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Proficiency as a variable in Gulf EFL students' employment of reading strategies

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Abstract

This paper reports a study of the reading strategies used by twelve Arabic-speaking undergraduates at a major Gulf university when reading texts in English. The procedure employed was a think-aloud protocol followed by a semi-structured interview. Three research questions were addressed: (a) What are the primary comprehension problems encountered by students attending an English-speaking university in the Gulf region when reading academic texts in English? (b) What reading strategies do the students actually employ in order to solve their reading problems? (c) To what extent can the demographic variable of English reading proficiency be used to reliably predict the students' use of reading strategies in English? Results revealed that while the participants were already in possession of repertoire strategies, they often failed to use them effectively. This was especially the case with the lower-proficiency readers. The implications of these findings are briefly discussed.

Keywords: Arabic EFL learners, reading comprehension problems, reading strategies, think aloud-protocol

Increased research about reading in the second language (L2) has relied on self-reported strategy usage by the readers (e.g., Endley, 2015; Malcolm, 2009; Mokhtari & Reichard, 2002; Poole, 2005; Sheorey & Baboczky, 2008; Sheorey & Mokhtari, 2001). While valuable light has been cast on a number of issues, this body of research is limited to the extent that it can only tell us participants' reflection about behavior. This leaves open the possibility of a "gap" between the behavior that readers report and the actual actions they engage in when participating in "real world" reading activities (Phifer & Glover, 1982).

A variety of research procedures have been developed and employed in an attempt to bridge this gap. A common procedure is the think-aloud protocol (TAP) whereby the participant provides "an ongoing report of his or her thought processes while performing some task" (Mackey & Gass, 2005, p. 77). This study aims to contribute to those studies that have employed a TAP to investigate the use of reading strategies among EFL learners whose first language is Arabic.

Literature Review

The Use of Think-aloud Protocols as a Research Technique

While their use raises a number of issues (Bowles, 2010; Crain-Thoreson, Lippman & McClendon-Magnuson, 1997; Konieczna, 2011; Leow & Morgan-Short, 2004; Morgan-Short, Heil, Botero-Moriarty & Ebert, 2012; Yoshida, 2008), it is generally accepted that TAPs provide "rich data concerning the flow of information through working memory. . . without intruding significantly on the comprehension process itself" (Yoshida, 2008, p. 207).

TAPs come in two main types: concurrent TAPs and retrospective TAPs. In concurrent TAPs participants verbalize their thoughts while engaging in a reading task; in retrospective TAPs participants complete the reading task first and then verbalize their thoughts. A trend of literature shows that recent research has favored the concurrent approach. As Leow and Morgan-Short (2004) comment, verbalizations that are gathered by means of a concurrent TAP (or what they refer to as an "introspective verbalization") "are not constrained by memory" (Leow & Morgan-Short, 2004, p. 36), whereas retrospective verbalization "has been critiqued for the potential effects of memory constraints and reconstructive processes— that is, additional information reported in one's recall of the data" (Leow & Morgan-Short, 2004, p. 36).

The distinction between concurrent and retrospective TAPs is related to another distinction: metalinguistic, and nonmetalinguistic verbalization. Leow and Morgan-Short (2004) explain the difference as follows:

> In metalinguistic verbalization, the researcher may ask for specific information (e.g., reasoning or explanation), and learners provide a metacognitive report on what they think their processes are. In nonmetalinguistic verbalization, learners are focused on the task with the think aloud secondary and only voice their thoughts without explaining them (p. 361).

In sum, there is widespread (although not universal) agreement that the optimum method for conducting research of this sort will involve a concurrent TAP with participants asked to verbalize their thought processes while they are engaged with the reading task rather than afterwards (Ericsson & Simon, 1993; Horibe, 1995; Leow & Morgan-Short, 2004; Young, 2005). Moreover, the TAP should be "non-metalinguistic" in the sense that they are not required to explain or analyze their thinking, but merely report it.

The Use of Think-aloud Protocols in Reading Strategy Research

Several studies using TAPs have indicated that particular reading strategies are characteristically employed by proficient or successful readers to a greater extent than they are by less proficient or less successful readers (Bakhshalinezhad, Nikou, & Bonyadi, 2015; Block, 1986; Chamot & El-Dinary, 1999; Ghavamnia, Ketabi & Tavakoli, 2013; Horibe, 1995; Hosenfeld, 1977; Jahander, Khodabandehlou, Seyedi & Abadi, 2012; Kong, 2006). One of the earliest investigations of the relationship between success in reading and strategy use is that of Hosenfeld (1977), who employed a TAP to investigate the strategies used by L1 English high school students reading in French. Based on their performance on a reading proficiency test, Hosenfeld divided her

participants into "successful" and "unsuccessful" readers. In a pattern that was to be repeated in several subsequent studies, Hosenfeld found that the more successful readers made use of a number of strategies that unsuccessful readers did not use. These included: 1) keeping the meaning of the passage in mind during reading, 2) skipping words that were judged to be unimportant to the overall meaning, and 3) maintaining a positive self-concept as a reader. Conversely, Hosenfeld found that unsuccessful readers tended to 1) lose the meaning of sentences as soon as they were decoded, 2) treat all words as equally important and 3) had a negative self-concept as a reader.

A similar pattern was reported in Block (1986) who used a TAP to study native and nonnative English readers at university. All the participants were "low-proficiency" readers, having failed a reading proficiency test, and were enrolled on a remedial reading course. This is one of the few studies to attempt to connect participants' strategy use with text comprehension. By using retellings (in which participants recalled as much of the reading as they could) and multiple choice questions after the TAP, Block distinguished between "successful" and "unsuccessful" readers. On this basis she was able to show that the successful readers in her sample (i.e., the participants who had scored highest on the above measures) tended to be those who had employed strategies such as: 1) using general and background knowledge, 2) integrating new information, 3) focusing on the overall meaning of the text, 4) identifying main ideas and distinguishing them from supporting ideas, and 5) monitoring of understanding. Less successful readers did not use these strategies to the same extent.

Another study that investigated the relationship between reading comprehension and employment of strategies is Horibe (1995), who used a TAP to investigate the reading strategies of L1 Japanese students taking English as part of their university general studies program. Horibe does not provide information about the overall proficiency of his participants; however, on basis of their performance in reading comprehension tests taken at the end of the semester, he divided them into three groups: a high-scoring group, a middle-scoring group, and a low-scoring group. Analysis revealed "some clear relationships" (Horibe, 1995, p. 190) between participants' reading comprehension scores and their strategy use. Thus, participants ranked in the high-scoring group employed top-down strategies (e.g., interpreting the text, questioning content, and integrating information) much more frequently than the others, and those in the middle-scoring group used them slightly more often than the low scorers. No comparable pattern was found in the use of bottom-up strategies. It should be noted that Horibe's assessment of participants' comprehension was based on end of semester examinations. He did not attempt an independent measure of readers' comprehension of the texts used in his investigation.

The study reported by Chamot and El-Dinary (1999) used a TAP to investigate the strategies used by English-speaking children in elementary-level immersion classrooms in the US. In consultation with the classroom teachers, the researchers developed criteria for rating the students as language learners, enabling them to distinguish between higher and lower-rated readers. The principle finding was that there were differences in the strategies used by higher-rated students compared with lower-rated students. Specifically, lower-rated students tended to rely heavily on phonetic decoding (i.e., a bottom-up strategy), whereas higher-rated students made greater use of strategies such as inferencing, predicting, and elaborating (i.e., top-down strategies).

Another study worthy of note is Kong (2006), who used a TAP to compare the reading strategies used by four Chinese adults while reading in the L1 and L2. Kong describes her participants as "proficient Chinese native readers and ESL (English as a Second Language) learners" (p. 23). Among Kong's chief findings were: (a) participants displayed more strategy use when engaged in L2 reading than in L1 reading, and (b) participants demonstrated much greater confidence and an ability to read critically in L1 reading than in L2 reading. However, unlike the findings of previous studies, Kong found that all her participants focused primarily on word meanings (a bottom-up strategy) in L2 reading. Kong reported that this tendency was especially apparent with the reader who had the lowest proficiency in English reading as measured by TOEFL score. However, it was also a feature of the other participants even though their scores were indicative of a high level of reading proficiency in English.

One interesting recent development in the field has been a number of studies with Iranian participants that report correlations between level of reading proficiency and strategy use. In a TAP study of upper-intermediate EFL students at an English institute in Iran, Jahander, Khodabandehlou, Seyedi and Abadi (2012) investigated the effect of the think-aloud procedure on readers' comprehension, administering a TOEFL reading test before and after the TAP sessions. Overall, they found that the participants, whom they describe as "good readers," displayed a wide range of strategies, including activation of prior knowledge, setting a purpose for reading, making a personal connection to text, making predictions, visualizing, monitoring their understanding, summarizing, self-questioning and using context. The researchers claimed a "significant impact of the think-aloud method" (Jahander et al., 2012, p. 7) on the comprehension of the treatment group compared with a control group. However, they provided no discussion of the results.

Likewise, Ghavamnia, Ketabi and Tavakoli (2013) report a TAP study of Iranian students majoring in Teaching English as a Foreign Language. All the participants had scored 75% in a compulsory reading test administered by the university. Close analysis of their scores enabled identification of two subgroups of "proficient" and "less proficient" readers. The researchers reported that all their participants displayed characteristics of "active strategic readers" (Ghavamnia et al., 2013 p. 363), and were "able to utilize a wide array of strategies to achieve comprehension" (p. 363). They add, however, that these strategies were used haphazardly and unsystematically, especially by the less-proficient readers (p. 370).

Also in Iran, Bakhshalinezhad, Nikou, and Bonyadi (2015) employed a TAP to investigate the strategies used by advanced and intermediate EFL learners when reading both in English and in Persian. They report that participants in the advanced group employed more strategies when reading in English and also employed them more frequently in comparison with the intermediate-level readers. They further report that among the strategies used by the advanced group, but not the intermediate group, were the following: defining text type structure, evaluation, recalling, restating, title awareness, and summarizing. With regard to L1 texts it was found that both groups used a similar range of strategies, suggesting that the difference in strategy use between the advanced and intermediate readers was limited to L2 reading.

The following table provides a summary of the studies discussed in this section.

Table 1. *Studies of reading strategies involved in think-aloud protocols*

Study	Participants	Proficiency	Assessment of reading strategies	Assessment of reading comprehension	Findings
Hosenfeld 1977	High school students (9th grade) in USA (n = 40); L1 English/L2 French	Two groups: "Successful" vs. "unsuccessful" readers (based on reading proficiency test)	TAP	Not measured	"Successful" readers keep meaning in mind during reading, skip words that are unimportant to overall meaning, and maintain positive self-concept as a reader.
Block 1986	University students enrolled in remedial reading courses in USA (n = 9); L1 English/L2 French	All low proficiency (based on reading proficiency test)	TAP	Post-reading retelling + M/C questions	"Successful" readers integrate information, are aware of text structure, and monitor understanding.
Horibe 1995	University Education Majors in Japan (n = 43); L1 Japanese/L2 English	Information not provided	TAP	Average score on end of semester exams; no assessment post-reading	Participants with higher reading comprehension scores made more frequent use of "top-down" strategies (e.g., anticipating and questioning content, using background knowledge, integrating information) than middle and low comprehension scores
Chamot & El-Dinary 1999	Elementary school students (3rd-4th grade) in USA Mainly L1 English/L2 French, Spanish & Japanese	Two groups: "highly effective" vs. "less-effective learners"	TAP	Not measured	Lower-rated participants rely heavily on "bottom-up" strategies (e.g., phonetic decoding), whereas higher-rated students make greater use of "top-down" strategies (e.g., inferencing, predicting, and elaborating)
Kong 2006	Adult ESL learners in USA	'proficient Chinese native readers and ESL	TAP	Not measured	1. Participants used more strategies in L2 than in L1

	(*n* = 4);	learners'			2. Participants focused primarily on "bottom-up" strategies in L2 (e.g., phonetic decoding)
Jahander et al. 2012	College-level EFL students in Iran (*n* = 32); L1 Persian/L2 English	Upper-intermediate	TAP	TOEFL Reading Test	Wide range of strategies used (e.g., activation of prior knowledge, setting purpose for reading; making personal connection to text; making predictions; visualizing; monitoring understanding; summarizing; self-questioning and using context)
Ghavamnia et al. 2013	TEFL majors in Iran (*n* = 8); L1 Persian/L2 English	Two groups: "proficient" vs. "less proficient" (based on scores in reading comprehension test)	TAP	Not measured	All participants able to utilize "a wide array of strategies" although often unsystematically, especially by less-proficient readers
Bakhsha-linezhad et al. 2015	College-level EFL students in Iran (*n* = 30); L1 Persian/L2 English	Intermediate vs. Advanced	TAP	Not measured	Advanced group used more strategies than intermediate group when reading in English and employed them more frequently

Many of the studies of reading strategies used by L2 readers have found evidence of a fairly robust relationship between reading proficiency and strategy use, with higher proficiency readers employing strategies that less proficient readers either do not use or do not use to the same extent. Thus, Chamot and El-Dinary (1999) reported that the higher-rated participants made greater use of top-down strategies such as inferencing, predicting, and elaborating than did the lower-rated participants, who tended to rely heavily on bottom-up strategies such as phonetic decoding. Similarly, Bakhshalinezhad, et al., (2015) found that advanced readers employed more strategies than did intermediate counterparts when they read in English and employed strategies more frequently. Strikingly, where reading comprehension has been assessed, as in Block (1986), those deemed to be more "successful" were found to make use of strategies that the "unsuccessful" readers failed to use. Likewise, Horibe (1995) reports that those participants who showed higher reading comprehension scores made more frequent use of top-down strategies than those with middle and low comprehension scores.

Reading Strategy Research in the Arabic-speaking World

There is a relative dearth of research into the L2 reading strategies employed by Arabic-speakers. Moreover, only a few of these studies have made use of the TAP as a data collection method (Abbott, 2010; Alsheikh, 2014; Alsheikh & Mokhtari, 2011; Elhoweris, Alsheikh & Haq, 2011; Shmais, 2002). A few more studies involving Arabic-speaking participants have relied on self-reports without employing a TAP.

The case study reported by Shmais (2002) is interesting in that it combined multiple research techniques including a TAP, interviews, a multiple choice comprehension test and a questionnaire. The two participants were English majors at a Palestinian university. Information regarding their English proficiency was not provided although both were described by the researcher as "very good learners of English" (Shmais, 2002, p. 637). Shmais reports that both participants invoked a variety of strategies in reading the texts. The most frequently used strategies were repetition, translation, paraphrasing, questioning, and confirming information. However, Shmais found that the participants' use of strategies was "haphazard, and limited" (Shmais, 2002, p. 648) and she questioned whether even good learners are "necessarily good and proficient readers" (Shmais, 2002, p. 648). This conclusion is supported by the participants' responses to the comprehension test, which led Shmais to question the extent to which they had successfully understood the texts they read.

Another interestingly designed study is reported by Abbott (2010), who used a TAP to compare the strategies employed by L1 Arabic and Mandarin speakers as they were completing a reading assessment test. All the participants were intermediate proficiency in English, being selected from intact ESL classes. One interesting finding to emerge from Abbott's study is that the Arabic-speakers used a greater percentage of top-down strategies (e.g., skimming for gist, linking information presented in various parts of the text, using background knowledge to speculate beyond the text) than did their Mandarin-speaking counterparts. Rather like Shmais, however, Abbott observes that this "did not necessarily indicate that the Arabic-speakers used those strategies successfully" (Abbott, 2010, p. 32). In fact, she notes that many of the Arabic-speaking participants tended to over-rely on background knowledge in particular. In addition, Abbott compares the participants' scores in the reading comprehension test and the total percentages of bottom-up and top-down strategies used. On this basis she suggests that reading "success" may not be related to frequency of strategy use – participants with the highest scores in the test did not employ the greatest number of strategies – but to appropriate selection and use of strategies.

A few studies have combined participant self-reports with a TAP. An example is Alsheikh and Mokhtari (2011), who in addition to TAP, made use of the Survey of Reading Strategies (SORS) developed by Mokhtari and Sheorey (2002) to investigate the strategy use of Arabic-speakers attending university in the USA. Since the participants were pursuing undergraduate or graduate degrees overseas, they were all deemed "advanced proficiency ESL readers" (Alsheikh & Mokhtari, 2011, p. 151). The SORS data indicated that the participants "used all of the strategies in the SORS" (Alsheikh & Mokhtari, 2011, p. 156) when reading both in Arabic and in English. The researchers also found that participants reported using more problem-solving, as well as

support-reading, strategies in English than they did in Arabic[1]. With regard to the data collected via the TAP, "the qualitative data showed that the ten participants actually used more than half of the strategies when they read in English whereas in Arabic, they actually used fewer strategies" (Alsheikh & Mokhtari, 2011, p. 156).

Another study that combined SORS and TAP is reported by Elhoweris, Alsheikh and Haq (2011), who investigated the strategies used by Arabic-speaking high school students in the UAE when reading two English texts, one more difficult than the other. The study is noteworthy in that all the participants were identified by their teachers as having learning disabilities (although no information regarding their reading proficiency is provided). The data collected via the TAP confirmed the results of SORS in that the participants used problem-solving strategies the most, followed by the global and support strategies. However, TAP data indicated that the participants actually failed to employ more than half of the strategies included in SORS.

Another study of Arabic-speaking high school students in the UAE, combining SORS and TAP, is reported in Alsheikh (2014). As with the earlier study conducted by Alsheikh and Mokhtari (2011), the aim of this study was to compare the participants' use of strategies in both Arabic and English. Unfortunately, the researcher does not provide information regarding the participants' proficiency, which renders interpretation of the findings difficult. Contrary to the findings reported in the earlier study, however, it was found that the participants reported using more strategies when reading in their L1 than the L2.

A few other studies of Arabic-speaking L2 readers have relied on self-reports without involving a TAP. While such studies provide data on participants' awareness of strategies, they can tell us nothing about the strategies participants actually employ. An example is Mokhtari and Reichard (2004), who used SORS to compare reading strategies among two groups of participants, native speakers of English and Arabic-speakers for whom English was an L2. Precise information concerning language proficiency of the two groups of participants is not given, although the researchers note that since they were all college students they could be regarded as having attained comparable levels of education. The researchers found considerable homogeneity among the two groups in their reported use of reading strategies. Both sets of participants displayed a moderate to high awareness of reading strategies, and both showed a clear preference for problem-solving strategies.

[1] The SORS instrument subdivides strategies into global, problem-solving and support strategies. Global strategies are defined as "intentional, carefully planned techniques by which learners monitor or manage their reading" (Mokhtari & Sheorey, 2002, p. 4). They include identifying a clear purpose for reading and maintaining this purpose in mind while reading, previewing the text in terms of length and organization, and making use of typographical aids, tables and figures. Problem-solving strategies are used by readers "while working directly with the text" (Mokhtari & Sheorey, 2002, p. 4); they are "localized, focused techniques used when problems develop in understanding textual information" (Mokhtari & Sheorey, 2002, p. 4). Examples include adjusting one's reading speed if the material becomes more difficult (or easy), guessing the meaning of unfamiliar words or phrases from context, and rereading the text to improve comprehension. "Support" strategies are "basic support mechanisms" (Mokhtari & Sheorey, 2002, p. 4) used by the reader to aid her or his comprehension of the text. Examples include making use of a dictionary, note-taking, and underlining or highlighting of key words and phrases.

Another study of L1 Arabic speakers that relies on self-reporting is Malcolm (2009), who used SORS to examine reading strategies among medical students from various countries of the Middle East. The participants were divided into two groups, based on their English proficiency. Malcolm reported that both sets of participants displayed high levels of awareness and use of strategies. As with several of the studies, Malcolm found a clear tendency among participants to favor problem-solving strategies over global and support strategies, albeit with "a few significant differences in the reported reading strategy use of low and high proficiency students" (Malcolm, 2009, p. 645).

Finally, Al-Sobhani (2013) used SORS to conduct a study of English majors at a university in Yemen. However, detailed information about the participants' proficiency was not provided. All the participants had received approximately ten years of English instruction at school and university. Results showed that participants used all the SORS strategies with "high and moderate frequency" (Al-Sobhani, 2013, p. 130) and a slight tendency to favor problem-solving strategies over global strategies and support strategies. Moreover, the use of problem-solving as well as that of global strategies correlated with scores in reading skills; however, no correlation was found between reading skills and use of support strategies.

The following table provides a summary of the studies discussed in this section.

Table 2. *Studies of reading strategies involving Arabic-speaking participants*

Study	Participants	Proficiency	Assessment of reading strategies	Assessment of reading comprehension	Findings
Shmais 2002	University Engl. Majors in Palestine (*n* = 2); L1Arabic/L2 English	Both participants "very good learners of English"	TAP, interviews & questionnaire	Post-reading Multiple choice questions	1. Variety of strategies used (e.g., repetition, translation, paraphrasing, questioning, and confirming information) 2. Use of strategies "haphazard" and "limited"
Mokhtari & Reichard 2004	Social Science and Humanities Majors in USA and Morocco (*n* = 350); L1 English (*n* = 141), L1Arabic/L2 English (*n* = 209)	Information not provided	SORS	Not measured	1. Both sets of participants displayed moderate to high awareness of strategies 2. Both showed clear preference for problem-solving strategies
Malcolm 2009	University Med. Majors in Bahrain (*n* = 160); L1Arabic/L2 English	Two groups: "low initial proficiency" vs. "higher initial English proficiency"	SORS	Not measured	1. Both sets of participants displayed high levels of awareness of strategies. 2. Tendency to favor problem-solving strategies over global

					and support strategies.
Abbott 2010	ESL students in Canada (n = 15); L1 Arabic/L2 English (n = 7), L1 Mandarin/L2 English (n = 8)	Intermediate	TAP	Canadian Language Benchmark Assessment Reading Test	Arabic-speakers used greater percentage of "top-down" strategies (e.g., skimming for gist, linking information presented in various parts of the text, using background knowledge to speculate beyond the text)
Alsheikh & Mokhtari 2011	University students in USA (n = 90 [SORS], 10 [TAP]); L1 Arabic/L2 English	All "advanced proficiency ESL readers"	SORS, TAP	Not measured	SORS and TAP data indicates tendency to use more problem-solving and support strategies in L2 than in L1
Elhoweris et al. 2011	High school students (6^{th}–10^{th} grade) with learning difficulties in UAE (n = 150 [SORS], 10 [TAP]); L1 Arabic/L2 English	Information not provided	SORS, TAP	Not measured	1. SORS data indicates tendency to favor problem-solving strategies followed by global and support strategies 2. But TAP data indicates participants did not actually employ more than half of SORS strategies
Al-Sobhani 2013	University Engl. Majors in Yemen (n = 100); L1 Arabic/L2 English	Information not provided	SORS	Reported use of strategies compared with scores in "reading skills exams" (no details provided)	Use of problem-solving and global strategies (e.g., correlated with scores in reading skills; no correlation found between reading skills and use of support strategies
Alsheikh 2014	High school students (10^{th}-12^{th} grade) in UAE (n = 390 [SORS], 10 [TAP]); L1 Arabic/L2 English	Information not provided	SORS, TAP	Not measured	Participants reported using and actually used more reading strategies in L1 than L2

Summarizing the research on the reading strategies employed by L1 Arabic speakers is rendered more difficult by the fact that many of the studies are not comparable either in terms of the procedures used, or with regard to the type of information provided. As we have seen, some of the studies make use of a TAP, others use SORS as an instrument and some use both TAP and SORS. Furthermore, in many cases details of participants' proficiency are lacking.

As we have seen, some studies with Arabic-speakers have made use of SORS. One robust finding is that Arabic-speakers favor the use of problem-solving strategies to resolve their reading difficulties. This tendency is seen in the findings of Mokhtari and Reichard (2004), Malcolm (2009), Alsheikh and Mokhtari (2011), Elhoweris, et al., (2011), and Al-Sobhani (2013). This finding is of interest, not least because a similar tendency has been reported in studies of readers from various L1 backgrounds (e.g., Magogwe, 2013; Tabatabaei & Assari, 2011; Temur & Bahar, 2011; Yüksel & Yüksel, 2012). However, one problem with self-reporting is that it tells us nothing about the effectiveness of the strategies used, which is surely something both researchers and teachers would wish to know. It is left unaddressed even in those studies that have combined SORS with a TAP (i.e., Alsheikh & Mokhtari, 2011; Elhoweris et al., 2011; Alsheikh, 2014). This is surprising given that the value of the TAP as a research method is precisely that it enables the researcher to gain insights into not only the actual strategies that participants employ but, in addition, the manner in which they are employed.

Research Questions

The current study adds to the small number of investigations that have employed a TAP to investigate the use of reading strategies among EFL learners whose first language is Arabic. The research questions addressed were as follows:

RQ1. What are the primary comprehension problems encountered by students attending an English-speaking university in the Gulf region when reading academic texts in English?
RQ2. What reading strategies do the students actually employ in order to solve their reading problems?
RQ3.To what extent can the demographic variable of L2 reading proficiency be used to reliably predict the students' use of reading strategies in English?

Method

Setting

The study was undertaken at United Arab Emirates University (UAEU). Established in 1976, UAEU is the national university of UAE. It consists of nine colleges, subdivided into several departments. The language of instruction is English. The student population is predominantly Emirati. The university is gender-segregated with approximately 70% of the student population being female.

Participants

Nonrandom purposive sampling was used to identify the sample population. A decision was taken to target students enrolled in three of the nine colleges that make up UAEU. The three colleges in question were the College of Business and Economics, the College of Engineering and the College of Humanities and Social Sciences. Both male and female students were involved. In all 45 students initially expressed an interest in participating in the study. These

were invited to take a pretest session consisting of an IELTS reading test. Participants who scored between 75% and 100% in the pretest were assigned to a Higher Proficiency Reading (HPR) group; those scoring under 45% were assigned to a Lower Proficiency Reading (LPR) group. After analyzing the pretest results, twelve participants (nine female, three male) were selected to take part in the next stage of the study, involving two concurrent think aloud protocols. Five of these participants belonged in the HPR group; seven belonged in the LPR group. Participants who scored above 45% but below 75% in the pretest took no further part in the study.

Table 3. *Demographic breakdown of study participants*

Participant	M/F	College	Age
HPR			
1	M	Engineering	21
2	M	Engineering	21
3	F	Humanities	20
6	F	Humanities	23
7	F	Humanities	20
LPR			
4	F	Humanities	20
5	F	Humanities	23
8	F	Humanities	21
9	M	Engineering	18
10	F	Humanities	21
11	F	Humanities	20
12	F	Humanities	22

Procedures

Two concurrent TAP sessions were conducted. Each session was conducted on an individual basis and followed by a semi-structured interview. The sessions took place in the Department of Linguistics Phonetic Laboratory at UAEU between one week and two weeks apart (depending on participants' availability). Prior to the first TAP session the purpose of the study was explained, together with the underlying rationale of think-aloud research. Participants were also invited to ask questions prior to beginning the first session. The researcher did not model the think-aloud process on the grounds that such modeling might bias the participants' subsequent behavior (Pressley & Afflerbach, 1995)[2].

Before beginning to record, a warm-up task was presented. This took the form of an arithmetic exercise which participants were asked to solve out loud. The aim of this was to accustom each

[2] An anonymous reviewer of an earlier draft of this paper has questioned this procedure, suggesting that the decision not to provide think-aloud training for the participants may have negatively impacted their ability to describe the strategies they were in fact using. The reviewer points out, quite rightly, that recent discussions (e.g., Bowles, 2010) have tended to argue cogently for the value of an orientation session prior to the collection of data. However, the study was conceived as an attempt to bring to light the reading strategies the participants found themselves most willing to employ. Seen thus, I would maintain that the decision remains a defensible one.

participant to the procedure of verbalizing their thoughts. Participants' verbalizations during the warm-up were not recorded.

Once the warm-up was completed, participants were reminded to verbalize all their thoughts, in English, as they read out loud. Participants were told that they could consult a dictionary as required, and that it was permissible to mark the paper. Finally, participants were reminded that they should try to answer the comprehension questions at the end of the reading text, and that they would be asked to briefly summarize the main points of the reading afterwards. There was no time limit set for completion of the two readings. Once a participant indicated that he or she was ready, the recorder was switched on and the TAP began. The researcher remained in the Laboratory during TAP sessions, seated behind the participant, observing and taking notes for use in the follow-up interview. Researcher intervention was kept to a minimum; however, occasional verbal prompts (e.g., "What makes you say that?," "What are you thinking now?," and "Please keep talking") were used.

On completion of a TAP session the researcher conducted a semi-structured interview (also recorded) with each participant. Each interview began by asking the participant to summarize main point(s) of the passage they had read. After this participants were asked to explain their answers to the comprehension questions. Interviews continued by focusing on any issues arising from each participant's performance during reading.

Materials

For TAP-based research to be successful, careful consideration must be given to the choice of reading materials. A text should be sufficiently challenging that readers are not able to process it automatically but rather are forced to employ several discrete strategies, and yet it must still be within readers' overall capabilities (Ericsson & Simon, 1993; Rankin, 1988).

For the present study two IELTS practice texts were chosen, together with comprehension questions taken from the same source. The decision to use two texts was taken in order to reduce the possibility that the strategies employed by the participants were a function of a specific text. Text 1, entitled "Light Pollution," was a relatively easy text (Flesch Reading Ease Rating 60.5; Flesch-Kinkaid Level 9.9). It contained 45 sentences, divided into ten paragraphs. Total word count was 913 (average sentence length 20 words). Text 2, entitled "Investigating Children's Language," was selected to be more challenging (Flesch Reading Ease Rating 38.9; Flesch-Kinkaid Level 13). It contained 39 sentences, divided into eight paragraphs. Total word count was 870 (average sentence length 22 words).

In order to maintain uniformity, the texts were re-typed using a twelve-point Times New Roman font. The only modification made to the texts was the insertion of short subheadings at strategic points[3]. Both texts were followed by five true-false questions. The inclusion of questions was

[3] In order to facilitate coding of strategies, a decision was taken at the outset to make use of the Survey of Reading Strategies (SORS) developed by Mokhtari and Sheorey (2002). Given that one of the strategies identified in SORS relates to the use of subheadings to aid comprehension, this modification was deemed justifiable.

intended to "problematise" the reading task, thus making the activity purposeful as well as (hopefully) helping participants to retain focus.

Analysis and coding

After transcription, each participant's data were subjected to "inductive data analysis" (Mackey & Gass, 2005, p.179), with multiple repeated examinations to allow frequent, dominant and significant patterns and themes to emerge. To ensure consistency, cross-case comparisons of the transcripts of different participants were also conducted. Each instance of a particular strategy was counted and coded. The aim was to try to ensure that the final data was as rich and varied as possible, accurately reflecting the actual reading performance of individual participants as they engaged in specific reading events.

To facilitate coding, a decision was taken to use the threefold taxonomy (global, problem-solving and support strategies) developed by Mokhtari and Sheorey in their Survey of Reading Strategies (SORS) (Mokhtari & Sheorey, 2002). This instrument was designed specifically for use with readers for whom English is a second or a foreign language. Therefore it is well suited to an investigation of reading strategies employed by participants in the Gulf region where tertiary-level education is delivered in English. Furthermore, SORS has been used by various other researchers in the region, thus facilitating comparisons between different studies.

Reliability of the coding was established by asking a colleague to act as a second rater on four randomly selected transcripts. A Cohen's kappa score of .84 was obtained, indicating an acceptable level of inter-rater reliability.

Results and Discussion

This section considers the findings of the study with reference to the specific research questions investigated.

RQ1: *What are the primary comprehension problems encountered by students attending an English-speaking university in the Gulf region when reading academic texts in English?*

Analysis revealed that the most common problems participants experienced in reading the two texts were: (a) problems with word recognition; (b) a tendency to focus attention at word level with a consequent failure to build words into higher-level meaning; and (c) difficulty in parsing complex grammatical structures in the texts. Participants' responses in an interview confirmed that these were the major difficulties, with participants belonging to the LPR group experiencing greater difficulties in these areas than their HPR counterparts[4].

Problems with word recognition

Both texts contained some relatively low frequency lexical items that gave rise to comprehension

[4] I am grateful to the anonymous reviewer who points out that precisely these problems were also identified in Hebrew-L1 students reading in English some years ago. See Cohen et al., 1979).

problems. For Text 1 items that were observed to cause difficulties included *cadre*, *eliciting*, *emanating*, and *emphatic*. For Text 2 items that caused difficulties were *datum*, *innately*, *paradigms*, and *unobtrusive*.

Some LPR participants appeared to misread certain words, either reading the word as belonging to a different lexical category (e.g., reading *production* as "producing") or reading an entirely different word (e.g., *convinced* read as "confused"; *evidence* read as "evaluation"). An interesting instance of a word recognition problem is seen in the following extract in which the participant's failure to recognize *multi-* as a prefix prevented her from finding the item in her dictionary:

Text "the subject has attracted enormous multi-disciplinary interest"
P10 (LPR) "multidis (..) I don't know (…) [consults dictionary] is it multi (…)? [searches for several seconds] (…) I can't find it"

During interview the participant confirmed that she had been particularly puzzled by this word and that she had not recognized the underlying lexical form to be *disciplinary* and that *multi-* was a prefix. The end result was that she abandoned her attempt to make sense of the word and simply moved on.

The finding that members of the LPR group had difficulty with word recognition is consistent with findings reported by other researchers (e.g., Horibe, 1995). In the present case, where the participants were L1 Arabic speakers reading in L2 English, it seems likely that differences in the orthographies of the two languages may have compounded the problem (Hayes-Harb, 2006).

Focusing attention at word level and consequent failure to build words into higher-level meaning

There is a widespread consensus in the research literature that higher proficiency readers tend to show relatively rapid processing and automaticity in word recognition whereas less proficient readers are concerned about decoding every word, as a result failing to build higher-level textual meaning (Block, 1986; Chamot & El-Dinary, 1999; Ghavamnia, Ketabi and Tavakoli, 2013; Hosenfeld, 1977). The following extracts illustrate the problem:

Text "overly bright security lights can actually force neighbors to close the shutters, which means that if any criminal activity does occur on the street, no one will see it"
P9 (LPR) "what he trying to say (…) the pollution of light makes easy to find who do the crime"

The participant was observed to pause and re-read the passage in question three times, stopping twice to consult his dictionary (*shutters*, *criminal*). His final comment indicates that he has severely misconstrued the textual meaning. This particular participant said in an interview that Text 1, dealing with "light pollution," held no interest for him since it made "no difference" to his life. This may help to explain the rather "wild" guessing which was a feature of his TAP transcript.

In the next extract, having stumbled over both *glaring* and *temporarily*, the participant provides a paraphrase entirely at odds with the textual meaning:

Text "For drivers, light can actually create a safety hazard. Glaring lights can temporarily blind drivers, increasing the likelihood of an accident"
P5 (LPR) "light helps the drivers"

The following remark, provided in an interview, is interesting insofar as it indicates that the participant was aware of the impact her word recognition difficulties had on her ability to comprehend text:

P10 (LPR) "I try to thinking (...) I just focus on hard words and lose the meaning of the sentence (...) I forget what the paragraph about"

The finding that LPR participants were concerned with decoding every word and as a result struggling to build higher-level textual meaning is consistent with the findings reported in several other studies. A case in point is Hosenfeld (1977), who reported that the less successful readers in her study treated all words as equally important. More recently, Ghavamnia, Ketabi and Tavakoli (2013) have reported that the less proficient readers believed that all words were equally important and their meaning must be known to comprehend a text.

Inefficient parsing of complex grammatical structures

Several participants had difficulties with complex grammatical clauses and sentences. An example is shown below.

Text "Migrating birds, confused by lights on skyscrapers, broadcast towers and lighthouses, are injured"
P9 (LPR) "broadcast towers and lighthouses are injured"

The participant was observed to hesitate and re-read the sentence slowly two times before commenting as shown. Evidently he has failed to identify *migrating birds* as the subject of the verb; instead, he treats the phrase *broadcast towers and lighthouses* (part of the intervening adjectival phrase) as the subject. Other participants displayed similar comprehension problems indicative of difficulties in parsing complex grammar:

Text "In the suburbs, where over-lit shopping mall parking lots are the norm, only 200 of the Milky Way's 2,500 stars are visible on a clear night"
P10 (LPR) "so at night (..) we can see thousands of stars (…) ok"

Text "And anyone who has tried to obtain even the most basic kind of data – a tape recording of a representative sample of a child's speech – knows how frustrating this can be"
P5 (LPR) "anyone can do this (…) I mean (..) tape recording children"

RQ2: *What reading strategies do the students actually employ in order to solve their reading problems?*

The TAP data for Text 1 – the easier text – indicates that participants collectively made use of 16 distinct strategies. Of these, 14 were strategies identified in SORS (five global, six problem-solving and three support); the other two strategies in the data are not found in SORS. For Text 2 – the more challenging text – they employed 14 distinct strategies. Of these, 13 were strategies identified in SORS (five global, five problem-solving, and three support); the other strategy is not found in SORS. Tables 4 to Tables 6 summarize the SORS strategies employed by participants while reading Texts 1 and 2.

Table 4. *SORS global strategies employed (HPR & LPR combined)*

Strategy	Text 1	Text 2
Making use of prior knowledge	Yes	Yes
Taking an overview of text before reading	No	No
Noting text length & organization	No	No
Deciding what to read closely	No	No
Using tables, figures, and pictures in text	No	No
Using context clues	No	No
Using typographical features	Yes	Yes
Analyzing and evaluating content	Yes	Yes
Checking understanding of new information	Yes	Yes
Predicting or guessing content	Yes	Yes
Confirming predictions	No	No
The number of strategies used	5	5

Table 5. *SORS problem-solving strategies employed (HPR & LPR combined)*

Strategy	Text 1	Text 2
Reading slowly and carefully	Yes	Yes
Maintaining focus	No	No
Adjusting reading speed	No	No
Paying closer attention	Yes	Yes
Pausing to think about reading	Yes	Yes
Visualizing information	Yes	No
Re-reading for better understanding	Yes	Yes
Guessing meaning of unknown words	Yes	Yes
The number of strategies used	6	5

Table 6. *SORS support strategies employed (HPR & LPR combined)*

Strategy	Text 1	Text 2
Underlying/circling	Yes	Yes
Using reference materials	Yes	Yes
Paraphrasing	Yes	Yes
Searching for relationships among ideas	No	No
Asking oneself questions	No	No
Translating from L2 to L1	No	No
Thinking in L1 and L2 when reading	No	No
The number of strategies used	3	3

Closer analysis indicates both HPR and LPR participants favored problem-solving and support strategies, while making comparatively little use of global strategies. Of the 288 strategies participants collectively provided for Text 1, 141 (49%) were problem-solving strategies; 112 (39%) were support strategies; and only 35 (12%) were global strategies. Of the 273 strategies participants collectively used for Text 2, 137 (50%) were support strategies; 118 (43%) were problem-solving strategies and only 18 (7%) were global strategies.

In order to contextualize the present findings, Table 7 provides details of the strategies reported in other TAP-based investigations conducted with Arabic speakers which made use of SORS taxonomy.

Table 7. *SORS strategies instanced in TAP data produced by Arabic speakers*

Study	Strategies instanced in TAP data
Present study	Global Using prior knowledge Using typographical features Analyzing & evaluating Checking understanding of new information Predicting or guessing text meaning Problem-Solving Reading slowly & carefully Paying close attention Pausing & thinking Visualizing (Text 1 only) Re-reading Guessing meaning of unknown words Support Underlining/circling Using reference materials Paraphrasing
Alsheikh & Mokhtari 2011	Global Using prior knowledge Determining what to read closely Using context clues

	Analyzing & evaluating Checking understanding Predicting or guessing text meaning Confirming predictions <u>Problem-Solving</u> Reading slowly & carefully Trying to stay focused Adjusting reading rate Paying close attention Pausing & thinking Visualizing information Re-reading Guessing meaning of unknown words <u>Support</u> Asking oneself questions Finding relationships among text ideas Paraphrasing
Elhoweris et al. 2011	<u>Global</u> Using prior knowledge Checking how text content fits purpose (Text 2 only) <u>Problem-solving</u> Reading slowly & carefully Trying to stay focused on reading Adjusting reading rate Paying close attention Pausing & thinking (Text 2 only) Re-reading Guessing meaning of unknown words <u>Support</u> Reading aloud
Alsheikh 2014	<u>Global</u> Using prior knowledge Determining what to read closely <u>Problem-solving</u> Reading slowly & carefully Trying to stay focused Adjusting reading rate Paying close attention Re-reading Guessing meaning of unknown words <u>Support</u> Asking oneself questions Finding relationships among text ideas

All the above studies found a general preference for problem-solving strategies although not for support strategies as was the case in the present study. According to Elhoweris et al. (2011), the participants used just eight SORS strategies when reading an easy text: one global strategy, six problem-solving strategies, and one support strategy. For the more difficult text, participants used a total of 10 strategies: two global strategies, seven problem-solving strategies, and one support strategy. Alsheikh (2014) reports 10 SORS strategies in total: two global strategies, six problem-solving strategies, and two support strategies. Alsheikh and Mokhtari (2011) report that their participants used 18 SORS strategies when reading in English: seven global, eight problem-solving and three support.

The absence of a strategy where one might be anticipated should inform our analysis of the data (Gu, 2014). All of the problem-solving strategies found in SORS were employed by one or more of the participants; however, several global and support strategies were conspicuous by their absence. The absence of one strategy can be explained as a methodological effect: there was no opportunity for participants to take notes – a key global strategy in SORS. The absence of other strategies, however, cannot be accounted for in the same way. For example, there was very little text awareness on display, with participants failing to preview content before reading, or note text characteristics such as length or organization. Nor did the participants examine the questions before beginning to read despite the researcher drawing their attention to the questions.

As well as the SORS strategies discussed above, participants made use of certain additional strategies in reading the two texts. These will be discussed below.

RQ3: *To what extent can the demographic variable of L2 reading proficiency be used to reliably predict the students' use of reading strategies in English?*

Cross-case analysis of the TAP data was undertaken with the aim of identifying trends and differences in the strategies employed by the two groups of participants. This analysis revealed striking patterns both in the relative frequency of strategy use and in the effectiveness of their employment.

As Figure 1 shows (see Appendix C), the tendency to disfavor global strategies was a feature of the performance of both groups.

Combining Texts 1 and 2, HPR participants made use of 274 strategies. Of these, 120 (44%) were support strategies, 109 (40%) were problem-solving strategies and 45 (16%) were global strategies. For LPR participants, the total number of strategies used was 305. Of these, 143 (47%) were support strategies, 154 (50%) were problem-solving strategies and only 8 (3%) were global strategies.

Investigations have repeatedly shown positive correlation between higher language proficiency and frequency of strategy use (e.g., Anderson, 1991; Bakhshalinezhad et al., 2015; Block, 1986; Chamot & El-Dinary, 1999; Horibe, 1995; Hosenfeld, 1977; Jahander et al., 2013). The results of the present study are only partially consistent with these findings in that LPR participants actually made more use of some strategies than did HPR participants (e.g., re-reading, paying

closer attention, underlining). There is also widespread agreement among researchers that good readers are characterized not simply by frequent use of strategies but by effective control of strategies, and a capacity for deliberately employing them to facilitate and enhance reading comprehension (Baker, 2002, 2008; Erler & Finkbainer, 2007; Pressley, 2002). In this respect the findings of the present study are wholly consistent with earlier research.

Problem-solving strategies used

A number of studies of Arabic-speakers have found a tendency to favor problem-solving strategies when reading in English (Alsheikh & Mokhtari, 2011; Al-Sobhani, 2013; Elhoweris, Alsheikh, & Hag, 2011; Endley, 2015; Malcolm, 2009; Mokhari & Reichard, 2004). In the present study, the participants collectively employed six SORS problem-solving strategies: re-reading, guessing the meaning of unfamiliar lexical items, pausing and thinking, visualizing information, paying closer attention, and reading slowly and carefully. Among HPR participants almost 40% of the strategies employed in reading the two texts were problem-solving strategies; among LPR participants the figure was almost 50%. Figure 2 (see Appendix C) shows the relative frequency with which problem-solving strategies were used by the two groups.

(a) *Re-reading, paying closer attention, reading slowly and carefully*

Re-reading tended to form a "strategy cluster" with two other strategies: paying closer attention and reading slowly and carefully. The following two extracts illustrate the use of this cluster:

P1 (HPR) "I don't know what this means (..) what it is related to (…) I need to read it one more time [after second reading] (…) ok now I understood"

P7 (HPR) "I don't understand (…) I have no images in my mind (…) I'll try to re-read it [after re-reading] (…) I think they're trying to lose unneeded lights to save energy"

In the following extract the participant uses this cluster after initially misreading the verb *devises* as a noun (devices):

Text "The investigator formulates a specific hypothesis about children's ability to use or understand an aspect of language, and devises a relevant task"

P6 (HPR) "and devices (…) no (.) wait (…) that doesn't (…) the investigator formulates a specific hypothesis (…) the investigator FORMULATES [heavily stressed] (…) it's a verb (…) devises (..) like 'makes'"

In slowly re-reading the text P6 appeared to experience a sudden insight (signaled by the exaggerated stress she gave to the verb *formulates*); this led to the recognition that *devises* was also a verb ("it's a verb"). In interview she confirmed her thought processes, saying "I had to read it a couple of times before I got it. Then I saw it. The investigator formulates and he devises."

(b) *Guessing the meaning of unfamiliar lexical items*

Several HPR participants made explicit efforts to infer the meanings of unfamiliar lexical items. LPR participants tended to make little use of this strategy, although in the interview several of them claimed it was a normal part of their reading practice. Moreover, on those few occasions when guessing was attempted by an LPR participant, the result was often failure to arrive at an appropriate meaning for the word in question. The following extracts illustrate one participant employing this strategy very effectively:

Text "glaring lights"
P2 (HPR) "I think that must mean something like 'sparkling' or 'very intense'"

Text "cadre of astronomers"
P2 (HPR) "That means something like 'team,' I think"

Text "some children, it seems, are innately programmed to switch off as soon as they notice a tape recorder being switched on"
P2 (HPR) "here innately must mean they inherited it (..) they are born with it"

This example is an interesting case of "strategic" reading in that the participant read to the end of the sentence before returning to the word *innately.* In the interview P2 explained that he understood the sentence completely but wanted to be sure about this word.

In the next extract we see the same participant making an initial guess and subsequently changing his mind after reading further:

Text "two main research paradigms are found"
P2 (HPR) "It means 'example' [reads further] ok (…) two 'approaches' (…) the natural one is done in the child's own home the other is experimental"

In the interview he confirmed that after his initial guess he noted the subheading immediately following referred to 'the natural approach,' and that two paragraphs later another subheading referred to 'the experimental approach.' Thus, reading further caused him to revise his understanding of the unfamiliar word *paradigms*.

In the following extract P2 initially guesses and then confirms his guess by checking his dictionary.

Text "the observers and their equipment are unobtrusive"
P2 (HPR) "from the context it means something like 'not seen' or "hidden' (...) [consults dictionary] ok (.) so it means they are 'hidden' (..) or maybe 'not shown'"

In the next extract the participant identified an unfamiliar word but read on for two further paragraphs in an effort to establish the meaning before eventually turning to her dictionary.

Text "two main research paradigms are found"
P3 (HPR) "I have no idea what it means . . . I'll try to go further . . . I might get an idea"

In the interview she stated that inferring meaning from context was the strategy she employed "most of the time"; as she put it, "Usually I guess some words . . . if I don't and my mind shuts down, I start using the dictionary. I have to use some help."

The effective use of this strategy, illustrated above, contrasts sharply with that evidenced by some LPR participants, as seen in the next two extracts. In the first extract, neither of the words suggested can be considered an appropriate synonym for *paradigms*:

Text "two main research paradigms are found"
P11 (LPR) "I think it is as a 'plan' or 'diagram'"

In the following extract the participant acknowledges her unfamiliarity with the word at issue, yet makes no attempt to infer its meaning from context; nor does she consult her dictionary. In interview she was unable to say what it meant or provide any synonym. It seems in this case she simply registered the word as unknown and moved on!

Text "two main research paradigms are found"
P9 (LPR) "I don't know this word"

(c) *Pausing & thinking about reading*

This was another strategy used with regularity, especially by HPR participants. Examples are shown below:

Text "overly bright security lights can actually force neighbors to close the shutters, which means that if any criminal activity does occur on the street, no one will see it"
P1 (HPR) "This is interesting now (…) it's a two-sided thing (…) on the positive side (…) no (.) the negative side when lights are too bright people will close their shutters (..) but on the positive side I think (..) we need the lights"

Text "But don't we need all those lights to ensure our safety? The answer from light engineers, light pollution control advocates and astronomers is an emphatic "no."
P2 (HPR) "Really? My answer would be 'yes' (..) why do they say that?"

(d) *Visualizing information*

This strategy was rarely used, even among the HPR group. Only one participant was observed to explicitly do this. Nonetheless, it is legitimate to note its occurrence insofar as it represents a processing operation employed by an individual participant in a specific reading situation. As Charters (2003, p. 76) puts it, "If only one participant uses a specific strategy to solve a problem, are his data less relevant than those of the others?" This participant, who in an interview

described herself as a "visual person," made use of this strategy on several occasions during her reading of Text 1:

Text "Glaring lights can temporarily blind drivers, increasing the likelihood of an accident"
P7 (HPR) "I'm seeing a driver (…) the lights are coming in his eyes and he can't see (…) he could have an accident"

Text "Migrating birds, confused by lights on skyscrapers, broadcast towers and lighthouses, are injured, sometimes fatally, after colliding with high, lighted structures"
P7 (HPR) "I'm seeing the birds are having some problems with the lights"

Support strategies used

Collectively, the participants made use of three SORS support strategies: underlining or circling information, consulting a dictionary, and paraphrasing. Among HPR participants almost 44% of the strategies employed were support strategies; among LPR participants the figure was almost 47%. Figure 3 (see Appendix C) shows the relative frequency with which support strategies were used by the two groups.

(a) *Underlining and circling*

HPR participants tended to be much more systematic in their employment of this strategy than LPR participants. This following extracts show this strategy being employed in a conscious and deliberate manner:

Text "One of these is known as 'naturalistic sampling.'
P7 (HPR) [After underlining *naturalistic*] "I'm underlining this because I think it's important"

Text "Mark Adams, superintendent of the McDonald Observatory in west Texas, says that"
P7 (HPR) [After underlining *Mark Adams* and *McDonald Observatory*] "I usually underline cities and names of people so that it's easy to find them again"

In interview P7 confirmed that this was her usual strategy when dealing with academic texts followed by comprehension questions. She reasoned that the questions often focused on names, places and so on.

The employment of this strategy seen above contrasts with the approach adopted by some of the LPR participants, who tended to be rather indiscriminate in their marking of the text. During the TAP sessions it was observed that some LPR participants appeared to be marking large amounts of text (either circling or underlining) for no discernible reason. This impression was confirmed during interviews when it was found that many of these participants were unable to provide any motivations for their actions.

(b) *Consulting dictionary*

Given that the two texts contained a number of relatively low frequency lexical items, it was not surprising to find both HPR and LPR participants making considerable use of dictionaries during the TAP sessions. A common pattern among the LPR group was a readiness to settle for the first definition found without considering whether the definition was appropriate to the context. Examples of this tendency are shown in the following two extracts:

Text "the observers and their equipment are unobtrusive"
P4 (LPR) "ok (..) [consults dictionary] 'not clear' (…) or something like that"

Text "the results provide evidence that supports or falsifies the original hypothesis"
P5 (LPR) "it means (..) [consults dictionary] to fake"

The above two extracts are in marked contrast with the following example in which the participant explicitly checks to see that the dictionary definition makes sense in the context of the passage:

Text "the observers and their equipment are unobtrusive"
P1 (HPR) "ok (...) I'm going to check the meaning of this word [consults dictionary] (..) ok (...) 'not seen' or 'does not appear' (...) does that work? [re-reads clause containing target item] (...) the equipment will not appear in front of him (..) the child"

In the next extract the participant clearly recognizes that the definition she found in her dictionary was not an appropriate one:

Text "A good quality, representative, naturalistic sample is generally considered an ideal datum for child language study"
P7 (HPR) "I'm looking up datum because this is a key word [consults dictionary] (...) that doesn't make sense (...) the dictionary didn't help (.) I'll re-read it [re-reads sentence] (...) I'm understanding right now"

Four participants, two HPR and two LPR, having looked up a word in their dictionary, wrote the Arabic translation above the word in the text. In interview all four indicated that they regularly employed this strategy when faced with difficult English vocabulary.

(c) *Paraphrasing*

There were clear differences between the two sets of participants in their use of paraphrasing. Comparison of two attempted paraphrases of a passage from Text 1 is instructive:

Text But don't we need all those lights to ensure our safety? The answer from light engineers, light pollution control advocates and astronomers is an emphatic "no." Elizabeth Alvarez of the International Dark Sky Association (IDA), a non-profit

> organization in Tucson, Arizona, says that overly bright security lights can actually force neighbors to close the shutters, which means that if any criminal activity does occur on the street, no one will see it. And the old assumption that bright lights deter crime appears to have been a false one: A new Department of Justice report concludes that there is no documented correlation between the level of lighting and the level of crime in an area. And contrary to popular belief, more crimes occur in broad daylight than at night.

Immediately after reading this passage P6 provided the following paraphrase:

P6 (HPR) What I understand (…) there is a danger of over-lighted streets in cities (…) for example (…) if there is too much light people will close their shutters and they won't see the crime happening and (…) another thing (…) there is no relation between crimes and lights in the street

The participant's ability to re-state the key points of the passage in her own words is an indication of firm understanding. The contrast with the following attempted paraphrase of the same passage could hardly be more obvious:

P11 (LPR) "He tells us about light pollution (...) how much they give us light (...) crime (...) we found it in broad daylight"

In attempting to paraphrase, P11 was noticeably hesitant, repeating a few phrases from text (*light pollution*, *crime*, *broad daylight*), apparently without any real sense of how these phrases connect to one another or contribute to the wider point the writer is making. To that extent, the above cannot be said to constitute a genuine paraphrase at all.

Global strategies used

The participants employed five SORS global strategies: using prior knowledge, using typographical features, analyzing and evaluating content, checking understanding of new information, and predicting or guessing meaning. As was noted above, both sets of participants, HPR and LPR, employed global strategies much less frequently than the other two subtypes. Among HPR participants 16% of the strategies were global strategies; among LPR participants only 3% of the strategies were global strategies. Figure 4 (see Appendix C) shows the relative frequency with which global strategies were used by the two groups.

Examples of global strategies are found in the following extracts. The first is an example of using prior knowledge:

Text "After hours of driving south in the pitch-black darkness of the Nevada desert, a dome of hazy gold suddenly appears on the horizon"

P3 (HPR) "I don't know where the Nevada desert is but (..) Las Vegas is in America, so I think (...) America"

In the extract below the participant uses a typographical feature to aid comprehension:

P7 (HPR) [After reading bold subheading: "What can be done?"] "I believe there is a solution here"

The following extract provides an example of analyzing and evaluating content:

Text "And the old assumption that bright lights deter crime appears to have been a false one"
P1 (HPR) "Interesting (…) I wonder why"

The next extract illustrates checking understanding of new information:

Text "Newly hatched turtles in Florida move toward beach lights instead of the more muted silver shimmer of the ocean"
P2 (HPR) "So (...) light can affect animals (..) I didn't know that before"

Finally, in the following extract, the participant is predicting or guessing meaning:

P6 (HPR) [After reading title of Text 2] "I think this will be about (..) will focus on how children learn to speak"

Other strategies

Participants employed two strategies not included in SORS: making use of morphosyntactic knowledge and segmenting lexical items. The former is illustrated in the following extract, already noted above, in which the participant explicitly recognizes that *devises* is a verb rather than a noun, as she had originally thought:

P6 (HPR) "and devices (…) no (.) wait (…) that doesn't (…) the investigator formulates a specific hypothesis (…) the investigator FORMULATES [heavily stressed] (…) it's a verb (…) devises (..) like 'makes'"

One participant, P7, (HPR) frequently divided words into smaller segments – a process she referred to as "cutting" the word – in order to aid comprehension. As she commented during the interview, "I'm a bad speller so sometimes I have a problem reading." Abbott (2010) similarly noted that this "bottom-up" strategy, as she termed it, was a feature of the TAP produced by her Arabic participants.

The comprehension measures

In order to measure their reading comprehension, immediately after the TAP the participants were presented with two tasks: a summary and a test in the form of true-false statements. The purpose of these tasks was to assess whether the reading strategies used by participants were effective in enabling overall comprehension of the text rather than simply being used to overcome particular reading problems. For the summaries, following a procedure similar to Block (1986), participants were allowed to look over the reading passage once more before being

asked to summarize it. During the summarizing they were not allowed to look at the text. Their summaries were scored for thesis statement, main points and supporting ideas. Turning to the test, both texts were followed by true-false statements (five for each text). For each statement participants had to decide whether the statement was true (if the statement was in agreement with information given in the text); false (if the statement contradicted information given in the text); or not given (if no information was provided in the text). For this task, participants were permitted to consult the text. They were asked to continue thinking aloud as they attempted to answer each statement. Participants' performances on the two tasks are given in the tables below.

Table 8. *Performance on summary task*

Participant	Text 1*			Text 2**		
	Thesis	Main	Support	Thesis	Main	Support
HPR						
1	Yes	6	10	No	6	14
2	No	6	9	Yes	6	12
3	Yes	6	9	Yes	6	12
6	Yes	6	9	No	6	11
7	Yes	6	10	Yes	7	14
LPR						
4	Yes	5	9	No	6	12
5	No	2	3	No	3	5
8	Yes	6	9	Yes	6	13
9	No	1	3	No	2	3
10	No	2	4	No	3	3
11	Yes	5	8	No	6	10
12	Yes	5	9	No	6	11

Note. Y = supplied thesis statement; N = did not supply thesis statement; * Text 1 contained 7 main ideas and 12 supporting ideas; ** Text 2 contained 9 main ideas and 16 supporting ideas

Table 9. *Performance on true-false task*

Participant	Number of correct responses (Out of 5)		% correct for two texts
	Text 1	Text 2	
HPR			
1	4	3	70
2	2	2	40
3	4	3	70
6	4	3	70
7	5	4	90
LPR			
4	2	1	30
5	0	0	0
8	5	4	90
9	0	0	0
10	0	0	0
11	2	1	30
12	5	4	90

Overall, performance on the summary task was good. All five HPR participants were able to successfully provide an accurate summary of the thesis of one or other of the two texts. They were also generally successful in recalling main and supporting ideas, albeit less so for the more difficult Text 2. Of the seven LPR participants, four (P4, P8, P11, and P12) performed relatively well on the summaries, with scores broadly in line with the HPR participants. However, three other LPR participants (P5, P9, and P10) were noticeably poor at summarizing. None of these three was able to successfully recall the thesis statement for either text, and their scores for recall of both main and supporting ideas were also markedly inferior to those of the other participants.

In general, the participants' performance on the true-false statements was worse than their performance on the summaries. This is somewhat inconsistent with the findings of Block (1986), who reported that in her study the participants who had recalled thesis statements and main ideas successfully also tended to achieve high scores in the multiple-choice tests, and also that some of the participants who had performed poorly on the retellings did much better on the multiple-choice tests. In the current study, three participants (P7, P8, and P12) performed particularly well in the true-false task. Of these, one was HPR and two were LPR. On the other hand, some participants performed poorly on both measures. Three LPR participants (P5, P9, and P10) who were noticeably poor at summarizing were also unable to answer any of the statements correctly. The fact that these participants did poorly in both tasks suggests they experienced major difficulties in comprehending the texts. Of the remaining six participants, P1, P2, P3, and P6 (all HPR) performed well on the summary task but were somewhat less successful on the true-false task; the remaining two participants, P4 and P11 (both LPR) scored reasonably well on summarizing but were noticeably weaker on the true-false task.

How does the participants' performance on the summary and the test relate to their use of strategies as reflected in the TAP data? No clear pattern is apparent between the two groups, HPR or LPR, and participants' performance in the two tasks. In fact, of the three participants who performed best on the two tasks, two belonged to the LPR group. These three participants each demonstrated a tendency to make effective use of particular strategies. P7 (HPR), in particular, was highly systematic in her employment of strategies. Among the strategies she demonstrated are the following: (a) judicious underlining of key parts of the text, (b) explicit checking to see whether the dictionary definition she had found made sense in the context of the passage, (c) attending to typographical features (e.g., subheadings) and (d) making use of the strategy 'cluster': re-reading, paying closer attention, reading slowly and carefully. The impression one gets from a close reading of her TAP transcript is of someone consciously monitoring her reading and checking carefully that she has understood as she proceeds. The TAP data of the two LPR participants who performed well on the tasks confirms that they were also able to use certain strategies effectively, and in a manner comparable to their HPR counterparts. Both P8 and P12 favored (a) checking understanding as they read and (b) underling key parts of the text (used sparingly, unlike the other LPR participants); they also made effective use of the same strategy 'cluster' noted above for P7. Like P7, the impression that emerges from their transcripts is that these two readers, despite being in the LPR group, were trying hard to monitor their understanding and were thinking carefully as they read.

The TAP data for P5, P9 and P10, the three worst performers on the two tasks, is also illuminating in that it shows a conspicuous failure to utilize numerous strategies effectively.

Furthermore, the recordings of these three participants were characterized by several quite severe instances of (a) failing to recognize particular words, (b) focusing on individual words at considerable cost to their overall grasp of meaning, and (c) inefficient parsing of complex grammatical structures.

Unfortunately, the picture becomes somewhat more murky when we turn to the other participants. While performing well on the summary task, P1, P2, P3, and P6 (all HPR) were less successful on the true-false task. P1, P3, and P6 answered three statements incorrectly; P2 was incorrect six times.

I would like to end this discussion of the findings by adverting once more to the value of the TAP method in enabling the researcher to gather rich data. This is highlighted by focusing more closely on the responses of the three participants who performed best in the post-reading comprehension test, each scoring five out of five for Text 1 and four out of five for Text 2. What is interesting is that all three of them answered the same item incorrectly. The troublesome item is given below:

> *In the 19th century, researchers studied their own children's language.*

This particular item presents a challenge to the reader because in order to see that the statement is 'true' one is required to draw an inference from one line of the text, which contains a specific textual clue, to the conclusion that the scholars were indeed investigating the language of their own children. The relevant line of text is as follows:

> "Scholars carried out several small-scale studies, especially towards the end of the 19th century, using data they recorded in parental diaries"

Here are the three participants' responses:

P7 (HPR): Ok, it's here (.) 'towards the end of the 19th century' (…) 'Scholars carried out several small-scale studies, especially towards the end of the 19th century, using data they recorded in parental diaries' (…) 'parental' (..) yes (..) that's to do with parents (…) I'm confused whether it's false or not given (…) I'll say false

P8 (LPR): "Here (..) 'the 19th century' (…) Does it say anything about children? (…) No (…) It's not given"

P12 (LPR): I'm trying to find the answer (…) the first paragraph, I think (…) 'towards the end of the 19th century' (…) 'Scholars carried out several small-scale studies' (…) that means they were not big (…) 'using data they recorded in parental diaries' (…) ok (.) they had diaries (..) but I don't know what 'parental' means (…) it's difficult (…) 'Scholars carried out' (…) it's false

The above data offers a 'snapshot' of the participants' cognitive processes as they are engaged in trying to solve a particular comprehension problem. P7, the HPR participant, having read the item, initially skims the text to find the relevant sentence, homing in on the phrase 'the 19th century.' Next, she correctly identifies 'parental' as the key textual clue. Sadly for her, having got this far she falls at the final hurdle, opting for 'false' as her answer. P8, one of the LPR participants, uses the same skimming method to correctly identify the relevant sentence. However, unlike P7, she does not spot the textual clue and fails to make the inference from the reference to 'parental diaries.' She is misled by the absence of an explicit mention of 'children' and so wrongly concludes that the information is not given. The other LPR participant, P12, also uses the phrase '19th century' to identify the relevant part of the text and even focuses her attention on the key phrase only to stumble over the meaning of 'parental' and decide, wrongly, that the statement is false.

Thus the TAP data provides an illuminating glimpse of three participants, each of whom is struggling with a particular comprehension issue, but struggling in interestingly different ways.

Pedagogical Implications

The present study aimed to determine the reading comprehension difficulties faced by Arabic-speaking EFL learners when encountering academic texts in English, together with the strategies they employed to overcome these difficulties, using qualitative data obtained from a think-aloud technique and a follow-up interview.

The data reveal that at the time the study was undertaken each of the participants was already in possession of a repertoire of reading strategies. In itself this is encouraging, since it suggests a foundation which might be built upon. However, there was considerable variation with regard to the ability to make effective use of strategies, suggesting that the foundation needs to be strengthened and extended. The performance of most of the LPR participants in particular was characterized by poor judgment with regard to certain crucial reading strategies such as the underlining of key words and phrases and consulting dictionaries. The implication that follows is an obvious, if slightly boring, one: early identification of weaker readers is essential. Such identification (ideally to be undertaken at the beginning of their major by means of a reading test), might lead to training (both direct instruction and modeling) in the employment of strategies, both to enable them to make more effective use of the strategies they possess already and to introduce new, alternative strategies where there is evidence of these being needed.

In this study, both higher and lower proficiency readers tended to favor problem-solving, and support strategies over global strategies. This tendency, which has been found in several previous studies both in the Gulf and elsewhere (see Magogwe, 2013; Tabatabaei & Assari, 2011; Temur & Bahar, 2011; Yüksel & Yüksel, 2012), was seen in their reading of both the easier Text 1 and the more challenging Text 2. It is noteworthy that none of the participants made use of the full range of strategies in SORS. For example, participants failed to preview the content of the text presented to them before they began to read. Similarly, no one noted text characteristics such as structure or organization; nor did anyone examine the questions beforehand. These are key academic reading skills, which, in principle, could be readily taught and practiced. As it is, all

the participants (HPR as well as LPR) conspicuously failed to display the kind of 'text awareness' that one would hope to see in an academic setting. This suggests that continued strategy-based instruction, particularly when designed to develop awareness and use of specific strategies, is something from which all readers might derive benefit. In other words, if they are to perform to their full potential, even proficient readers may require training in monitoring their strategy use to determine when to employ particular strategies, especially where these might otherwise remain underused.

Unfortunately, training in the use of reading strategies alone may not be sufficient. A major pattern to emerge from this study is that the less proficient readers tended to display a number of characteristics which impacted negatively on their reading performance. Specifically, three problems emerged from an analysis of the data, namely, (a) problems with word recognition; (b) a tendency to focus attention at word level and, as a consequence, failure to build words into higher-level meaning; and (c) difficulty in parsing complex grammatical structures in the texts. The last of these problems in particular, which is consistent with various previous studies, is unlikely to be resolved by 'strategy-based instruction' by itself.

Lastly, there is the issue of text comprehension. Analysis of the participants' performance on the two comprehension measures indicates that there was no straightforward relationship between competence in the use of particular strategies and overall comprehension of a text. Several of those participants who had employed specific strategies quite successfully during the TAP sessions, nonetheless showed only limited understanding of textual meaning, especially as measured by their ability to answer true-false statements appropriately. Such facts must give us pause. They confirm that the ability of an individual reader to employ strategies to resolve specific problems within a text may not necessarily translate in any direct fashion into better comprehension of the text as a whole.

While space constraints do not permit detailed discussion of this important matter, one technique that suggests itself is to require students to explain and justify their answers in front of their peers once they have completed a comprehension task. Asking students to give a public account of how they arrived at a particular answer with reference to the text is likely to raise their awareness of the strategies they customarily use and also provide opportunities for further (perhaps student-led) discussion of alternative, potentially more effective strategies.

Limitations

In this study, the coding of the TAP data was conducted primarily by means of Mokhtari and Sheorey's (2002) Survey of Reading Strategies. While SORS provides a useful interpretative framework, and its use here enabled direct comparison with other studies that used this same instrument, it cannot be said to offer a comprehensive set of all the possible strategies that someone might call upon in performing a reading task. It may be argued, in fact, that in relying on a pre-established taxonomy of strategies the value of SORS as a research instrument is limited. Therefore, further research should be conducted with other instruments and types of analysis, which might reveal a wider range of strategies than was apparent here.

Secondly, as already noted above, in designing the research project it was decided not to provide a model of a think-aloud for participants to follow. Clearly, such a decision has its risks so far as data collection is concerned. The current trend among researchers is to provide participants with more guidance with regard to what thinking-aloud involves than was the case here. As explained above, in the present case the researcher judged that the risk was worth taking. The depth and richness of the data subsequently gathered would seem to justify this decision. Nonetheless, modeling the think-aloud procedure for the participants in advance may have altered their performance during the TAP sessions, resulting in rather different data.

Thirdly, something should be said about the choice of texts. If data collection via TAP is to be successful, it is essential that the participants be sufficiently motivated to engage with the text presented to them. In the present case, the selection of texts was based on the researcher's judgments of what was likely to prove interesting and challenging to readers in light of his several years of experience teaching in the Gulf region. For the most part, this seems to have worked. Only one participant explicitly stated that he found the topic of one of the texts uninteresting. However, while 'participant engagement' must remain an obvious pre-requisite, efforts should be made in future research to select texts on other grounds. For example, texts might be deliberately chosen to induce specific strategies, particularly where previous research provides evidence that these strategies may not be readily employed by all readers.

Finally, the participants involved in this study were selected by means of nonrandom purposive sampling. There was no control for variables such as academic major, gender, number of years learning English, etc. Further studies involving systematic targeting of particular populations, with such variables controlled, are certainly called for. Moreover, the relatively small sample size in the present study, and the specificity of the context in which it was undertaken, means that caution should be exercised in forming generalizations from the data collected. Within the Gulf region in particular, where little such work has been done, there is a continuing need for TAP-based research on reading strategies, ideally involving larger samples, if we are to unravel the complex interconnections between reading proficiency, strategy use, and comprehension of text.

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Appendix A

Text 1: Light Pollution

After hours of driving south in the pitch-black darkness of the Nevada desert, a dome of hazy gold suddenly appears on the horizon. Soon, a road sign confirms the obvious: Las Vegas 30 miles. Looking skyward, you notice that the stars are harder to find than they were an hour ago.

More Light Than Is Necessary

Light pollution—the artificial light that illuminates more than its intended target area—has become a problem of increasing concern across the country over the past 15 years. In the suburbs, where over-lit shopping mall parking lots are the norm, only 200 of the Milky Way's 2,500 stars are visible on a clear night. Even fewer can be seen from large cities. In almost every town, big and small, street lights beam just as much light up and out as they do down, illuminating much more than just the street. Almost 50 percent of the light emanating from street lamps misses its intended target, and billboards, shopping centres, private homes and skyscrapers are similarly over-illuminated.

America has become so bright that in a satellite image of the United States at night, the outline of the country is visible from its lights alone. The major cities are all there, in bright clusters: New York, Boston, Miami, Houston, Los Angeles, Seattle, Chicago—and, of course, Las Vegas. Mark Adams, superintendent of the McDonald Observatory in west Texas, says that the very fact that city lights are visible from on high is proof of their wastefulness. "When you're up in an airplane, all that light you see on the ground from the city is wasted. It's going up into the night sky. That's why you can see it."

A Problem Lights Do Not Solve

But don't we need all those lights to ensure our safety? The answer from light engineers, light pollution control advocates and astronomers is an emphatic "no." Elizabeth Alvarez of the International Dark Sky Association (IDA), a non-profit organization in Tucson, Arizona, says that overly bright security lights can actually force neighbors to close the shutters, which means that if any criminal activity does occur on the street, no one will see it. And the old assumption that bright lights deter crime appears to have been a false one: A new Department of Justice report concludes that there is no documented correlation between the level of lighting and the level of crime in an area. And contrary to popular belief, more crimes occur in broad daylight than at night.

For drivers, light can actually create a safety hazard. Glaring lights can temporarily blind drivers, increasing the likelihood of an accident. To help prevent such accidents, some cities and states prohibit the use of lights that impair night time vision. For instance, New Hampshire law forbids the use of "any light along a highway so positioned as to blind or dazzle the vision of travelers on the adjacent highway."

The Environmental Dangers

Badly designed lighting can pose a threat to wildlife as well as people. Newly hatched turtles in Florida move toward beach lights instead of the more muted silver shimmer of the ocean. Migrating birds, confused by lights on skyscrapers, broadcast towers and lighthouses, are injured, sometimes fatally, after colliding with high, lighted structures. And light pollution harms air quality as well: Because most of the country's power plants are still powered by fossil fuels, more light means more air pollution.

What Can Be Done?

So what can be done? Tucson, Arizona is taking back the night. The city has one of the best lighting ordinances in the country, and, not coincidentally, the highest concentration of observatories in the world. Kitt Peak National Optical Astronomy Observatory has 24 telescopes aimed skyward around the city's perimeter, and its cadre of astronomers needs a dark sky to work with.

For a while, that darkness was threatened. "We were totally losing the night sky," Jim Singleton of Tucson's Lighting Committee told Tulsa, Oklahoma's KOTV last March. Now, after retrofitting inefficient mercury lighting with low-sodium lights that block light from "trespassing" into unwanted areas like bedroom windows, and by doing away with some unnecessary lights altogether, the city is softly glowing rather than brightly beaming. The same thing is happening in a handful of other states, including Texas, which just passed a light pollution bill last summer. "Astronomers can get what they need at the same time that citizens get what they need: safety, security and good visibility at night," says McDonald Observatory's Mark Adams, who provided testimony at the hearings for the bill.
And in the long run, everyone benefits from reduced energy costs. Wasted energy from inefficient lighting costs us between $1 and $2 billion a year, according to IDA. The city of San Diego, which installed new, high-efficiency street lights after passing a light pollution law in 1985, now saves about $3 million a year in energy costs.

Legislation isn't the only answer to light pollution problems. Brian Greer, Central Ohio representative for the Ohio Light Pollution Advisory Council, says that education is just as important, if not more so. "There are some special situations where regulation is the only fix," he says. "But the vast majority of bad lighting is simply the result of not knowing any better." Simple actions like replacing old bulbs and fixtures with more efficient and better-designed ones can make a big difference in preserving the night sky.

Questions 1-5

Do the following statements agree with the information given in the reading passage?
On the line provided write **TRUE, FALSE** or **NOT GIVEN**.

TRUE *if the statement agrees with the information.*
FALSE *if the statement contradicts the information.*
NOT GIVEN *if there is no information on this*

1. _____ One group of scientists find their observations are made more difficult by bright lights.

2. _____ It is expensive to reduce light pollution.

3. _____ Many countries are now making light pollution illegal.

4. _____ Old types of light often cause more pollution than more modern ones.

5. _____ Bright lights are important to prevent crime.

Appendix B

Text 2: Investigating Children's Language

For over 200 years, there has been an interest in the way children learn to speak and understand their first language. Scholars carried out several small-scale studies, especially towards the end of the 19th century, using data they recorded in parental diaries. But detailed, systematic investigation did not begin until the middle decades of the 20th century, when the tape recorder came into routine use. This made it possible to keep a permanent record of samples of child speech, so that analysts could listen repeatedly to obscure extracts, and thus produce a detailed and accurate description. Since then, the subject has attracted enormous multi-disciplinary interest, notably from linguists and psychologists, who have used a variety of observational and experimental techniques to study the process of language acquisition in depth.

The Difficulties of Analysing Children's Language

Central to the success of this rapidly emerging field lies the ability of researchers to devise satisfactory methods for eliciting linguistic data from children. The problems that have to be faced are quite different from those encountered when working with adults. Many of the linguist's routine techniques of enquiry cannot be used with children. It is not possible to carry out certain kinds of experiments, because aspects of children's cognitive development – such as their ability to pay attention, or to remember instructions – may not be sufficiently advanced. Nor is it easy to get children to make systematic judgments about language, a task that is virtually impossible below the age of three. And anyone who has tried to obtain even the most basic kind of data – a tape recording of a representative sample of a child's speech – knows how frustrating this can be. Some children, it seems, are innately programmed to switch off as soon as they notice a tape recorder being switched on.

New Developments

Since the 1960s, however, several sophisticated recording techniques and experimental designs have been devised. Children can be observed and recorded through one-way-vision windows or using radio microphones, so that the effects of having an investigator in the same room as the child can be eliminated. Large-scale sampling programmes have been carried out, with children sometimes being recorded for several years. Particular attention has been paid to devising experimental techniques that fall well within a child's intellectual level and social experience. Even pre-linguistic infants have been brought into the research: acoustic techniques are used to analyse their vocalisations, and their ability to perceive the world around them is monitored using special recording equipment. The result has been a growing body of reliable data on the stages of language acquisition from birth until puberty.
There is no single way of studying children's language. Linguistics and psychology have each brought their own approach to the subject, and many variations have been introduced to cope with the variety of activities in which children engage, and the great age range that they present. Two main research paradigms are found.

A Natural Approach

One of these is known as 'naturalistic sampling.' A sample of a child's spontaneous use of language is recorded in familiar and comfortable surroundings. One of the best places to make the recording is in the child's own home, but it is not always easy to maintain good acoustic quality, and the presence of the researcher or the recording equipment can be a distraction (especially if the proceedings are being filmed). Alternatively, the recording can be made in a research centre, where the child is allowed to play freely with toys while talking to parents or other children, and the observers and their equipment are unobtrusive. A good quality, representative, naturalistic sample is generally considered an ideal datum for child language study. However, the method has several limitations. These samples are informative about speech production, but they give little guidance about children's comprehension of what they hear around them. Moreover, samples cannot contain everything, and they can easily miss some important features of a child's linguistic ability. They may also not provide enough instances of a developing feature to enable the analyst to make a decision about the way the child is learning. For such reasons, the description of samples of child speech has to be supplemented by other methods.

An Experimental Approach

The other main approach is through experimentation, and the methods of experimental psychology have been widely applied to child language research. The investigator formulates a specific hypothesis about children's ability to use or understand an aspect of language, and devises a relevant task for a group of subjects to undertake. A statistical analysis is made of the subjects' behavior, and the results provide evidence that supports or falsifies the original hypothesis.
Using this approach, as well as other methods of controlled observation, researchers have come up with many detailed findings about the production and comprehension of groups of children. However, it is not easy to generalise the findings of these studies. What may obtain in a carefully controlled setting may not apply in the rush of daily interaction. Different kinds of subjects, experimental situations, and statistical procedures may produce different results or interpretations. Experimental research is therefore a slow, painstaking business; it may take years before researchers are convinced that all variables have been considered and a finding is genuine.

Questions 1-5

Do the following statements agree with the information given in reading passage?

Write *true*, *false* or *not given* on the line provided.
TRUE *if the statement agrees with the information.*
FALSE *if the statement contradicts the information.*
NOT GIVEN *if there is no information on this*

1. _____ In the 19th century, researchers studied their own children's language.

2. _____ Attempts to elicit very young children's opinions about language are likely to fail.

3. _____ Radio microphones are used because they enable researchers to communicate with a number of children in different rooms.

4. _____ Many children enjoy the interaction with the researcher.

5. _____ Parents should not be present when children are being recorded.

Appendix C

Figures

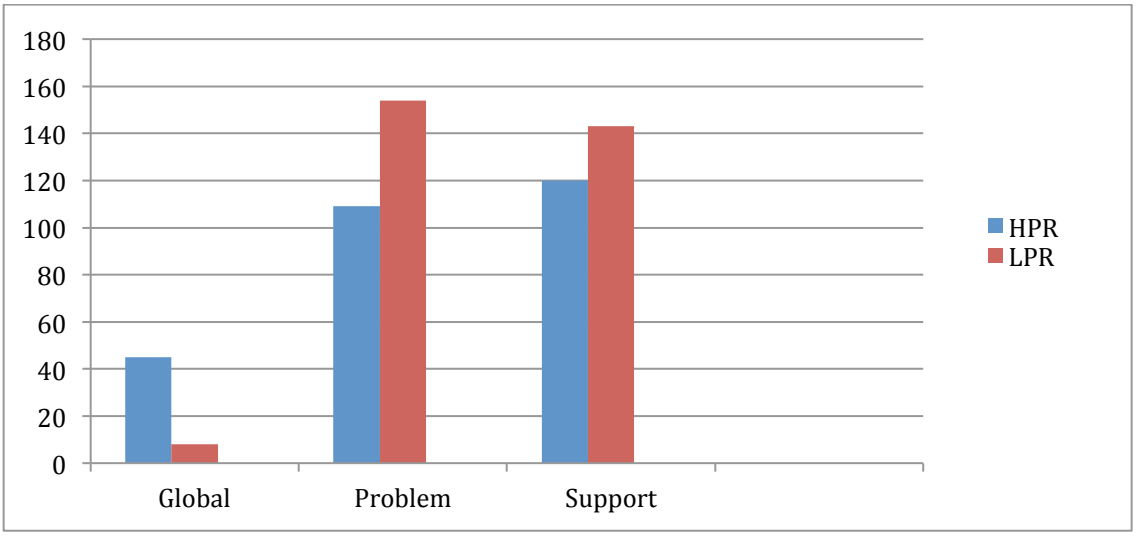

Figure 1. Relative frequency of SORS strategies used by the two groups.
Note. Blue column = HPR; Brown column = LPR

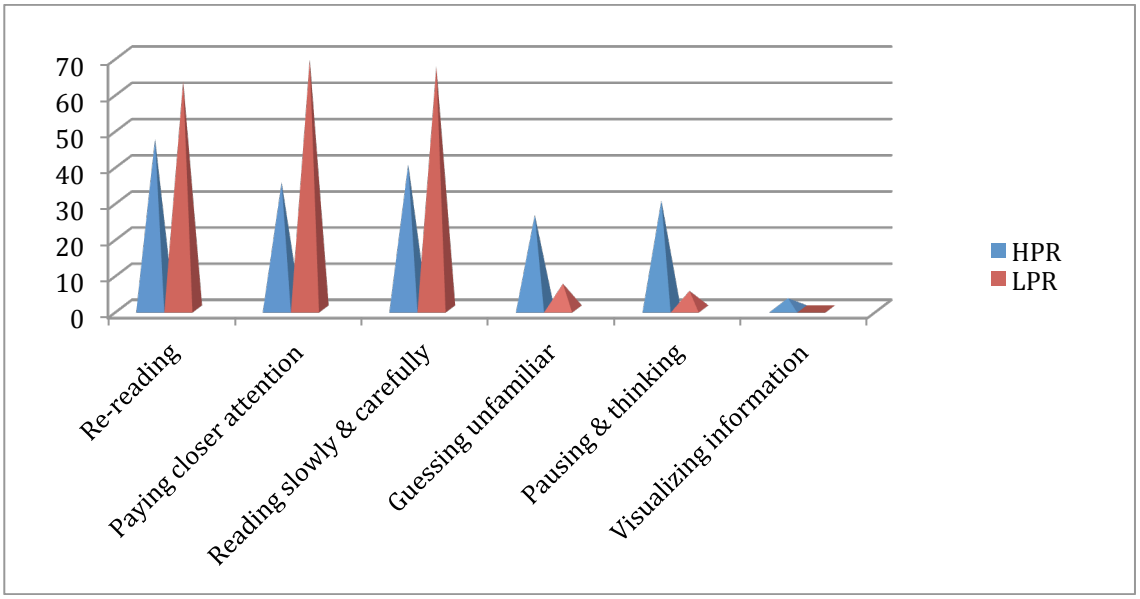

Figure 2. Relative frequency of problem-solving strategies used by the two groups.
Note. Blue column = HPR; Brown column = LPR

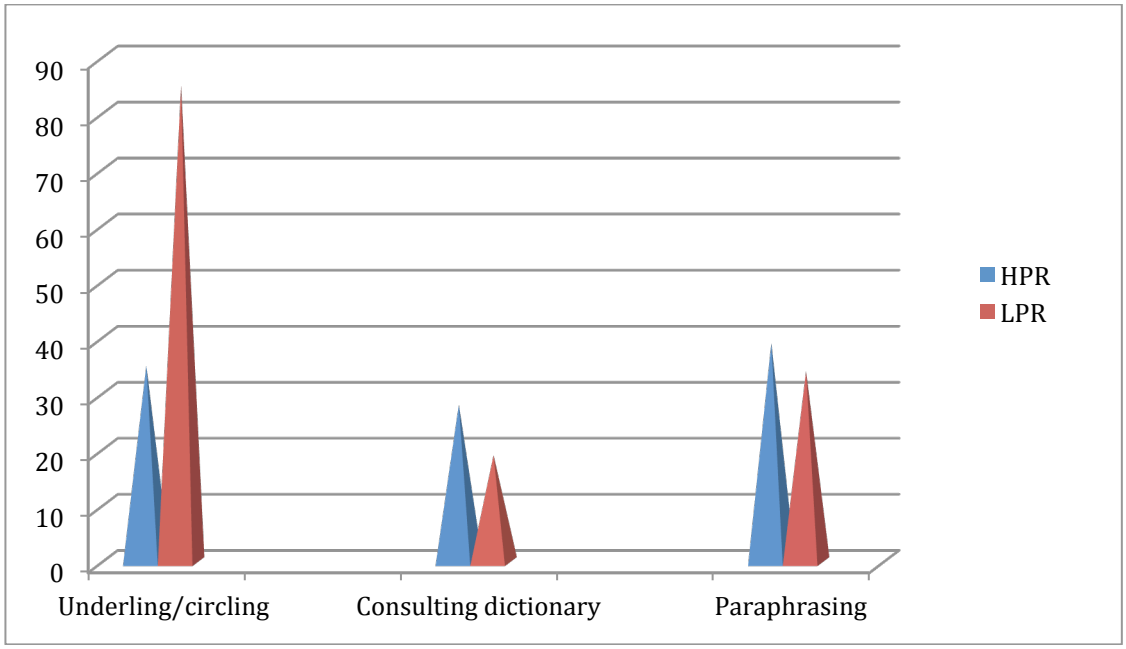

Figure 3. Relative frequency of support strategies used by the two groups.
Note. Blue column = HPR; Brown column = LPR

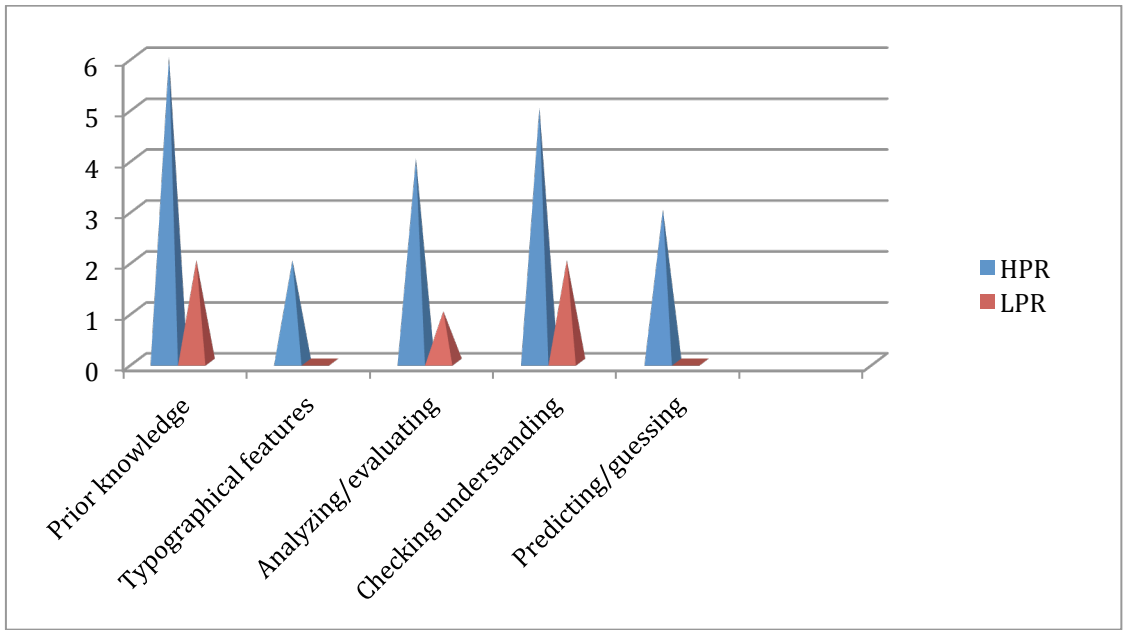

Figure 4. Relative frequency of global strategies used by the two groups.
Note. Blue column = HPR; Brown column = LPR

About the Author

Martin Endley has been a member of the Department of Linguistics at UAEU since 2011. He has previously worked at universities in Turkey and South Korea. His major research interests are L2 reading strategies, L2 vocabulary acquisition, perceptions of error gravity, and written corrective feedback. E-mail: martinjendley@uaeu.ac.ae