Reading Comprehension Ability and Metacognitive Awareness of Reading Strategies among High, Mid and Low Ambiguity Tolerance EAP Students

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Abstract

This study examined the differences among high, mid and low ambiguity tolerance groups in their reading comprehension ability and their metacognitive awareness of reading strategies. To this end, 123 first-year college students majoring in Engineering with an age range of 19-25 were stratified into three groups of high, mid and low ambiguity tolerance to participate in the study. They took part in the Nelson test of proficiency and a reading comprehension test and also filled out two questionnaires: the Metacognitive Awareness of Reading Strategies Inventory, and the Tolerance of Ambiguity Scale. The results showed significant differences between Low and High groups. That is, high ambiguity tolerance students scored higher on reading comprehension test, displayed higher metacognitive awareness of reading strategies, and showed higher perceived use of Global and Problem-Solving metacognitive reading strategies. However, no significant differences were found between the middle group and the other two groups in these variables. Also, no

significant difference was found in the use of Supportive strategies among these three groups. The findings are interpreted to have implications for syllabus designers and EFL teachers.

Key terms: Learning Styles, Tolerance of Ambiguity, Metacognitive Awareness, Reading Strategies, EAP Students

Introduction

The ability to read academic texts is considered one of the most important skills that university students need to acquire. Clearly, students have to deal with English extensively in their college studies. They are expected to read and understand various kinds of texts from paragraphs to passages and simplified articles. College students majoring in the fields of study other than EFL usually confront some serious problems in their academic texts.

As an example, rarely are learners able to guess the meaning of a new lexical item. These problems may stem from the fact that these students are usually unaware of effective reading strategies. Shih (1992) states that employing reading strategies requires thought and practice in a content approach. It seems when a student tries to think with a content-based strategy, they increase their metacognitive control over reading and studying process, so that they can use these strategies in academic content classes. However, the students' metacognitive control over reading comprehension process, even when they read texts of the same academic contents, differ greatly from one student to another. According to Oxford (1989), the use of learning strategies differs greatly in part because the general learning styles of students using them are so varied. The purpose of

this paper is, therefore, to report on a study which investigated the relationship between college students' awareness and perceived use of metacognitive reading strategies and their level of ambiguity tolerance as a personality style which, as Ely (1989) put it, significantly predicts students' choice of many learning strategies.

Metacognitive Reading Strategies

Recent research (Anderson, 2002; Cohen, 2003; Santana 2003) has shown that the strategies that mark the true difference between effective and ineffective learners are the metacognitive strategies. That is, the more a student knows about how s/he learns, the better learner s/he will be. Oxford (1990) defines *metacognitive strategies* as "actions which go beyond purely cognitive devices, and which provide a way for learners to coordinate their own learning process" (p.136). According to O'Malley and Chamot (1990), metacognitive strategies include selective attention to the task, planning self-monitoring, and self-evaluating. As applied to reading, these metacognitive strategies entail specifying a purpose for reading, planning how the text will be read, self-monitoring for errors in reading comprehension, and self-evaluating how well the overall objectives are being fulfilled, which allows for taking corrective measures if comprehension is not being achieved (Nebiela Dhieb, 2003).

Researchers consistently posit that metacognition plays an important role in reading. There appears to be a strong relationship between reading strategies used by readers, metacognitive awareness, and reading

proficiency. In essence, successful readers appear to use more strategies than less successful ones and also appear to use them more frequently.

Better readers also have an enhanced metacognitive awareness of their own use of strategies and what they know, which in turn leads to greater reading ability and proficiency (Baker and Brown, 1984; Garner, 1987).

After examining 38 research studies on native English speakers' reading, Pressley and Afflerbach (1995) theorized that proficient readers are strategic and "constructively responsive" and take conscious steps to comprehend what they are reading. Such steps involve a careful orchestration of the cognitive resources to ensure maximum comprehension. Nebila Dhieb (2003), in an investigation on the effectiveness of metacognitive strategy training for reading research articles in an ESP context, concluded that the students who received training did indeed benefit from it and confirmed the usefulness of training advanced level ESP students in a variety of reading styles so as to equip them with the flexibility required to operate under different real–life constraints.

Sheorey and Mokhtari (2001) also examined differences in the reported use of reading strategies of native and non-native English speakers when reading academic materials. Results of the study revealed that, first, both native and non-native students displayed awareness of almost all of the strategies included in the survey. Secondly, both groups attributed the same order of importance to categories of reading strategies in the survey, regardless of their reading ability or gender: *cognitive strategies* followed by *metacognitive strategies* and *support strategies*. Thirdly, both native and non-native high-reading-ability students showed comparable degrees of

higher reported usage of cognitive and metacognitive reading strategies than lower-reading-ability students in the respective groups, and while the native high-reading-ability students seemed to consider support reading strategies to be relatively more valuable than low-reading-ability students, non-native students attributed high value to support reading strategies, regardless of their reading ability level.

The Intersection between Language Learning Styles, Strategies and Tasks

Cohen (2003) believes that "language learning and language use strategies are not inherently 'good' or 'effective', but rather need to be evaluated in terms of their effectiveness for individual learners possessing differing style preferences, in the completion of given language tasks with their specific configuration of task characteristics" (p.282). Reiss (1985) has pointed out that the description of a good language learner relies on the learners' personality traits and characteristics. One important way in which personality type can affect learning outcomes is the manner in which learning style influences the type and extent of strategies used by learners.

Brown (1994) believes that learning strategies do not operate by themselves, but rather are directly tied to the learner's underlying learning styles and other personality-related variables in the learner. Oxford (2003) defines *styles* and *strategies* as factors which influence the student's ability to learn in a particular instructional framework. Researches such as Oxford and Ehrman (1988) and Ehrman and Oxford (1989) suggest that learning

style has a significant influence on students' choice of learning strategies, and that both styles and strategies affect learning outcomes.

Tolerance/Intolerance of Ambiguity

Reid (1995) has classified learning styles into three main categories: cognitive, sensory, and personality learning styles. One of the personality learning styles is *tolerance/intolerance of ambiguity*. An L2 situation can be considered *ambiguous* because of some characteristics like being *novel*, having *too numerous* cues to interpret, or being perceived as *unstructured* (Chapelle and Roberts, 1986; Brown, 1987). Oxford (1990) points out that "language learners are often overwhelmed by too much *newness*, different writing systems, unfamiliar vocabularies, confusing rules…" (p.136). A feature that helps learners to overcome uncertainties inherent in language learning is tolerance of ambiguity. Oxford (1990) explains that "with all this novelty, many learners lose their focus, which can *only* be regained by the conscious use of *metacognitive strategies* such as paying attention and overviewing/linking with already familiar material" (p.136).

Norton (1975) conceived of intolerance of ambiguity as "a tendency to perceive or interpret information marked by vague, incomplete, fragmented, multiple, probable, unstructured, uncertain, inconsistence, contrary, contradictory, or unclear meanings as actual or potential sources of psychological discomfort or threat" (p.608). Reiss (1985) found that students who considered themselves as good language learners viewed tolerance of ambiguity important to them. She concluded that a good

language learner is one who is, among other things, "fairly comfortable with ambiguity" (p.518). The learner who has high tolerance is defined by Chapelle and Roberts (1986) as one who can "function rationally and calmly in a situation in which interpretation of all stimuli is not clear" (p.30), while the learner who has low tolerance considers ambiguous situations "as sources of threat" (Budner, 1962, p.29). As part of a second/foreign language learning situation, reading is fraught with uncertainty (Bartholomae and Petrosky, 1986; Ruddell, 1991, Weaver, 1993). Foreign language learners seldom know the meanings of all words in a reading passage. Therefore, they may give up quickly when they independently read a passage containing some difficult words.

In a study done by Ely (1989) on students of Spanish at the university level, he tried to investigate the influence of tolerance of ambiguity on the use of second language learning strategies. It was found that strategies which focus on specific details are used more by students low in tolerance of ambiguity, while strategies which focus on understanding general meaning are utilized more by students who are high in tolerance of ambiguity. The predictions regarding tolerance of ambiguity received support from the findings of some, but not all, of the strategies. In the case of strategies involving reliance on the L1, tolerance of ambiguity was indeed a significant negative predictor of: looking for similarities between new words and L1 words and by looking up words in English right away when reading.

Tolerance of ambiguity, as hypothesized, was found to be a significant negative predictor of various strategies, which involves focusing on

individual language elements. For strategies involving overall meaning, tolerance of ambiguity did in fact prove to be a significant positive predictor for overall meaning in learning (Ely, 1989). According to Ely (1995), tolerance of ambiguity can be involved in strategy training, in which we not only have students practice a particular skill, but also prepare them to use the skill on their own in the future. It is probable that the students can become fairly proficient in using a particular skill in the classroom but still never employ it outside the classroom. El-Koumy (2000) examined differences in foreign language reading comprehension among high, mid, and low ambiguity tolerance of 150 EFL freshman university students in Egypt by using Norton's (1975) Measure of Ambiguity Tolerance (MAT-50) and a reading comprehension subtest of TOEFL and found that the moderate ambiguity tolerance group scored significantly higher than the low and high groups, and the low and high groups were not found to be significantly different. He concluded that a relationship may exist between ambiguity tolerance and learning strategies and that high, mid, and low ambiguity tolerance students may exhibit different learning strategies that could, in turn, lead to different rates of language learning success. Based on these results, he recommended that EFL students be helped to become moderate ambiguity tolerant students.

Despite the fact that many of the previous studies have obtained information about learners' use of metacognitive strategies and the reading process, the relationship between university students' metacognitive awareness of reading strategies and their level of ambiguity tolerance has not yet been investigated extensively. Therefore, the present research is

intended to fill this gap by reporting on a study which compared the metacognitive awareness of reading strategies of High, Mid and Low ambiguity tolerance EAP students to reveal how such behaviors influence foreign language reading comprehension. More specifically, this study seeks to find answers to the following research questions:

1. are there any significant differences in the subjects' mean scores on reading comprehension tests among high, mid and low ambiguity tolerance groups?

2. are there any significant differences in the subjects' use of metacognitive reading strategies among high, mid and low ambiguity tolerance groups?

3. are there any significant differences in the subjects' use of *Global* metacognitive reading strategies among high, mid and low ambiguity tolerance groups?

4. are there any significant differences in the subjects' use of *Problem-Solving* metacognitive reading strategies among high, mid and low ambiguity tolerance groups?

5. are there any significant differences in the subjects' use of *Supportive* metacognitive reading strategies among high, mid and low ambiguity tolerance groups?

Methodology

Participants

123 male and female first-year college students with the age range of 19-25 participated in this study. All the subjects were Iranian native speakers of Persian who were studying English as a foreign language. They were majoring in different fields of Engineering and attended ESAP (English for Specific Academic Purposes) courses during the first semester of 2008-2009 academic year. This sample was selected from Amir Kabir University of Technology in Tehran. The reason for this selection was that there were a sufficient number of students majoring in different fields of Engineering who were attending English courses to study academic texts at this university. Attempts were made to choose the subjects randomly from different fields of Engineering including Civil and Environment Engineering, Mining, Petroleum, Mechanical, Electrical, Industrial and Chemical Engineering. Therefore, the sample is hoped to be representative of Iranian students who are majoring in different fields of Engineering attending English as a foreign language for specific academic courses.

Instrumentation

Four instruments were used to collect the necessary data. First, to ascertain homogeneity of the participants of the study in terms of language proficiency, a general language proficiency Test (*The Nelson test, 300 B*) was utilized. The test was extracted from "Nelson English Language Tests"

by Fowler and Coe (1976). It comprised 50 multiple-choice grammar and vocabulary items.

Also, in order to test the students' reading comprehension ability of academic texts, an ESAP reading comprehension test developed for the purposes of this study was administered. The test consisted of four reading passages selected from "English for the Students of Engineering" by Bidahri et al. (2006). Each passage contained six questions. A pilot study was conducted to calculate the reliability of the reading test.

The present study also used a new self-report measure, the Metacognitive Awareness of Reading Strategies Inventory (MARSI) originally developed by Mokhtari and Reichard (2002), which was translated into Persian, and then pilot tested and administered to the subjects of the study. In developing MARSI, an attempt was made to draw on Pressley and Afflerbach's (1995) notion of constructively responsive reading, which appears to be quite consistent with recognized theories of reading such as Rosenblatt's (1978) reader response theory, in which the transaction between readers and texts is emphasized. The concept of constructively responsive reading also embraces key principles of the top-down processing model of reading reflected in schema theory (Anderson and Pearson, 1984), bottom-up text-processing strategies emphasized by Van Dijk and Kintsch (1983), and the comprehension monitoring processes advocated by several notable researchers in this line of inquiry (e.g., Baker and Brown, 1984; Garner, 1987; Paris and Winograd, 1990) which offer various strategies skilled readers use before, during, and after reading. Overall, in developing MARSI, the psychometric data demonstrated that

the instrument is a reliable and valid measure for assessing students' metacognitive awareness and perceived use of reading strategies while reading for academic purposes.

The original 30-item MARSI was designed to assess adolescent and adult readers' metacognitive awareness and perceived use of reading strategies while reading academic or school-related materials. It permits one to assess the degree to which a student is or is not aware of the various processes involved in reading and to make it possible to learn about the goals and intentions they hold when coping with academic reading tasks.

The students read each statement and rate how often they use the strategy described in the questionnaire items using a 5-point Likert-type scale ranging from 1 (*I never do this*) to 5 (*I always do this*). There are 3 strategy subscales or factors in this instrument: *Global* Reading Strategies, *Problem-Solving* Strategies, and *Support* Reading Strategies. The first factor (Global Reading Strategies) contained 13 items and represented a set of reading strategies oriented toward a global analysis of texts. The second factor (Problem-Solving Strategies) contained 8 items that appeared to be oriented toward strategies for solving problems when the text becomes difficult to read. These strategies provide readers with action plans that allow them to navigate through text skillfully. Such strategies are localized, focused problem-solving or repair strategies used when problems develop in understanding textual information. The third factor (Support Reading Strategies) contained 9 items and primarily involved use of outside reference materials, taking notes, and other practical strategies that might be described as functional or support strategies. Strategies such as these

serve a useful function for some students who seem to invoke them as needed. These strategies provide the support mechanisms aimed at sustaining responses to reading. These three types of strategies (Global, Problem-Solving, and Support Strategies) interact with each other and have an important influence on text comprehension. The information gleaned from the inventory serves as a catalogue of strategies students report using while reading academic or school related materials (Mokhtari and Reichard, 2002). As mentioned before, the original form of MARSI was in English. In order to eradicate any possible misunderstanding or confusion on the side of the subjects, the questionnaire was translated into Persian.

The translated version of the questionnaire was pilot tested and judged by several university instructors, before being administered.

The present study also used the Second Language Tolerance of Ambiguity Scale (SLTAS) developed by Khajeh (2003). She designed her questionnaire based on Ely (1989) and (McLain, 1993) and reported the reliability index of 0.83 and the validity of 0.85 for it. In order to extend Khajeh's questionnaire, it was decided to add some more items to it.

Therefore, on the basis of eight more characteristics of an ambiguous situation defined by Norton (1975) including *unexpected, incomplete, unstructured, fragmented, contrary, probable, uncertain,* and *vague* situations, which were not mentioned in the original questionnaire developed by Khajeh (2003), eight more items (23-30) which were appropriate in the foreign language context were constructed for the purposes of the present research.

The Pilot Study

As mentioned earlier, a pilot study was conducted on 32 students in order to calculate the reliability of the tests. The achieved reliability of the Nelson Test and the reading comprehension test using KR-21, were found to be 0.72 and 0.73, respectively. Also with the help of the Nelson test and by running a correlation between these scores and those obtained from the reading test, the concurrent validity of the reading comprehension test was found to be 0.71. To ensure the clarity of the translated version of (MARSI), some experts were requested to judge it. As a result, some translated items underwent changes. Then, some students, similar to the subjects of the main sample, were asked to read the items carefully to identify the items whose meanings were unclear. After being refined, it was administered to 42 students for estimating the reliability by applying the Cronbach alpha (*a*) formula which was found to be 0.79. In order to estimate the reliability of the 8 added items to the 22-item Ambiguity Tolerance Scale developed by Khajeh, 42 students answered the extended 30-item questionnaire. Then, the scores obtained on the 22 items were correlated with the scores obtained on the whole 30 items. The results showed a significant correlation of 0.85. Also, using the Cronbach alpha (*a*) formula, the reliability of the 30 item questionnaire was estimated to be 0.84. This showed that the added items had worked well because the achieved reliability increased from 0.83 in the previous questionnaire to 0.84 in the extended one.

Procedure

A total of 218 students answered the proficiency test in one session and the reading comprehension test in a subsequent session. All students were tested together with a time constraint of twenty minutes on the reading comprehension test. Then, two questionnaires were completed at the third session. For scoring the Metacognitive Awareness of Reading Strategies Inventory, the procedure proposed by Mokhtari and Reichard (2002) was used. A score was assigned to each answer which ranged from 1 to 5. The range of scores for this scale was between 30 and 150 (mean of 1 to 5). The interpretation of the information derived from the instrument was based on the interpretation schemes used in published studies (e.g., Henk and Melnick, 1995; Oxford, 1990). In examining the reading strategy usage of individual and groups of students on the MARSI, which ranges from 1 to 5, three levels of usage were identified, as suggested by Oxford for language learning strategy usage: high (mean of 3.5 or higher), medium (mean of 2.5 to 3.4), and low (2.4 or lower). These usage levels provide a helpful standard that can be used for interpreting the score averages obtained by individual or groups of students. The scores obtained should be interpreted using the high, moderate, and low usage designations shown on the scoring rubric that accompanies the scale. These usage designations are based on the average performance of the students (the norm group) that was used to validate the MARSI.

For correcting the tolerance of ambiguity scale the procedure proposed by Ely (1995) was used. The range of scores for the Tolerance of Ambiguity

Scale was between 30 and 180. The higher the score, the more tolerant the learners are of foreign language ambiguities. Based on the ultimate scores, the students were then stratified into three groups with three ambiguity tolerance levels (high, middle, and low). Each subject was classified to his/her ambiguity tolerance level, as defined and operationalized by Norton (1975) in the following way: a subject with a score greater than one standard deviation from the mean on the Tolerance of Ambiguity Scale was defined as a high ambiguity tolerance subject; a subject with a score less than one standard deviation from the mean on the Tolerance of Ambiguity Scale was defined as a low ambiguity tolerance subject; and a subject with a score within half a standard deviation around the mean was defined as a middle ambiguity tolerance subject. From each group, a random selection of 41 subjects was made to participate in the study. For scoring the Metacognitive Awareness of Reading Strategies Inventory, the procedure proposed by Mokhtari and Reichard (2002) was used.

Results

The *first research question* was concerned with the differences in the mean scores on the reading comprehension test among high, mid and low ambiguity tolerance groups. A one-way ANOVA was run to compare the reading comprehension scores of these three groups, the results of which are presented in Table 1.

Table 1. One-way ANOVA for the reading comprehension test of ambiguity tolerance groups

ANOVA Reading Comprehension					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	96.40	2	48.20	5.66	.004
Within Groups	1020.29	120	8.50		
Total	1116.69	122			

As illustrated in Table 1, the F-observed value is 5.66. This amount of F-value at 2 and 120 degrees of freedom is greater than the critical value of F, i.e. 3.08. Based on these results it can be concluded that the first null-hypothesis stating that there is no significant difference in the mean scores on the reading comprehension test among high, mid, and low ambiguity tolerance groups is rejected. In other words, there are significant differences in the mean scores on the reading comprehension test among these groups.

To locate the differences among these three groups, the post-hoc Scheffe's test was run, the results of which are displayed in Table 2.

Table 2. Post-hoc Scheffe's test for the reading comprehension test of ambiguity tolerance groups

Multiple Comparisons Dependent Variable: Reading Comprehension Scheffe						
(I) ATTOTAL	(J) ATTOTAL	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
High	Mid	.80488	.64401	.460	-.7914	2.4011
	Low	2.14634(*)	.64401	.005	.5501	3.7426
Mid	High	-.80488	.64401	.460	-2.4011	.7914
	Low	1.34146	.64401	.119	-.2548	2.9377
Low	High	-2.14634(*)	.64401	.005	-3.7426	-.5501
	Mid	-1.34146	.64401	.119	-2.9377	.2548
*The mean difference is significant at the .05 level.						

Based on the results it can be concluded that the difference between the mean scores of the High and Low Ambiguity Tolerance groups is significant. The High Ambiguity Tolerance students with a mean score of 17.46 outperformed the Low Ambiguity Tolerance group whose mean score was 15.31. Also the Middle group with a mean score of 16.65 scored lower than the High group and higher than the Low group. However, the difference between the mean score of the Middle group and the other two groups was not found to be significant.

In order to probe the *second research question* dealing with the differences in the total scores on Metacognitive Reading Strategies Inventory (MARSI) among high, mid and low ambiguity tolerance groups, a one-way ANOVA was run to compare these three groups' total scores on MARSI. The results are presented in Table 3.

Table 3. One-way ANOVA for the total scores on metacognitive reading strategies of ambiguity tolerance groups

ANOVA METATOTAL					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3640.50	2	1820.25	8.18	.000
Within Groups	26691.90	120	222.43		
Total	30332.40	122			

As displayed in Table 3, the F-observed value is 8.18. This amount of F-value at 2 and 120 degrees of freedom is greater than the critical value of F, i.e. 3.08. Thus, it can be concluded that the second null-hypothesis stating that there are no significant differences in the mean scores of MARSI among high, mid and low ambiguity tolerance groups is rejected. That is to say, there is a significant difference in the mean scores on MARSI among these groups.

Next, the post-hoc Scheffe's test was run to locate the differences, as illustrated in Table 4.

Table 4. Post-hoc Scheffe's test for total scores on metacognitive reading strategies of ambiguity tolerance groups

Multiple Comparisons Dependent Variable: METATOTAL Scheffe						
(I) ATTOTAL	(J) ATTOTAL	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
High	Mid	7.46341	3.29399	.081	-.7011	15.6280
	Low	13.29268(*)	3.29399	.000	5.1281	21.4572
Mid	High	-7.46341	3.29399	.081	-15.6280	.7011
	Low	5.82927	3.29399	.213	-2.3353	13.9938
Low	High	-13.29268(*)	3.29399	.000	-21.4572	-5.1281
	Mid	-5.82927	3.29399	.213	-13.9938	2.3353
* The mean difference is significant at the .05 level.						

On the basis of these results, it can be concluded that there is a significant difference between the mean scores of the High and Low Ambiguity Tolerance groups. The students in the High group with a mean score of 106.80 outperformed the Low group whose mean was 93.51. Also, the Middle group with a mean score of 99.34 scored lower than the High group and higher than the Low group, but the difference between the mean score of the Middle group and the two other groups was not found to be significant.

In order to investigate the *third research question* exploring the significant differences in the mean scores on Global Metacognitive Reading Strategy use among high, middle and low ambiguity tolerance groups, a one-way ANOVA was run to compare these three groups' mean scores, as shown in Table 5.

Table 5. One-way ANOVA for the global metacognitive reading strategies of ambiguity tolerance groups

ANOVA METAGLOB					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.828	2	2.414	7.41	.001
Within Groups	39.055	120	.325		
Total	43.883	122			

As displayed in Table 5, the F-observed value is 7.41. This amount of F-value at 2 and 120 degrees of freedom is greater than the critical value of F, i.e. 3.08. Therefore, it can be concluded that the third null-hypothesis stating that there are no significant differences in the mean scores on Global strategies in MARSI among high, mid and low ambiguity tolerance groups is rejected. In other words, there is a significant difference in the mean scores on Global strategies among these groups.

Next, the post-hoc Scheffe's test was run to locate the differences, as illustrated in Table 6.

Table 6. Post-hoc Scheffe's test for the global metacognitive reading strategies
of ambiguity tolerance groups

Multiple Comparisons **Dependent Variable: METAGLOB** **Scheffe**						
(I) ATTOTAL	**(J) ATTOTAL**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
High	Mid	.28293	.12600	.085	-.0294	.5952
	Low	.48293(*)	.12600	.001	.1706	.7952
Mid	High	-.28293	.12600	.085	-.5952	.0294
	Low	.20000	.12600	.287	-.1123	.5123
Low	High	-.48293(*)	.12600	.001	-.7952	-.1706
	Mid	-.20000	.12600	.287	-.5123	.1123
* The mean difference is significant at the .05 level.						

According to these results, it can be concluded that the difference
between the mean scores of the High and Low ambiguity tolerance groups is
significant. The High ambiguity tolerance students with a mean score of
3.61 (high usage level) outperformed the Low ambiguity tolerance group
whose mean was 3.13 (moderate usage level). Also, the Middle group with a
mean score of 3.33 scored lower than the High group and higher than the
Low group. However, the difference between the mean score of the Middle
group and the other two groups was not found to be significant.

In order to investigate the *fourth research question* exploring the
significant differences in the mean scores on Problem-Solving strategies in

MARSI among high, mid and low ambiguity tolerance groups, a one-way ANOVA was run to compare these three groups, as displayed in Table 7.

Table 7. One-way ANOVA for the problem-solving metacognitive reading strategies of ambiguity tolerance groups

ANOVA METAPROB					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.47	2	2.23	6.64	.002
Within Groups	40.44	120	.33		
Total	44.92	122			

As shown in Table 7, the F-observed value is 6.64. This amount of F-value at 2 and 120 degrees of freedom is greater than the critical value which is F, 4. 79[1]. Based on these results it can be concluded that the *fourth* null-hypothesis stating that there is no significant difference in the mean scores on Problem-Solving Metacognitive Reading Strategies test among high, mid and low ambiguity tolerance groups is rejected. That is to say, there is a significant difference in the mean scores on Problem-Solving strategies among these groups.

Next, the post-hoc Scheffe's test was run to locate the differences, as shown in Table 8.

[1.] It should be noted that a .01 level of significance is employed in this section because the three groups do not enjoy homogeneous variance. Please refer to Pallant (2001, p.213).

Table 8. Post-hoc Scheffe's test for the problem-solving metacognitive reading strategies of ambiguity tolerance groups

Multiple Comparisons Dependent Variable: METAPROB Scheffe						
(I) ATTOTAL	(J) ATTOTAL	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
High	Mid	.20000	.12823	.300	-.1178	.5178
	Low	.46585(*)	.12823	.002	.1480	.7837
Mid	High	-.20000	.12823	.300	-.5178	.1178
	Low	.26585	.12823	.121	-.0520	.5837
Low	High	-.46585(*)	.12823	.002	-.7837	-.1480
	Mid	-.26585	.12823	.121	-.5837	.0520
* The mean difference is significant at the .05 level.						

The results demonstrated that the difference between the mean scores of the High and Low Ambiguity Tolerance groups is significant. The High group with a mean score of 3.96 (high usage level) outperformed the Low group whose mean is 3.45 (moderate usage level). Also, the Middle group with a mean score of 3.76 scored lower than the High group and higher than the Low group. But the difference between the mean score of the Middle group and the other two groups was not found to be significant.

In order to investigate the *last research question* exploring the significant differences in the mean scores on Supportive strategies in

MARSI among high, middle and low ambiguity tolerance groups, a one-way ANOVA was run to compare these three groups' mean scores on these strategies, as displayed in Table 9.

Table 9. One-way ANOVA for the supportive metacognitive reading strategies of ambiguity tolerance groups

ANOVA METASUP					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.97	2	.98	2.42	.093
Within Groups	48.99	120	.40		
Total	50.97	122			

As illustrated in Table 9, the F-observed value is 2.42. This amount of F-value at 2 and 120 degrees of freedom is lower than the critical value of F, i.e. 3.08. Thus, it can be concluded that the fifth null-hypothesis stating that there is no significant difference in the mean scores on Supportive Metacognitive Reading Strategies among three groups is supported. That is to say, there are no significant differences in the mean scores on Supportive strategies among these three groups. High, Mid, and Low groups scored 2.96, 2.76, and 2.66 (moderate usage level) respectively on Supportive Metacognitive Reading Strategies.

To sum up, the results of data analyses revealed that there are significant differences in the reading comprehension scores, the metacognitive awareness of reading strategies (MARSI), and the use of two

categories of these strategies *(Global* and *Problem Solving)* among high and low ambiguity tolerance groups, but not between the Middle group and the other two groups. Also, no significant difference was found in using supportive strategies among the three groups of ambiguity tolerance.

Discussion

This study was an attempt to investigate the differences in the metacognitive awareness of reading strategies (MARSI) and in subscales of these strategies among high, mid and low ambiguity tolerance groups of Iranian students majoring in different fields of Engineering and attending English courses to study specific academic texts.

Regarding the reliability and validity of the extended version of Ambiguity Tolerance questionnaire, statistically speaking, it was found that the added items in this study worked well in increasing the reliability index of the questionnaire used by Khajeh (2003). Therefore, the scale was found to be a highly reliable instrument to measure the ambiguity tolerance level of Iranian students attending ESAP classes.

The findings of this study can be compared and contrasted with those of other researches. For instance, regarding the relationship between the mean scores on reading comprehension test among high, mid and low ambiguity tolerance groups, El-Koumy (2000) discovered that the moderate ambiguity tolerance group scored significantly higher than the low and high groups, and the low and high groups were not found to be significantly different.

Findings of the present study, however, revealed that high ambiguity tolerance students significantly outperformed the low group.

Although no significant difference was found between the mean scores of the middle ambiguity tolerance students and the other two groups, this group scored lower than the high group and higher than the low group. The differences in the results of the present study and the study conducted by El-Koumy, (2000) can be attributed to different university majors of the participants of the two studies. It seems that students who study in majors other than EFL at the university level, such as Engineering students, need higher level of ambiguity tolerance than EFL students to deal with English texts in their college studies. This may be due to the fact that while students read texts for academic purposes, they are engaged with both "subject-content" of what they read and "the language in which it is expressed". In other words, reading academic texts in a content-based approach seems to require higher level of ambiguity tolerance.

The results of the present study also revealed that high, mid, and low ambiguity tolerance students exhibited different awareness of reading strategies that could, in turn, lead to different rates of reading comprehension success. It was shown that the higher the students are ambiguity tolerant, the more they are aware of metacognitive reading strategies. Therefore, it can be suggested that the more the students are aware of metacognitive reading strategies, the less they lose their focus in ambiguous language learning situations while reading. These finding are in line with Oxford's (1990) view stating that language learners are often overwhelmed by too much newness, different writing systems, unfamiliar

vocabularies and confusing rules which make language learning situations ambiguous. Oxford (1990) believes that "with all this novelty, many learners lose their focus, which can *only* be regained by the conscious use of *metacognitive strategies* such as paying attention and overviewing/linking with already familiar material" (p.136).

The results of the present research are also in agreement with those of previous studies which have shown that better readers have an enhanced metacognitive awareness of their own use of strategies and what they know, which in turn leads to greater reading ability and proficiency (Baker and Brown, 1984; Garner, 1987; Baumann, Jones and Seifert-Kessel, 1993; Pressley and Afflerbach, 1995; Sheorey and Mokhtari, 2001). That is, if a reader is aware of what is needed to perform effectively, then it is possible to take steps to meet the demands of a reading situation more effectively. If, however, the reader is not aware of his or her own limitations as a reader or of the complexity of the task at hand, then the reader can hardly be expected to take actions to anticipate or recover from difficulties (Carrell et al., 1989).

The results of the present study, in line with Ely (1989), revealed that high ambiguity tolerance students used *Global* metacognitive reading strategies more than low ambiguity tolerance students. According to Mokhtari and Reichard (2002) *Global strategies* are as a set of generalized, intentional reading strategies oriented toward a global analysis of text that aim at setting the stage for the reading act (e.g., setting purpose for reading, making predictions). These strategies, as explained by Ely (1989), focus on understanding general meaning and are utilized more by students who are

high in tolerance of ambiguity. As an example, high ambiguity tolerance students think more about their reading purpose, or try to skim the text first by noting characteristics like length and organization. They decide what to read closely and what to ignore and instead use tables, figures and pictures in the text to increase their understanding. They also know how to use contextual clues to help them better understand what they are reading.

Also, high ambiguity tolerance students in the present study proved to use *Problem-Solving* strategie*s* more than the low group who showed *moderate* use of these strategies. Thus, it can be concluded that when problems arise in understanding textual information, students with high level of ambiguity tolerance use *Problem-Solving* strategie*s* more than the low group. As an example, when text becomes difficult to read, instead of focusing on details, these students re-read the text to increase their understanding. They also check their understanding when they come across conflicting information. Moreover, they are more able to guess the meaning of unknown words or phrases than low ambiguity tolerance students.

Therefore, it can be concluded that high ambiguity tolerance students, that are more aware of metacognitive reading strategies, use *Global and Problem-Solving* strategies more effectively and flexibly than the low ambiguity tolerance students. These finding are in line with studies which have shown that skilled readers who use metacognitive strategies more, are those who can monitor their reading comprehension by considering the reading objectives, adjusting their reading rates, and use strategies more *effectively* and *flexibly* than less skilled readers (Paris and Meyers, 1981; Sheorey and Mokhtari, 2001).

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With respect to the use of *Supportive* strategies, no significant difference was found between high, mid and low ambiguity tolerance students. Therefore, it can be concluded that level of ambiguity tolerance does not influence the university students' awareness and use of *Supportive* strategies while reading academic texts. Students from all levels of ambiguity tolerance were found to be moderately aware of these strategies and used them when needed. As an example, almost all of them reported to make moderate use of reference materials such as dictionaries and other support systems, underline or circle information in the text to help them remember it, and take notes while reading to help them understand what they read. These strategies, as Mokhtari and Reichard (2002) point out, serve a useful function for some of the students who seem to invoke them as needed and provide the support mechanisms aimed at sustaining responses to reading.

Conclusion and Pedagogical Implications

In this study, one of the sources of individual differences in relation to the metacognitive awareness of reading strategies by ESAP readers was investigated. It was attempted to explore the relationship between the personality factor of "Tolerance of Ambiguity", the students' reading comprehension ability, and their metacognitive awareness of reading strategies. The results showed significant differences between high and low ambiguity tolerance students; however, no significant differences were found between the Middle group and the two other groups. It was found

that when the level of ambiguity tolerance increases the students show more metacognitive awareness of reading strategies, and score higher on reading comprehension tests.

With respect to the use of the three categories of strategies in MARSI (i.e. *Global, Problem-solving, and Supportive* strategies), high and low ambiguity tolerance students were found to be significantly different in the use of *Global and Problem-solving* strategies, which were used by the High group more. However, no significant difference was found between the Middle group and the other two groups in the use of these types of strategies. Also, no significant differences were found in the use of *Supportive* strategies among the three groups. It was found that when ambiguity tolerance level increases the students use these strategies more.

Based on these results, it can be concluded that there is a meaningful relationship between the students' level of Ambiguity Tolerance, their metacognitive awareness of reading strategies, and their performance on reading comprehension tests. It can also be concluded that, as Ely (1989) discovered, students' level of Ambiguity Tolerance influences their choice of strategies. Thus, there is a pressing need on the part of teachers to instruct directly and indirectly all kinds of metacognitive reading strategies regarding the students' level of ambiguity tolerance. Teachers should make low ambiguity tolerance students more aware of metacognitive reading strategies, with more emphasis on *Global* strategies. The increase of this awareness may, in turn, result in an increase in the level of ambiguity tolerance in these students when reading.

Finally, it is worth mentioning that the relationship demonstrated here is only part of a complex picture, which reveals just some of the factors operating in the mind of our students that warrant investigation. The findings of the present study demonstrated that learners who are highly tolerant are likely to use metacognitive reading strategies more frequently.

However, it should be mentioned that the relationship between language learners' styles and strategies is a highly complex issue. Therefore, metacognitive strategy awareness may not be just an outcome of decreased intolerance; rather, we need to investigate other types of learning strategies and styles and look at what helps students to decrease their ambiguity intolerance and increase their metacognitive awareness.

The central implication of the present study, confirming Ely (1989), concerns the way in which teachers view and present language learning strategies. Although some teachers are now becoming aware of the need to recommend particular strategies to their students (for example, saying "be sure to look for overall meaning when you read"), often little thought is given to individual *learning style* and personality characteristics. The present study demonstrated a deeper dimension to the problem of strategy instruction. It appears that teaching language behavior is not merely to be accomplished by making students aware of a strategy and its potential benefits, encouraging them to use it, and providing opportunities to do so.

Teachers should also become aware of (and take into account) underlying personality factors and individual differences which may influence the students' perceived use of strategies. As we become more knowledgeable about the personal characteristics of our students that may

promote or inhibit the adoption of various learning processes, we will move more quickly toward helping our students to become good language learners.

The most important way we can use the result of a tolerance of ambiguity instrument is to help our students come to grips with the psychological crosscurrents that they feel in the L2 learning process. To do this, the teacher should take two steps. The first step is to raise the students' consciousness about uncertainty. After consciousness raising, the next step is empowerment which relates to helping students to make changes in their feelings about uncertainty. To do this, students need to view language uncertainty in a more positive light. Learners should discover that uncertainty is really an opportunity to discover something new about the L2.

To help students realize this, the teacher can have learners participate in activities and tasks characterized by uncertainty and show them, step by step, how each instance of uncertainty can be used for progress in L2 acquisition. The real goal in this activity is to have students move from feeling embarrassed or unhappy in a linguistic uncertain situation to seeing himself or herself as a linguistic researcher or problem solver.

Teachers can also help low ambiguity tolerance students through creating classroom atmospheres in which these students can make more risks without fear of failure, or criticism from the teacher or other students.

Also, the results of the present study showed that the students' with high ambiguity tolerance level have a higher level of metacognitive awareness of the reading strategies they use. This implies that teachers

should make low ambiguity tolerance students more aware of metacognitive strategies which may, in turn, increase their level of ambiguity tolerance.

The results of the present study also showed that low ambiguity tolerance students usually use Global strategies (which focus on understanding general meaning of the text) less than students with high level of ambiguity tolerance. This implies that teachers should make low ambiguity tolerance students more aware of Global strategies. The increase of this awareness can, in turn, result in an increase in the level of ambiguity tolerance in these students when reading.

Also making these students aware of the clues for intelligent guessing seems to be helpful to increase their level of ambiguity tolerance.

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