An Introspective Study of Arabic- and Mandarin-Speakers' Reading Comprehension Strategies

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Little L2 reading strategy research has explored the effect of linguistic and cross-cultural differences on strategic reading habits. This study attempted to fill this void by examining the reading strategies that Arabic- and Mandarin-speaking immigrants employed when reading and answering Canadian Language Benchmarks Assessment reading comprehension items. A chi-square analysis of their bottom-up and top-down strategy use revealed that the Mandarin-speakers used bottom-up strategies significantly more than expected, whereas the Arabic-speakers used top-down strategies more than expected. The findings of the study are discussed in the light of earlier research, and some preliminary implications for reading strategy instruction, strategy training studies, and test development practices are suggested.

Peu de recherches sur les stratégies de lecture en L2 ont porté sur l'effet des différences linguistiques et transculturelles sur les habitudes de lecture stratégique. Cette étude a tenté de combler ce vide en examinant les stratégies de lecture qu'emploient les immigrants de langue arabe et mandarine quand ils complètent une évaluation des niveaux de compétence linguistique canadiens. Une analyse du chi-carré de leurs stratégies ascendantes et descendantes a révélé que les locuteurs mandarins ont employé des stratégies ascendantes bien plus que prévu alors que les locuteurs arabes ont eu recours aux stratégies descendantes plus que prévu. Nous discutons des résultats de cette étude à la lumière de recherches antérieures, et proposons quelques conséquences quant à l'enseignement des stratégies de lecture, aux études portant sur la formation en matière de stratégies, et aux pratiques en développement des évaluations.

Strategies

Research into second-language reading comprehension strategies has proved to be a complex endeavor because the concept of strategy is difficult to define, observe, measure, describe, and classify. Despite the lack of consensus about what constitutes a strategy, numerous researchers use the term *strategies* to refer to the mental processes or behaviors that language-learners employ in second-language acquisition, second-language use, or second-language testing situations (Alderson, 1984; Carrell, 1989; Cohen, 1998; Hosenfeld, 1977; O'Malley & Chamot, 1990; Oxford, 1990; Purpura, 1997).

According to Cohen, language use and test-taking strategies are the "mental operations or processes that learners consciously select when accomplishing language tasks" (p. 92). By adapting this definition to the context of reading, reading comprehension strategies may be defined as the mental operations or comprehension processes that readers select and apply in order to make sense of what they read. Researchers such as Grabe (2009) suggest that strategies "are consciously controlled by readers to solve reading problems" (p. 221). Because strategies are generally considered to be conscious or at least potentially conscious, they are open to inspection (Weinstein & Mayer, 1986).

Several second-language (L2) reading strategy investigations have produced a wide variety of reading strategy classification schemes (Anderson, 1991; Block, 1986; Carrell, 1989; Phakiti, 2003; Purpura, 1997; Schueller, 2004; Young & Oxford, 1997). One common characteristic shared by many of the L2 reading strategy inventories is that the strategies are divided into binary categories, which reflect local or bottom-up and global or top-down processing. Bottom-up reading comprehension strategies are data-driven (i.e., they focus on linguistic parts and forms to interpret text on an element by element basis), whereas top-down strategies are conceptually or hypothesis-driven (i.e., they use existing schematic knowledge of real-life situations and discourse organization to make meaning, Carrell, 1983). Despite conflicting results regarding which of these two categories contributes most to reading comprehension, the common conclusion from studies of the relationship between strategy use and reading ability is that reading comprehension is more likely to occur when people use strategies both actively and flexibly during reading given the nature of the context (Anderson; Barnett, 1988; Block, 1986, 1992; Carrell; Phakiti; Purpura; Sarig, 1987; Schueller; Young & Oxford). Nonetheless, a clearer understanding of reading strategy use is necessary to help language-learners discover when, where, and how to use strategies effectively.

Although some reading strategy training studies (Barnett, 1988; Schueller, 2004) suggest that strategy training improves comprehension, most strategy training programs are generic in nature in the sense that they do not address research that suggests that learners from diverse cultural, linguistic, and educational backgrounds tend to rely on varied reading strategies and/or varied word recognition strategies when attempting English academic reading tasks (Akamatsu, 2003; Bang & Zhao, 2007; Chen, 1992; Fender, 2003; Koda, 1988, 2005, 2007; Parry, 1996). Before successful reading strategy training programs specifically designed for language-learners from a variety of linguistic/cultural groups can be developed, researchers need to explore the differences in strategy use that exist between linguistic/cultural groups.

The purpose of this study was to examine the differences in Arabic- and Mandarin-speaker ESL reading strategy use while completing a reading

subtest of the Canadian Language Benchmarks Assessment (CLBA). In the past, CLBA Assessment results have predominantly been used to place immigrants in appropriate English-as-a-second-language classes. However, CLBA results are currently also being used as a means of establishing admissible levels of English-language proficiency in some postsecondary institutions in Canada.

Arabic and Mandarin ESL-learners were selected for three main reasons: first, they are currently two of the largest recent immigrant groups in Canada; second, both languages are radically different from English and from each other in terms of orthographic script; and third, the two groups are culturally distinct. To date, no research has examined the reading strategy use of recently arrived immigrants studying ESL outside of a university context. By ascertaining Arabic- and Mandarin-speakers' reading strategy use on an English placement/proficiency test, this study not only fills a gap in the cross-cultural reading strategy literature, but also has the potential to inform reading strategy instruction and future reading strategy training studies, and reading test development practices. Before describing the method and results of the study, I briefly discuss the relevant L2 research that has examined the effects of educational, cultural, and linguistic differences on reading and reading strategy use.

Effects of Education and Culture on Reading Strategy Use

Instructors of reading in English influence how their students approach text by teaching them to read in particular ways. For example, it is often cited that Chinese teachers tend to use traditional teacher-centered approaches to teaching EFL (Burnaby & Sun, 1989; Parry, 1996; Penner, 1995) for the purpose of preparing students to write entrance exams or tests for securing employment. As a result, Chinese EFL learners are taught to pay close attention to word-level cues (i.e., morphology and syntax). According to Fischer-Kohn (1986, cited in Kohn 1992), Chinese teachers of reading in English encourage their students to

1. read slowly and take care that they know each word as they go;
2. vocalize or voice the material, either aloud or silently;
3. reread difficult sentences until they are understood;
4. look up definitions of all unknown words in a dictionary; and
5. analyze complex structures carefully. (p. 121)

Thus it appears that Chinese EFL learners are taught to use bottom-up strategies because they are expected to scrutinize each word in the text carefully and memorize grammar rules and exceptions (Kohn, 1992).

In contrast, the general trend in Arab nations is to place more emphasis on student-centered EFL activities that encourage linguistic interaction through the use of authentic, real-life tasks (Kharma, 1998). These types of

communicative activities focus on developing functional language skills in a learning environment that stresses meaning over form. As Parry (1996) suggested, authentic reading activities that emphasize reading for meaning tend to encourage a global, top-down approach to text. Therefore, it is likely that the exposure to communicative activities that Arab EFL students receive promotes the development of top-down reading strategies.

Research suggests that cultural differences may also be related to differences in processing skills and strategies in reading (Kohn, 1992; Oxford & Burry-Stock, 1995; Pritchard, 1990; Pritchard & O'Hara, 2008; Parry, 1996). For example, in a cross-cultural study of reading strategies, Parry examined the relationship between cultural membership and the EFL reading strategies used by 20 rural Nigerian secondary school students and 25 urban Chinese university graduates when reading academic texts. Parry's research was based on her own teaching experiences and observations of the roles and processes of L1 and L2 literacy in Yola, Nigeria and Nanjing, China. Diverse data-collection techniques for eliciting information on student reading behaviors were used in these two contexts.

In Nigeria, Parry (1996) administered questions from an outdated school certificate English exam in her English class under exam-like conditions. Then, over the next three days, she individually interviewed 20 volunteers about the behaviors they used to comprehend the seven reading passages and to answer the 34 accompanying questions. During the tape-recorded interviews, students (a) read the passages aloud and identified any words that they did not know, (b) answered each question, and (c) explained why they answered as they did. Analysis of students' responses revealed that although they correctly answered 28% of the low-level (bottom-up) questions that focused primarily on single lexical items and grammatical knowledge, they correctly answered 41% of the higher-level questions that relied on holistic interpretations of the passages, or at least sections of the passages, which necessitated top-down strategy use to answer the questions correctly.

In China, Parry (1996) was an instructor of an academic reading and writing course for already certified teachers of English. She had her students "read articles and write essays on four themes: (a) literacy at home, (b) literacy in school, (c) approaching English, and (d) making sense of English text" (p. 676). Seventeen of the 25 teachers chose to write about the strategies they used when reading English texts. Of these 17 teachers, 13 stated explicitly that they concentrated on vocabulary and grammar, which suggested that they placed more emphasis on a bottom-up approach to comprehending English texts than on a top-down approach.

Parry (1996) maintained that the differences between the general tendencies of the two groups reflected differences in their experiences of language and literacy. Although the structure of the Chinese EFL textbooks and methods of teaching both Chinese and EFL tended to encourage bottom-up

strategies, how the Nigerians learned to read for meaning and the multilingual environment in which they lived encouraged a global, top-down approach to text. Although the differences in how the Nigerian and Chinese students approached English texts may have been due to differences in proficiency, task type, age, and experience, Parry concluded that reading strategies could also "be explained in terms of how different cultural communities represent, use and teach both language and literacy" (p. 687). Therefore, the knowledge of strategies and when to use them is probably influenced by individuals' experience of text, their written language, and the social process of learning to read.

The Effects of Linguistic Differences on Reading

Research has also suggested that language-specific differences are related to differences in processing skills and strategies in reading (Akamatsu, 2003; Bang & Zhao, 2007; Chen, 1992; Fender, 2003; Hayes-Harb, 2006; Koda, 1988, 1989, 2005; Wang & Koda, 2007; Wang, Koda, & Perfetti, 2003). For example, when Koda (1988, 1989) compared the cognitive strategies of ESL readers from four L1 orthographic backgrounds, she found that when reading in English, the readers used cognitive strategies developed in their L1. Koda (2000) also examined Korean and Chinese ESL learners' morphological awareness and discovered that the Chinese participants were more efficient in integrating morphological information when processing sentences. Wang, Koda, and Perfetti's research, which compared Korean and Chinese ESL learners' semantic category judgments, also indicated that L1 decoding skills may be transferred to reading L2 texts, as the Korean readers relied on phonological information, whereas the Chinese readers relied mainly on orthographic information when reading English words. Akamatsu also found L1 effects on L2 reading processes when comparing nonalphabetic L1 ESL learners (i.e., Chinese and Japanese) with alphabetic L1 ESL learners' (i.e., Persian) English word identification skills, as the nonalphabetic L1 ESL learners were less efficient in processing English words.

More recently, Hayes-Harb (2006) compared the reading processes of 10 native Arabic-speakers with those of 10 native English-speakers and 10 non-Arabic ESL learners. She found that the Arabic-speakers were less aware of vowel letters in English texts than the other two groups. Hayes-Harb reasoned that Arabic-speakers use semantic strategies when reading in Arabic that reflect their L1 word identification strategies because Arabic words with similar consonant structures are semantically related, and vowel letters are predictable based on grammatical function. However, this is not the case in English, as vowels cannot be predicted based on semantic and syntactic context. Results of this study suggest that the Arabic-speakers use more of a top-down approach to reading.

In another cross-linguistic study of ESL reading, Fender (2003) investigated differences in 19 native Arabic- and 20 native Japanese-speakers' ESL word recognition processes. On a computer screen, the intermediate ESL learners read a total of 60 randomized sentences. After each question, they answered a true/false question designed to reflect their comprehension of clause or sentence structures. Results indicated that the Arabic-speaking ESL participants were significantly more accurate in comprehending and integrating words into larger phrase and clause units than the Japanese ESL learners. This suggests that Arabic ESL-learners may have a proclivity for using top-down reading strategies. In contrast, Japanese like Chinese, uses an orthography that encodes language at the level of morphemes, which in general correspond to words and affixes (Chen, 1992) (*kanji*: Japanese employs both morphographic (*kanji*) and phonographic (syllabic, *kana*) scripts. Content words are written in *kanji*, whereas function words are written in *kana*). As a result, one may hypothesize that Chinese ESL learners may also be less accurate in comprehending larger clause units than Arabic ESL learners when reading in English.

According to Abu-Rabia (1997), "Arabic is perhaps the only language in the world in which readers must first understand the sentence in order to recognize the word" (p. 76). Because short vowels are not represented in Arabic orthography, Arabic-speakers may be less dependent on local cues in the printed word when reading. If reading in Arabic encourages a reliance on higher-level cues and strategies, it is possible that the Arabic ESL learners in Fender's (2003) study were more successful integrators than the Japanese ESL learners because they effectively transferred their well-developed L1 reading strategies to the L2 reading task.

The findings from the cross-cultural reading strategy research and the research on the effects of linguistic differences on strategy use presented above suggest that Arabic- and Mandarin-speaking ESL learners may rely on different reading strategies when approaching reading comprehension tasks. In order to gain a better understanding of the differences in reading strategy use across these two groups of ESL learners, the following research questions were proposed.

1. What are the bottom-up and top-down reading strategies that intermediate proficiency Arabic- and Mandarin-speaking ESL learners employ when reading and answering Canadian Language Benchmarks Assessment (CLBA) reading items?
2. Are there general trends/differences in the types and frequencies of reading strategies employed by each of these cultural/linguistic groups?

To address these questions, verbal report data were collected from intermediate Arabic- and Mandarin-speaking ESL students as they were reading and answering 32 CLBA Reading Assessment items.

Method

Participants

Arabic- and Mandarin-speaking immigrants were recruited from intermediate ESL college classes. A letter written to invite students to participate in the study was given to the instructors to hand out to Arabic- and Mandarin-speaking students in their intermediate ESL classes. The teachers forwarded the names of the students who expressed an interest in the study to an administrative assistant who coordinated the student recruitment and scheduling of participants at the college. Only those students who were literate in their L1 (i.e., had at least 11 years of basic education in their country of origin), who had reached a language threshold in English, and who had not resided in Canada for more than two years were selected.

Sample size was determined by data saturation. Saturation occurs when no new or useful information about the strategy categories can be obtained (Glaser, 1978; 1992; Glaser & Strauss, 1967). Researchers suggest that data saturation is typically reached after the analysis of 5-10 protocols (Conrad, 1978; Glaser & Strauss; Jones, 1980; Rennie, 1984). To clarify and elaborate on the reading strategies used by the ESL learners, sampling continued until no new or relevant strategies emerged from the participants' verbal reports in either of the language groups. Thus data collection and analysis occurred concurrently.

Although it appeared that saturation was complete after five Mandarin participants' and four Arabic participants' verbal reports had been collected, transcribed, coded, and re-coded to ensure data saturation had been achieved, verbal reports were collected from three additional Arabic participants and three additional Mandarin participants. Although these last reports did not provide any new reading strategy categories, in some instances they provided clearer examples of the bottom-up and top-down reading strategies that emerged from the think-aloud data (see Table 1).

Instruments

Background Questionnaire. All participants were interviewed using a personal-background questionnaire to obtain information on their first language, age, sex, education level, country of birth, length of time studying English, and languages spoken and studied. To ensure that the participants understood the questions, bilingual translators assisted with the interviews. Participants' responses were recorded on the questionnaire at the time of administration.

Canadian Language Benchmarks Assessment—Reading Assessment. The participants' verbal reports were collected while they were reading and answering CLBA Reading Assessment items. The CLBA Reading Assessment is a reading comprehension test that requires examinees to attempt a range of task types. The assessment is divided into two stages, with four

Table 1
Reading Strategies Used When Answering the CLBA Reading Items During the Think-Alouds

Strategy		*Definition*
	Bottom-up, local strategies	*The reader*
B1	breaks lexical items into parts	breaks words into smaller units to promote comprehension.
B2	scans for explicit information requested in the item	scans the text for specific details or explicitly stated information requested in the item.
B3	identifies a synonym or a paraphrase of the literal meaning of a word, phrase, or sentence	identifies or formulates a synonym or a paraphrase of the literal meaning of a word, phrase, or sentence in the text to help answer the question.
B4	relates verbal information to accompanying visuals	matches verbal information in the text to visual information in the item to answer the question.
B5	matches key vocabulary in the item to key vocabulary in the text	matches key vocabulary or phrases in the item or options to key vocabulary or phrases in the text.
B6	uses knowledge of grammar or punctuation	uses awareness of grammar, syntax, parts of speech, or punctuation to help answer the question.
B7	uses local context cues to interpret a word or phrase	uses the words in a sentence that precede or follow a specific word or phrase to understand a particular word or phrase.
Top-down, global strategies		*The reader*
T1	skims for gist/identifies the main idea, theme, or concept	draws on the major points of the passage to answer the question; summarizes main concept.
T2	connects or relates information presented in different sentences or parts of the text	relates new information to previously stated information to help answer the question; synthesizes scattered information.
T3	draws an inference based on information presented in the text	makes an inference, draws a conclusion, or forms a hypothesis based on information not explicitly stated in the text to answer the question.
T4	speculates beyond the text	uses background knowledge to speculate beyond the text.
T5	recognizes discourse format	uses discourse format or text organization to answer the question (e.g., discriminates between: fact and opinion or cause and effect; or notes how the information is presented).

parallel forms for each stage. Form 1, Stage II was administered in the current study. Stage II of the assessment consists of eight dichotomously scored constructed-response items and 24 multiple-choice, four-option items (total out of 32). The items follow four passages (Tasks A-D), which represent four genres and range in length from 251 to 547 words. Internal consistency of the CLBA has been reported as high (Cronbach's alpha = .94; Watt & Lake, 2004). Because the CLBA is a secured test (i.e., not available to the public) with copyright limitations, the reading passages and items cannot be released. However, to provide examples for the reader, a reading passage of similar difficulty with representative corresponding multiple-choice and constructed-response items is included in the Appendix.

Procedures

The verbal report procedures applied in this study follow the initial model suggested by Ericsson and Simon (1993), which was further refined as steps applicable to language-testing situations by Green (1998). The Verbal Protocol Analysis steps outlined in Green were followed in the current study. The key steps are described below.

Training of bilingual interpreters. Before collecting the verbal report data, the bilingual interpreters (a bilingual speaker of Arabic and English and a bilingual speaker of Mandarin and English) were trained in the verbal report procedures and asked to read and sign a confidentiality agreement.

Types of verbal reports collected. Concurrent and retrospective non-mediated reports were chosen to avoid the possibility that researcher probes could lead the participants. Thus participants were asked to report both concurrently and retrospectively in their language of choice (i.e., his or her L1, English, or both languages—whatever language(s) he or she was comfortable reporting in) as they worked through the CLBA reading items. Retrospection was used to clarify the online processing strategies reported in the concurrent verbal protocols.

Training of participants. Each participant met with me and a bilingual interpreter in an empty office at the college. The participant sat at a table on which were two microphones and a folder containing the experimental materials. These materials consisted of a consent form, a background questionnaire, a sheet of directions, a practice passage and questions (i.e., CLBA Reading subtest Form 2, Stage II, Task A), and the CLBA Reading subtest Form 1, Stage II, Tasks A-D.

To reduce the cognitive load on the participants, verbal report data were collected on two afternoons during the same week. On day one, after the participant had read and signed the consent form, a bilingual interpreter and I interviewed the participant using the background questionnaire. Then the participant was given as much time as he or she needed to read a passage

silently, after which verbal reports were conducted to identify the strategies he or she used when answering the CLBA reading items.

Initially, a bilingual translator and I introduced each participant to concurrent and retrospective verbal report procedures. I explained the procedures in English, and the translator ensured that the participants understood by discussing the instructions in the participant's L1. After reading each passage, each participant was provided with a chance to practice his or her verbal reporting skills with four or more reading comprehension questions taken from Form 2, Stage II of the CLBA. Then each participant practiced reporting in detail what he or she was thinking and to what information he or she was attending when answering each question. If the participants remained silent for more than five seconds, they were reminded to keep talking. During this training session, it was emphasized that they verbalize whatever was going through their minds in whatever form it occurred as they attempted to complete the reading tasks. This produced the concurrent think-aloud data. Then after one of four possible multiple-choice options was selected, the participants were asked to report what they could remember about what they were thinking from the time they read each question until they selected an answer. This produced the retrospective data.

The validity of the verbal reports was maximized by ensuring that the procedures were adhered to (i.e., standardized instructions were used; there was minimum researcher/interpreter intervention; and both concurrent and retrospective verbal reports were collected to maximize the amount of information obtained about the participants' reading strategy use).

Collection of verbal report data. Once the participants were accustomed to the verbal report procedures, they were administered the first 14 CLBA reading comprehension questions from Form 1, Stage II, and prompted to think aloud while completing each question, and then report retrospectively after completing each question. On day two, using the same verbal report procedures specified above, participants were asked to complete the remaining 18 CLBA Form 1, Stage II items.

Transcription of audiotape data. The participants' responses were audiotaped and subsequently translated into English where necessary, and transcribed for analysis by myself and bilingual assistants. To distinguish the parts where the participants responded in English from the parts where they responded in their L1, the responses made in the L1 were typed in square brackets. Although the participants had the option to report verbally in their L1s, they all reported predominantly in English. They switched into their L1 only when they had difficulty explaining their thoughts in English.

Data Analysis

Segmenting and coding the protocols. To identify the types of bottom-up and top-down reading strategies used by the Arabic- and Mandarin-speakers

and thereby address research question 1, I segmented and coded the protocols for types of reading strategies used when reading and answering the 32 CLBA reading comprehension items. Each segment of the protocols corresponded to a statement or phrase associated with each strategy that the reader employed. Strategies were defined as each separate action that the reader took to process the reading comprehension question and to formulate an answer. The strategy segments comprised the units for analysis. Each segment was assigned one code. Those segments that could not be unambiguously coded were assigned a miscellaneous code.

After each new participant's verbal report data were collected, transcribed, segmented, and coded for bottom-up and top-down strategy use, the reading strategy coding schema was revised and the previously coded protocols were recoded using the modified strategy classification scheme. This method of multiple readings and constant comparison throughout the analyses ensured the consistency of the coding and the accuracy of the accounts of the participants' strategy use (Denzin & Lincoln, 2003).

Inter-rater coding and agreement. Inter-rater agreement was assessed to ensure that the verbal protocols were coded consistently. Consistency, which is related to the validity of the coding scheme (i.e., its ability to capture the students' behaviors), was defined as the extent to which the protocol segments were coded using the same categories by both raters. Consistency of the coding was investigated by having one independent rater who had no experience with the study code 11 of the 32 CLBA questions from each of the protocols (34.4% of the total verbal report sample). Eleven questions were selected as they were believed to elicit the full range of bottom-up and top-down strategies identified in the verbal reports. First, the coding schema was discussed with the rater. Next, the entire verbal report protocols from three randomly selected participants were coded for practice (with the exception of the 11 items used to calculate Cohen's kappa). A kappa of .87 was obtained between the raters' codes for the 11 items, indicating that the inter-rater reliability was acceptable.

Frequencies of bottom-up and top-down reading strategies. To identify general trends or differences in the types and frequencies of reading strategies employed by each of these cultural/linguistic groups and thereby address research question 2, the coded strategy segments were quantified (i.e., the number of bottom-up and top-down strategies used were summed across items for each participant and then across each group). This allowed for an examination of the frequency of Arabic- and Mandarin-speakers' strategy use on the CLBA Reading Assessment. Due to the small sample sizes and the calculation of frequency data, a non-parametric analysis using Chi-square was conducted to compare the total frequencies of bottom-up and top-down strategies used across the two groups.

Results and Discussion

Background Questionnaire

Results from the Background Questionnaire indicated that four female and three male Arabic-speaking participants had immigrated to Canada from seven countries: Egypt, Jordan, Kuwait, Lebanon, Libya, Sudan, and Syria. Demographic information is provided in Table 2. The mean length of time spent studying English was five years and four months in their home countries, and nine months in Canada. At the time of testing, the Arabic-speaking participants had lived in Canada between seven and 24 months (M=16.29 months). The mean age of the Arabic-speakers was 32.86 (Mdn=32.0). All participants had between 12 and 19 years of education (M=14.86). In addition to being fluent in oral and written Arabic, two participants reported that they were also fluent in a second language, either French or Baria. The female participants' occupations included student, secretary, kindergarten teacher, and zoologist. The male participants' occupations included civil engineer, electrical engineer, and electrician.

The Mandarin-speaking participants consisted of four men and four women who had immigrated to Canada from mainland China. The mean length of time spent studying English was eight years and five months in China, and 10 months in Canada. At the time of testing, these participants had lived in Canada between six and 24 months (M=13.43). The mean age of the Chinese participants was 36.13 (Mdn=36.5). Their years of education ranged from 15 to 23 years (M=16.94). None of the Chinese participants was fluent in a second language. The female participants' occupations included instrument designer, statistician, oilfield engineering assistant, and customer service representative. The male participants' occupations included mechanical engineer, software engineer, electronic engineer, and surgeon.

Table 2
Demographic Information for the Verbal Report Participants

Demographic Variables	*Arabic n=7*			*Mandarin n=8*		
	M	*SD*	*Range*	*M*	*SD*	*Range*
Time spent studying English in their home country (years)	5.32	5.87	0-15	8.39	2.39	5-11
Time spent studying English in Canada (months)	9.00	7.66	3-24	10.00	6.99	4-24
Length of residence in Canada (months)	16.29	7.54	7-24	13.43	7.57	6-24
Age (years)	32.86	7.71	21-45	36.13	7.40	25-48
Education (years)	14.86	2.41	12-19	16.94	2.76	15-23

Research question 1. What are the bottom-up and top-down reading strategies that intermediate proficiency Arabic- and Mandarin-speaking ESL learners employ when reading and answering Canadian Language Benchmarks Assessment (CLBA) reading items?

The verbal report procedures proved valuable in addressing research question 1, as they revealed the reading strategies elicited by the CLBA reading items (see Table 1). Analyses of the protocols identified 12 main reading strategy categories consistent with those identified in the L2 literature. The seven bottom-up strategies that emerged from the data included breaking lexical items into smaller parts, scanning for details, identifying synonyms or paraphrases, matching key words to key visuals, matching key vocabulary in the text to key vocabulary in the item using knowledge of grammar or punctuation, and using local context cues to interpret a word or phrase. The five top-down strategies found in the data included skimming for gist, connecting or relating information presented in various parts of the text, drawing an inference based on information presented in the text, using background knowledge to speculate beyond the text, and recognizing discourse format. Extended definitions of the strategies that emerged from the verbal reports are presented in Table 1.

Research question 2. Are there general trends/differences in the types and frequencies of reading strategies employed by each of these cultural/linguistic groups?

The coding schema captured definite patterns of similarities and differences among the Arabic- and Mandarin-speaking participants in the frequency of strategies they used when reading and answering the 32 CLBA reading questions. The total number of bottom-up and top-down strategies assigned to all the protocol segments for each participant is presented in Table 3. To facilitate the comparison of bottom-up and top-down reading strategies by language group and across participants, strategy frequencies were converted to percentages (i.e., the total number of times a given strategy was reported for each participant was divided by the sum of the total number of strategies reported for each participant and multiplied by 100).

Dominance of bottom-up strategy use. The patterns of strategy use inferred from the verbal reports revealed that both groups relied most heavily on two of the bottom-up strategies (i.e., B3—identifying synonyms or paraphrases, and B5—matching key vocabulary in the text to key vocabulary in the item; see Table 3): when answering the 32 CLBA reading items, the Arabic-speakers used B3 24.9% of the time (i.e., of the total 558 strategy segments, 139 were coded as B3–139/558=24.9%). In comparison, the Mandarin-speakers used B3 29.1% of the time (i.e., of the total of 762 strategy segments, 139 were coded as B3–222/762=29.1%). Regarding strategy B5, the Arabic-speakers used it 22.8% of the time, whereas the Mandarin-speakers used B5 24.3% of the time. Because a substantive analysis of the CLBA Reading

Table 3
Bottom-up, Top-down Strategy Frequencies (f) and Percentage (P) Scores for Each Participant and Language Group on the CLBA Reading Assessment

Strategy	*B1*		*B2*		*B3*		*B4*		*B5*		*B6*		*B7*		*T1*		*T2*		*T3*		*T4*		*T5*		*Total*
Participant	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*	*P*	*f*
Arabic 1	0	0	14	13.6	21	20.4	0	0	15	14.6	0	0	0	0	9	8.7	4	3.9	9	8.7	29	28.2	2	1.9	103
Arabic 2	1	1.1	10	11.4	28	31.8	2	2.3	34	38.6	0	0	0	0	1	1.1	3	3.4	6	6.8	1	1.1	2	2.3	88
Arabic 3	0	0	9	12.0	16	21.3	0	0	8	10.7	0	0	0	0	1	1.3	6	8.0	10	13.3	24	32.0	1	1.3	75
Arabic 4	0	0	7	09.2	20	26.3	0	0	17	22.4	0	0	0	0	4	5.3	6	7.9	5	6.6	15	19.7	2	2.6	76
Arabic 5	0	0	8	12.9	13	21.0	0	0	16	25.8	0	0	1	1.6	2	3.2	5	8.1	7	11.3	9	14.5	1	1.6	62
Arabic 6	0	0	12	17.4	18	26.1	0	0	19	27.5	0	0	1	1.4	2	2.9	4	5.8	9	13.0	4	5.8	0	0	69
Arabic 7	0	0	10	11.8	23	27.1	1	1.2	18	21.2	0	0	0	0	4	4.7	2	2.4	7	8.2	18	21.2	2	2.4	85
Total/Mean	1	0.2	70	12.5	139	24.9	3	0.5	127	22.8	0	0	2	0.4	23	4.1	30	5.4	53	9.5	100	17.9	10	1.8	558
Mandarin 1	0	0	12	13.6	18	20.5	1	1.1	28	31.8	0	0	2	2.3	3	3.4	6	6.8	10	11.4	6	6.8	2	2.3	88
Mandarin 2	2	2.3	12	13.6	24	27.3	0	0	15	17.0	0	0	5	5.7	2	2.3	6	6.8	10	11.4	10	11.4	2	2.3	88
Mandarin 3	1	1.2	10	12.2	22	26.8	2	2.4	16	19.5	0	0	2	2.4	2	2.4	5	6.1	11	13.4	8	9.8	3	3.7	82
Mandarin 4	1	0.8	13	10.2	55	43.0	2	1.6	20	15.6	3	2.3	1	0.8	3	2.3	9	7.0	5	3.9	13	10.2	3	2.3	128
Mandarin 5	0	0	15	14.9	23	22.8	0	0.0	30	29.7	2	2.0	2	2.0	7	6.9	1	1.0	5	5.0	16	15.8	0	0	101
Mandarin 6	0	0	12	12.1	28	28.3	2	2.0	29	29.3	1	1.0	1	1.0	3	3.0	1	1.0	11	11.1	7	7.1	4	4.0	99
Mandarin 7	0	0	10	9.3	29	27.1	2	1.9	36	33.6	0	0	1	0.9	2	1.9	6	5.6	14	13.1	3	2.8	4	3.7	107
Mandarin 8	0	0	14	20.3	23	33.3	2	2.9	11	15.9	0	0	2	2.9	4	5.8	3	4.3	6	8.7	1	1.4	3	4.3	69
Total/Mean	4	0.5	98	12.9	222	29.1	11	1.4	185	24.3	6	0.8	16	2.1	26	3.4	37	4.9	72	9.4	64	8.4	21	2.8	762

Note. Bottom-up strategies: B1—breaking lexical items into smaller parts, B2—scanning for details, B3—identifying synonyms or paraphrases, B4—matching key words to key visuals, B5—matching key vocabulary in the text to key vocabulary in the item, B6—using knowledge of grammar or punctuation, B7—using local context cues interpret a word or phrase. Top-down strategies: T1—skimming for gist, T2—connecting or relating information presented in different parts of the text, T3—drawing an inference based on information presented in the text, T4—using background knowledge to speculate beyond the text, and T5—recognizing discourse format.

Assessment questions conducted by three ESL experts (two had PhDs in linguistics, one had a master's in TESL, and all had extensive teaching experience) revealed that 18 of the 32 questions dealt primarily with lower-level skills that are presumed to elicit bottom-up strategies, it may be assumed that the structure and nature of the CLBA Reading Assessment promoted the use of bottom-up strategies over top-down ones. This finding lends support to Hill and Parry's (1989, 1992), and Purpura's (1997) conclusion that most ESL reading comprehension test questions require readers to search for specific details or facts, forcing them to focus on low-level linguistic cues, which tend to elicit bottom-up as opposed to top-down reading strategies.

Range and group comparisons of frequencies of strategy use. Further examination of the reading strategies employed by the two groups of ESL learners in Table 3 revealed that all the participants used most of the strategies identified in the strategy schema. However, none of the Arabic-speakers employed B6—using knowledge of grammar or punctuation, and only one Arabic-speaker used B1—breaking lexical items into smaller parts. This corresponds to the fact that the Arabic-speakers also used a greater percentage of top-down strategies than the Mandarin-speakers (38.7% vs. 28.9%, respectively, see Table 4). When the Arabic-speakers encountered comprehension problems, they often did not refer closely to the text; rather, they had a greater tendency than the Mandarin-speakers to rely on their own background knowledge or common sense, which is a top-down strategy (i.e., they selected options that made sense to them based on their personal experiences, not the information contained in the passages). In contrast, when the Mandarin-speakers encountered words or sentences that they did not understand, they were more likely to try to analyze them by focusing on low-level linguistic cues (i.e., orthographic, morphological, or syntactic cues), which reflect the use of bottom-up strategies.

An examination of the data in Table 3 also indicated that both groups used each of the following strategies more than 5.0% of the time: B2—scanning for details, B5—matching key vocabulary in the text to key vocabulary in the item, T3—drawing an inference based on information presented in the text, and T4—using background knowledge to speculate beyond the text. The most frequently used strategies in descending order for the Arabic-speakers were B3 (24.9%), B5 (22.8%), T4 (17.9%), B2 (12.5%), T3 (9.5%), and T2 (5.0%); whereas the most frequently used strategies in descending order for the Mandarin-speakers were B3 (29.1%), B5 (24.3%), B2 (12.9%), T3 (9.4%), T4 (8.4%), and T2 (4.9%). In addition, although there was a fair amount of variation in the two groups, on average the Mandarin-speakers applied a slightly wider range of strategies with greater frequency than the Arabic-speakers (i.e., the Mandarin-speakers had a tendency to use a wider range of the bottom-up strategies than the Arabic-speakers, and the mean number of

Table 4
CLBA Reading Scores Compared with the Percentage of Total Bottom-up and Top-down Strategies Used

Participant	*CLBA Score /32*	*% Total Bottom-up*	*% Total Top-down*
Arabic 1	10	48.5	51.5
Arabic 2	16	85.2	14.8
Arabic 3	15	44.0	56.0
Arabic 4	8	57.9	42.1
Arabic 5	19	61.3	38.7
Arabic 6	15	72.5	27.5
Arabic 7	11	61.2	38.8
Arabic *M*	13.4	61.3	38.7
Arabic *Mdn*	15.0		
Arabic *SD*	3.9		
Mandarin 1	23	69.3	30.7
Mandarin 2	21	65.9	34.1
Mandarin 3	23	64.6	35.4
Mandarin 4	22	74.2	25.8
Mandarin 5	16	71.3	28.7
Mandarin 6	26	73.7	26.3
Mandarin 7	26	72.9	27.1
Mandarin 8	16	75.4	24.6
Mandarin *M*	21.6	71.1	28.9
Mandarin *Mdn*	22.5		
Mandarin *SD*	3.9		

strategies used by the Mandarin and Arabic-speakers was 95 and 80 respectively).

Further comparisons of the strategies employed by the two groups in Table 3 indicated that both groups used similar percentages of strategies in several of the strategy categories (e.g., B2 almost 13.0% of the time; T2 almost 5.0% of the time; and T3 almost 9.0% of the time). However, a 2 x 2 Chi-square test of independence was performed to examine the relationship between group membership and frequency of strategy use. The relation between these variables was significant [χ (1, N=15) = 14.09, p<.001]. The Mandarin-speakers were more likely than expected to use bottom-up strategies (Mandarin 71.1% vs. Arabic 61.3%, see Table 4), and the Arabic-speakers were more likely than expected to use top-down strategies (Arabic 38.7% vs. Mandarin 28.9%). More specifically, the Arabic-speakers used T4—using background knowledge to speculate beyond the text—approximately 10.0% more often than the Mandarin-speakers (see Table 3). In contrast, the

Mandarin-speakers used B3—identifying synonyms or paraphrases approximately 4.0% more often than the Arabic-speakers. These differences in reading strategy use lend some support to Parry's (1993) conclusion that the knowledge of strategies and when to use them is probably influenced by individuals' experience of text, their written language, and the social process of learning to read.

Because the Arabic-speakers appeared to be weaker readers than the Mandarin-speakers, as demonstrated by the difference in their mean CLBA reading scores (Arabic 13.43/32=42.0% vs. Mandarin 21.63/32=67.6%, see Table 4 for mean CLBA reading scores), this may appear to support Wolff's (1987) and Hammadou's (1991) findings that differences in bottom-up and top-down strategy use are a function of language proficiency. However, Wolff's and Hammadou's conclusions that beginner foreign-language (FL)/English-as-foreign-language (EFL) learners have a tendency to rely on top-down rather than bottom-up processing strategies were based on results from native English-speakers studying French or Italian at an American university and native German-speakers studying English in Germany. The similarities between these Indo-European languages and cultures may have influenced how the language-learners approached the L2 texts. Furthermore, the participants in the current study were not novice ESL learners—they were all enrolled in intermediate ESL classes. Therefore, one could reason that the differential strategy use across groups in this study might be attributed to differences in the Arabic- and Mandarin-speakers' home country linguistic, cultural, and educational systems.

Individual strategy use comparisons across groups. An examination of the information in Table 3 case by case indicated that Arabic-speaker 1's verbal report (which was given mainly in English) contained a total of 103 bottom-up and top-down strategy segments. This total was the highest number of segments recorded for any of the Arabic-speakers and was spread over eight strategy categories; this participant did not use four of the strategies (i.e., B1—breaking lexical items into smaller parts, B4—matching key words to key visuals, B6—using knowledge of grammar or punctuation, and B7—using local context cues interpret a word or phrase). The strategies that Arabic-speaker 1 used at least 5.0% or more of the time when reading and answering the CLBA Reading Assessment items included B2—scanning for details, B3—identifying synonyms or paraphrases, B5—matching key vocabulary in the text to key vocabulary in the item, T1—skimming for gist, T3—drawing an inference based on information presented in the text, and T4—using background knowledge to speculate beyond the text. The strategy that this reader used to the greatest extent was T4—using background knowledge to speculate beyond the text (used 28.2% of the time). Interestingly, despite the heavy strategy use, this participant was the second lowest scoring Arabic-speaking participant on the CLBA Reading Assessment,

10/32=31.3% (see Table 4 for a comparison of the participants' CLBA scores and the total percentages of bottom-up and top-down strategies used).

In comparison, the Mandarin-speaker with the highest number of strategy segments recorded for any of the Mandarin-speakers was Mandarin-speaker 4. This participant's verbal report (which was given mainly in Mandarin) contained a total of 128 strategy segments that were spread over all 12 strategy categories. The strategies that Mandarin-speaker 4 used at least 5.0% or more of the time included B2—scanning for details, B3—identifying synonyms or paraphrases, B5—matching key vocabulary in the text to key vocabulary in the item, T2—connecting or relating information presented in diverse parts of the text, and T4—using background knowledge to speculate beyond the text. The strategy this reader used to the greatest extent was B3—identifying synonyms or paraphrases (used 43.0% of the time). This participant scored near the Mandarin participants' mean on the CLBA Reading Assessment (22/32=68.8%).

Although Arabic-speaker 5 had the lowest number of strategy segments recorded for any of the Arab participants, her score on the CLBA Reading Assessment (19/32=59.4%) was the highest in the Arab group. In contrast, Mandarin-speaker 8 had the lowest number of strategy segments (n=68) recorded for any of the Chinese participants and received the lowest CLBA reading score in the Chinese group (16/32=50.0%), whereas the other Chinese participant who also scored 50.0% on the CLBA Reading Assessment (i.e., Mandarin-speaker 5) had the third highest number of strategy segments (n=101) in the Chinese group.

Arabic-speaker 5's inferred strategy use, however, was contrary to the general Arab tendency to employ top-down strategies with a higher frequency than the Mandarin-speakers, as Arabic-speaker 5 used the highest percentage of bottom-up strategies (85.2%) and the lowest percentage of top-down strategies (14.8%) recorded for any of the participants in either of the groups (see Table 4). Interestingly, she was the youngest Arabic-speaker in the group, with the highest number of years of EFL study (i.e., 15 years), and the second highest score of the Arab participants on the CLBA Reading Assessment (19/32=59.4%). Another factor that may account for Arabic-speaker 5's contrary-to-group strategy use was that she was multilingual as she had also studied German in high school.

The relationship between accuracy on the CLBA reading questions and frequency of strategy use. The findings described above indicate that the degree of learner success may not be related to the frequency of strategy use, as the participants with the highest CLBA scores did not employ the greatest number of strategy segments. Rather, it appears that successful reading comprehension for both groups of ESL learners in this study was influenced by the appropriate selection and use of strategies. The Arabic learners, in particular, overrelied on their background knowledge (top-down strategy T4)

when answering the CLBA questions instead of applying appropriate reading strategies that would have assisted them in finding the correct answer. Therefore, it appears that less effective readers need to be taught how and when to use a variety of *appropriate* strategies when reading in English.

Preliminary Pedagogical Implications

Instructors working with Arabic-speaking and Chinese-speaking ESL learners can use a variety of techniques to help learners realize the value of strategies and to develop confidence in using a wide range of reading comprehension strategies that are appropriately matched to diverse reading tasks. One technique for helping students answer reading comprehension questions is to have them go through the process of explaining how they arrived at their answers. Justifying their answers helps the students to develop an awareness of the strategies they use when answering questions (i.e., metacognitive awareness) and often leads them to the realization that they have the wrong answer. Evidence of such self-correction was found in the verbal report data collected in the current study: while reporting retrospectively, 12 of the participants at some point realized they had chosen a wrong answer. These results substantiate the value of having students monitor their reading comprehension by reflecting on and verbalizing their thinking processes.

Strategy instruction designed to encourage Arabic- and Mandarin-speaking ESL learners to monitor and evaluate their reading strategy would probably benefit both groups of learners. However, because it is often extremely difficult to get people to change their ways (Argyris, 1970) or create new habits, it is necessary to create an environment where the teachers and students positively embrace strategies and make changes to their beliefs and values about strategy use. Because it may be difficult to get Mandarin-speakers to embrace particular top-down strategies or to get Arabic-speakers to value particular bottom-up strategies, the strategies taught should not only be perceived as useful, but should also be linked to effective performance on various tasks. For strategies to be perceived as beneficial, teachers and students must be convinced of their value. However, considering the wide linguistic and cultural variation found in many ESL classes, it may be difficult to convince all students of the value of certain types of strategies because they may resist developing strategies that have not been emphasized or are not traditionally accepted or valued by the education systems in their countries of origin.

Although the results of this study revealed that the Arabic-speakers employed a greater percentage of top-down strategies than the Mandarin-speakers, this did not necessarily indicate that the Arabic-speakers used those strategies successfully; their background knowledge interfered with their reading comprehension and caused them to choose an incorrect option

as their answer 14 times. Therefore, to ensure that the ESL readers who tend to rely on top-down strategies do not overrely on their background knowledge when answering reading comprehension questions, instructors and test developers should emphasize in their instructions that the examinees answer the questions based on the information in the reading passage, as reliance on their personal experiences may cause them to choose distracters that may reflect differences in their sociocultural knowledge and experiences.

Considering that most of the Arabic-speakers did not use the full range of bottom-up strategies, it seems logical to suggest that strategy instruction designed specifically to develop the following bottom-up strategies would be particularly beneficial for this group of ESL learners: (a) strategy B1—identifying English morphemes, recognizing their meaning in words, and using word formation rules to break words into the smallest units of language that carry information about meaning; (b) strategy B4—matching key words to key visuals; (c) strategy B6—using knowledge of grammar or punctuation to make meaning in sentences; and (d) strategy B7—using local context cues in the sentence to interpret a word or phrase.

Limitations and Implications for Future Research

Before concluding I identify the limitations of the present study and their associated implications for future research. First, the verbal report data were collected in a low-anxiety situation that had no real-life implications for the participants and therefore did not simulate actual testing conditions. Nonetheless, all the participants were genuinely motivated as they approached the task of answering the questions correctly with effort and persistence. Second, because the classification schema was developed from the strategies that were elicited by the CLBA items, it was not intended to be a comprehensive account of all possible bottom-up and top-down reading strategies. Nevertheless, it reflected the key mental operations that the participants in this study used when answering CLBA constructed-response and multiple-choice reading comprehension questions. Therefore, to develop a more complete reading strategy framework, further research needs to be conducted with other samples of Arabic- and Mandarin-speaking examinees and other linguistic/cultural groups across several proficiency levels of learners in a variety reading contexts.

One important implication stemming from the small, purposeful sample and its specificity of context is that attempts to generalize the findings to the general population of Arabic- and Mandarin-speaking ESL learners across Canada should be made cautiously. Research with larger samples is needed to examine the exact nature of the relationship between group differences in strategy-use frequency and reading test scores. This would allow for statistical tests to determine whether differences in strategy use have any effect on

performance. In addition, the strategies inferred from the verbal protocols do not comprise an exhaustive list of the full range of strategies that readers employ, only those that were elicited by the task of responding to the 32 CLBA reading items. Therefore, additional protocol analysis research with larger sample sizes and other types of reading tasks is necessary in order to explore group differences in strategy use and to extend the list of reading strategies used with these particular groups of ESL learners.

A further limitation of this study is that the act of having to report verbally while reading and answering the CLBA questions may have disrupted the participants' normal reading behaviors such that additional strategies were employed (Cohen & Scott, 1996). In addition, the participants' thought processes may not have been accessible or easily verbalized (Cohen & Scott), despite the fact that they had the option to report in their L1s. These issues reinforce the need to cross-check the data by using multiple data-collection procedures (i.e., triangulation). Further research comparing reading strategy data collected using multiple methods is clearly in order.

Conclusions

Although verification of the findings in this study by using larger sample sizes is necessary, some preliminary conclusions can still be drawn based on the findings. It appears that strategy use may indeed be a function of linguistic/cultural differences (Parry, 1993, 1996). The ESL learners in these two linguistic/cultural groups had particular reading strategy preferences that may have been related to their experiences with written language and the social process of learning to read (Parry, 1996). It may have been the case that the strategies the readers used for coping with the orthographic features specific to their L1s were transferred to L2 reading (Akamatsu, 2003; Hayes-Harb, 2006; Koda, 1988, 1989, 2000, 2005, 2007; Wang, Koda, & Perfetti, 2003).

The results also lend some support to the claim that instructional approaches may reinforce or encourage the use of bottom-up, word-level strategies over top-down, text-level strategies to overcome comprehension difficulties or vice versa (Kohn, 1992; Parry, 1996). For example, the structure of Chinese EFL textbooks and methods of teaching such as grammar translation and structural approaches to teaching EFL, where most of the teaching and communication is in the L1, probably tended to encourage the use of bottom-up strategies, whereas the exposure that the Arabic EFL students received to more communicative activities probably promoted the use of top-down reading strategies.

The results from this study also support Fender's (2003) and Hayes-Harb's (2006) findings, which implied that Arabic ESL learners use a more top-down approach to reading than ESL learners from non-alphabetic L1 backgrounds (e.g., Chinese). It is likely that the reduction of the extent of the

Arab readers' dependence on the visual stimulus in their L1 caused them to develop more effective top-down reading comprehension processes. These results indicate that Arabic- and Mandarin-speaking ESL students use reading strategies in varied ways, implying variable learning needs and pedagogical interventions for developing ESL reading proficiency.

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Appendix
Example Reading Comprehension Test Items

Instructions:

Please read the passage below and answer the following questions.

Environmental Issues

The environment has become an important issue in Canada and other parts of the world. Many scientists say that if we don't change our way of living, we will destroy the world. What happens in one country can affect the rest of the world.

One issue that has received a great deal of attention is global warming. Many scientists believe that the whole earth is becoming a giant greenhouse. The earth is surrounded by a blanket of gases called the atmosphere. The gases act like the glass in a greenhouse, trapping the heat from the sun. Recently, there has been a striking increase in certain gases, especially carbon dioxide, methane, and chlorofluorocarbons; these gases trap heat. Consequently the average temperature of the earth is rising, a trend called global warming.

Global warming is caused by the burning of fuels such as oil, coal, wood and gas; deforestation; vehicle exhaust; fertilizers; rotting garbage; and cattle digesting food. In fact, most things that consume energy contribute to the problem (e.g., air conditioning, heating, driving, and manufacturing). Canada has one of the worst records of the industrialized nations for producing greenhouse gases (only the United States and Luxembourg have worse records than Canada).

Global warming results in frightening consequences to the climate. A hotter earth means that ice caps in the polar region will melt, causing oceans to rise. Many islands will disappear under the water and coastal areas will be flooded. Studies estimate that 35% of Bangladesh will be under water by the year 2100. Many plants, fish and animals will be unable to survive the warmer temperatures. Some parts of the world will get less rain and crops will suffer.

In the summer of 2001, for example, the Prairies suffered the driest summer ever; many farmers had no crops and could not feed their animals.

The drought situation is even worse in Africa, where more and more land becomes desert every year. All countries contribute to the global warming problem, but the industrialized nations are the worst offenders.

In 1997, Canada along with another 160 countries, met in Kyoto, Japan to discuss how to reduce greenhouse gases around the world. The countries set targets for lower production of gases; the agreement to achieve these targets is called the Kyoto protocol. The Kyoto protocol was signed by Canada in 2002. Many politicians and business people are concerned that agreements such as the Kyoto protocol will result in job loss and a poor economy.[3]

Note. From *Being Canadian* (p. 94), by J. Cameron & T. Derwing, 2004 (2nd ed.), Saint-laurent, PQ: Pearson Longman ESL. Copyright 2004 by Longman. Reprinted with permission.

Questions: (Please circle the letter of the best answer).

1. The word *deforestation* in paragraph three means
   (a) deacidifying forests.
   (b) replanting forests.

(c) clearing forests.
(d) preserving forests.

2. The word *striking* in the second paragraph means
   (a) slight.
   (b) painful.
   (c) significant.
   (d) predictable.
3. Which of the following pictures represents a fuel that was specified in the passage?

(a)  (b)  (c)  (d) 

4. The primary cause of global warming is
   (a) fish farming.
   (b) heat from the sun.
   (c) the burning of fuels.
   (d) the melting ice caps.
5. Which of the following words is not similar in meaning to the word *consequence*?
   (a) outcome
   (b) result
   (c) effect
   (d) affect
6. The word *drought* in paragraph six means
   (a) dry.
   (b) rainy.
   (c) global.
   (d) political.
7. Which of the following would be the best subtitle for the article?
   (a) The Elimination of Chlorofluorocarbons
   (b) The Production of Greenhouse Gases
   (c) The Signing of the Kyoto Protocol
   (d) The Effects of Global Warming
8. What actions could be taken to slow down global warming?
   (a) intensified fertilizer use
   (b) reduced recycling
   (c) additional cattle
   (d) reduced driving
9. The reader cannot conclude that
   (a) the polar ice caps are melting.
   (b) Luxembourg consumes a lot of energy.
   (c) Canada has met the Kyoto Protocol target.
   (d) the drought conditions in Africa are very bad.
10. Which of the following is a consequence of global warming?
    (a) increasing energy consumption
    (b) increasing the death of plants
    (c) increasing world population

(d) increasing greenhouse gases

Please fill in the following blanks with the best answer.

11. Canada signed the Kyoto protocol in _____.
12. Bangladesh is a _____.