03202766.

Vacha-haase, T., Ness, C., Nilsson, J. and Reetz, D. (1999), "Practices regarding reporting of reliability coefficients: a review of three journals", *The Journal of Experimental Education*, Vol. 67 No. 4, pp. 335-341, doi: 10.1080/00220979909598487.

Versteegh, K. (2014), *The Arabic Language*, Edinburgh University Press, Edinburgh.

Zumbo, B.D. and Chan, E.K. (2014), "Setting the stage for validity and validation in social, behavioral, and Health Sciences: trends in validation practices", *Validity and Validation in Social, Behavioral, and Health Sciences*, Vol. 54, pp. 3-8, doi: 10.1007/978-3-319-07794-9_1.

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Appendices
The supplementary material for this article can be found online.

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