

# **L2 Learners' Lexical Inferencing: Perceptual Learning Style Preferences, Strategy Use, Density of Text, and Parts of Speech as Possible Predictors**

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## **Abstract**

This study was intended first to categorize the L2 learners in terms of their learning style preferences and second to investigate if their learning preferences are related to lexical inferencing. Moreover, strategies used for lexical inferencing and text related issues of text density and parts of speech were studied to determine their moderating effects and the best predictors of lexical inferencing. To this end, a posttest group design with 142 students studying engineering was adopted for the study. Perceptual style preferences questionnaire was administered to identify the students' major learning styles, followed by strategy training for deriving the meaning of unknown words. Finally, lexical inferencing texts were given to the students to study and extract the meaning of unknown words and concurrently determine the type of strategy used for lexical inferencing. The results indicated that a great proportion of students belonged to the kinesthetic category of styles while the predominant treatments in the class were audio-visually structured. The analysis also revealed that tactile, kinesthetic, and group categories of style preferences are meaningfully related. Moreover, it was found that learning style preferences lead to statistically different lexical inferencing. As for the strategies, the 'syntactic knowledge analysis' showed the highest correlation with 'auditory learners'. Lexical density and parts of speech were also shown to moderate the effect of perceptual style preferences on lexical ability. On the whole, strategy and perceptual style preferences were found to be the two best predictors of successful lexical inferencing.

**Keywords:** L2; lexical inferencing; parts of speech; preferences in perceptual learning styles; strategy training; text density

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## INTRODUCTION

One important cognitive process in reading comprehension is inferencing (Nassaji, 2002, 2003a, 2003b; Whitney, 1987). Inferencing is defined as the efforts that people make in extracting the meaning from a text (Nassaji, 2006). Inferencing as a cognitive process prevails in the act of reading comprehension both in L1 and L2 and is achieved through different strategies such as linking the text with background knowledge, establishing connections between different parts of the text, looking for cohesion and coherence within the text as well as making informed guesses about the unknown vocabulary items (Graesser & Zwaan, 1995; Haastrup, 1991; Kintsch, 1988). L2 learners may face the vocabulary challenges for the interpretation of the texts as vocabulary makes up a sizable portion of any text. Thus, learners account for the inadequacy of their lexicon through either communication strategies if they are involved in the production of the language or through inferencing strategies if they face comprehension problems associated with unknown words (Haastrup, 1991). Inferencing, in general, is an essential task in the context of foreign language learning, and learners engage in lexical inferencing whenever they fail to grasp the meaning of a new word appearing in the text in question.

Lexical inferencing as an important comprehension process employs a host of both linguistic and non-linguistic signs to guess meanings of the unknown words of the text (Oxford, 1990). Parel (2004) views it as a compensation strategy for low receptive vocabulary reservoir in the face of lexical demands of the text. Lexical inferencing, however, is part of strategic competence of the learners (Schmitt & Zimmerman, 2002) that cannot be fulfilled independently of the context, text, or learner. The studies dealing with the strategy training have shown that contextual clues, though sometimes effective, are restricted in their efficacy and often fail to lead to successful guessing of meanings. Hue and Nation (2000) have shown that text-related issues such as the density of words and parts of speech of words play an important role in understanding the texts. Some other crucial factors which might affect lexical inferencing include the types of reading tasks, reading profiles of readers (Levine & Reves, 1998, Shen, 2010), and strength of the clues used in the texts (Frantzen, 2003).

Though a variety of factors have been recognized to affect how learners cope with the problem of inferring unknown words, it is undeniable that different learners do not tackle the problems in a similar manner. They learn variably and act differently through their own preferred learning modes. In other words, learners are individually different and thus respond to learning environments in conformity with their individual differences. One element that has rarely been considered in the studies on lexical inferencing concerns learners' perceptual learning styles. In fact, perceptual learning styles determine the way learners approach the challenges of learning tasks and can function as screening tools making it possible for instructors to gear their instructional resources to learners' different learning inclinations. In this line of thinking, Shen (2010) believes that learning preferences can make a difference in lexical inferencing because learners can adjust themselves for learning in line with their potentials. Ely (1995), Ehrman (1999), and Obralic and Akbarov (2012) also argue that learning styles can be a predictor of a foreign language learning, in particular the lexical items. Due to the significance of learners' styles in lexical inferencing and language learning, which can help maximize the benefits of pedagogical programs, and because of paucity of research in this particular area, the present study seeks to discover if individual differences in the EFL learners' perceptual styles have any bearing on the L2 lexical inferencing. Further, the study intends to delve into the way perceptual styles may moderate the use of strategies for lexical inferencing. The way learners' perceptual styles interact with text density and parts of speech in lexical inferencing was also addressed in this research. This study was in fact undertaken to substantiate the issues of concern and their possible interactional effect more vividly.

## **LITERATURE REVIEW**

Generally, learning is defined as integrating a number of different cognitive, emotional, and environmental abilities to acquire, enhance, and modify one's knowledge of the world views (Illeris, 2004). It is also agreed that learning as a process of transforming one's experiences into knowledge is strongly associated with the way individual learners independently explore, acquire, retain, and retrieve information (Peacock, 2001). Quite a few researchers have stressed that individual learners may be characteristically different and require to be differentially treated. Felder, Felder, and Dietz (2002) argue that learners

have different strengths and weaknesses, skills and interests, and that the way learners view the instructional programs must be directed in such a manner that their learning needs are effectively met. Funderstanding (2008) ascribes such individual differences to both heredity and upbringing which necessitate special methods of accommodation. Tripp and Moore (2007) and Gilbert (2000) believe that learners, depending on their preferences, may focus on facts, data, and algorithms, and respond to different types of activities, which all should be accounted for in a well-designed program.

This individuated view of learning has attracted increasing attention in the context of foreign language learning because learning a foreign language, i.e., English, has so far culminated in divergent results on the parts of individuals, which could not be accounted for simply through the contextual, social, and pedagogical plans. The wide variation in the results of foreign language learning as such is attributed to the individual differences which are represented through some different categories of learning styles.

As one aspect of individual differences, learning style is defined by Keefe (1979) as those cognitive, affective, and even physiological characteristics which are relatively invariable and indicate how learners perceive, interact with, and respond to their learning milieu. In other words, learning styles refer to both nature and nurture based manners through which individuals can act on their environment, thus modifying and using it to their own advantage (Felder & Henriques, 1995).

Elaborating on the notion of learning styles in the ESL/EFL settings, Reid (1995) categorized learners' style preferences into four perceptual and two social styles built into a questionnaire known as Perceptual Learning Style Preference (PLSP). The questionnaire involves four perceptual styles (auditory, visual, tactile, and kinesthetic) and two social (group vs. individual) learning preferences. In fact, these categories of learning styles are supposed to demonstrate how individual learners prefer one way or another to learn the materials. As stated by Reid (1995), student's perceptual learning styles result in preferences for different activities in the classroom. Students with visual orientations tend to read and employ mental images; they enjoy videos and movies and prefer written directions and instructions to learn a foreign language. In contrast, auditory learners employ memory strategies. They like to be engaged in conversations and discussions, and enjoy group activities. However, learners with tactile orientations enjoy

making artwork associated with language learning, and prefer to learn with touching and handling objects. As a result, they are not probably capable of associating meanings and word information in an abstract way. Kinesthetic learners need movement, a great deal of breaks during classroom work, and enjoy authentic language. According to Reid (1995), kinesthetic learners prefer total physical response (TPR), games, and activities such as role-play which demand moving around. Group learners, unlike individual ones, can take advantage of cooperative learning situations more effectively.

In the same vein, Kinsella (1995) asserts that learners employ various perceptual styles of learning to obtain and process information. Learners whose dominant style of learning is intuitive are not sympathetic to a systematic and pre-structured syllabus. However, students possessing a judging personality are more at home with unambiguous, orderly, and predictable goals and prefer a structure oriented learning environment (Ehrman & Oxford, 1990).

In the context of EFL/ESL learning, the role of individual learning is acknowledged (Ehrman, 1995). As research has revealed, language learners' success and learning styles are closely correlated. For example, Zhenhui (2001) discovered that focusing on learners' styles of learning can help them develop their self-awareness and become more responsive to their potentials. Matthews (1996) also found that certain learning styles might be more effective than other learning preferences for particular tasks in learning environments and in general, learners whose perceptual styles are different perform differently in their academic activities. Kinsella (1995) found that students who were auditorily oriented respond poorly to questions, corrections, and written comments on their compositions' drafts. A study by Carbo (1983) that investigated the perceptual styles of elementary readers in a US school revealed that poor readers had a strong preference for kinesthetic and tactile learning while good readers were more dependent on their auditory and visual abilities. In another study, Collinson (2000) concluded that learners' preference to be independent of or dependent on the classroom structure was closely related to their high and low achievement, respectively. One rare study on the relationship between lexical inferencing and learning styles was conducted by Shen (2010). The results of the study showed that different perceptual styles are related to different lexical inferencing abilities and that learners with certain perceptual styles benefit more from explicit instruction.

As the concern of the present study, lexical inferencing as a strategy which involves information processing in the text faces a number of text related constraints such as high and low density of text (Hue & Nation, 2000; Laufer, 1997) and also context based factors like parts of speech, global, and immediate contexts, as stated by Frantzen (2003) and Diakidoy and Anderson (1991).

Liu and Nation (1985) believe that as far as density of text is concerned, it is easier to guess unknown words in texts of low density. They also assume that verbs are relatively easier to guess than other parts of speech. On the other hand, Schmitt (2000) contends that the percentage of unknown words determines the level of difficulty of a text. According to Anderson (2000), lexical inferencing is easier when contextual clues such as local/global clues are closer to the unknown words.

In relation to the learner factor, Hunt's (1996) study, which is in line with Laufer's lexical threshold (1997), implies that lexical inferencing is rewarding when learners are able to identify a great number of words with high frequency in the context. Laufer (1997) indicates that lacking sufficient vocabulary results in the inability to infer unknown vocabulary correctly and slows down reading comprehension.

Levine and Reves (1998) state that the learners' profile, especially educational background and reading strategies, can affect the inference of unknown words. Nassaji (2004) sees a significant relationship between the learners' depth of vocabulary knowledge and their use of word inference strategies. Fukkink, Block, and Glopper (2001) suggest that lexical inference ability depends on the level and system of the learners' semantic and conceptual ability.

Investigating how Spanish students infer word meaning from context, Frantzen (2003) presents a framework the findings of which reveal that an incorrect guess might be attributed to the context, the students' reading habits, and their lexical inferencing strategies. The findings also reveal that the context itself cannot be always beneficial because it might be ambiguous, vague, and even misleading. An incorrect guess might also be the result of the students' erroneous certainty about words which they do not know but they think they know.

As shown above, lexical inferencing is a far reaching issue which can permeate a vast area of activity on the part of learners determining their success or failure in the contexts of both gaining knowledge

through a foreign language and developing language as a skill. This fact can justify why further investigations into the subject must be launched.

## **PURPOSE OF THE STUDY**

This study was prompted by the exigency of practically contributing to learners to overcome the problems of lexical inferencing. As it is well evidenced, lexical problems pose a deterrent to the gigantic task of comprehension in a language context especially compared with the confined scope of language structure. Thus, to help learners with their comprehension to take a quick path rather than committing more and more vocabulary items to their memory, this study is hoped to unravel the effect of inferencing instruction and the interactional effect of some individual and textual parameters. Despite the studies and discussions around such variables as text factors, context factors, and learner's profile affecting the inferencing of unknown words, the literature on the L2 Learners' Perceptual Learning Style Preferences, strategy use, density of text, and parts of speech in relation to lexical inferencing ability is scant. Therefore, the present study is motivated to bridge the gap and dig deeper into the role that the above-stated variables may have in lexical inferencing in the context of English as a foreign language. To address the above issues, the following questions are posed:

1. Do learners of English language differ in their learning style preferences?
2. Do learning style preferences affect learners' lexical inferencing?
3. Do learning style preferences have any bearing on strategies of lexical inferencing?
4. Do features of text density and parts of speech moderate lexical inferencing?

## **METHOD**

### **Participants**

There were as many as 142 male and female participants (male=69 and female=73 with the age range of 19 to 21) who were taking General English course at Qom University of Technology, Iran. The participants were all Engineering students majoring in different fields including electrical, computer, mechanical, and industrial engineering. These participants were chosen since they were available (availability

sampling) and thus, one of the researchers could carry out the job as part of his academic responsibility. They had taken the required English course in the first semester of the academic year 2012-2013. Since our participants were matched for their proficiency based on their university entrance exam and thus allowed to register for the general English course, we considered them as roughly homogeneous to participate in the study.

### **Instrumentation**

To measure the students' learning style preferences, Reid's *Perceptual Learning Style Preference Questionnaire (PLSPQ)* which has been shown to be highly reliable ( $r=.85$ ) was used (Peacock, 2001). This questionnaire assesses the students' preferred learning styles through 30 items of 5-point Likert scale and determines how students approach learning contexts using their perceptions (visual, auditory, kinesthetic, and tactile) and social preferences (group vs. individual). Students can indicate to what extent they agree with each item on a scale from strongly agree to strongly disagree. A score between 0 and 24 indicates negligible or no learning styles, 25-37 denotes minor learning preferences, and 38-50 represents major learning styles. In the current study, students were categorized according to their major learning style preferences.

As for the lexical inferencing, two reading texts were used. The choice of two short reading texts was to take care of possible bias of the topics for the participants. The reading texts were about 100 words long and their difficulty level was decided through Fry's readability graph (the index for all was about 16). The second questionnaire that was utilized was a strategy questionnaire that was constructed based on the strategy training session (and categories of strategies taught for lexical inferencing) and participants were required to determine the type of strategy they used while doing the lexical inferencing. The content validity of the questionnaire was meticulously judged and controlled against the itemized strategies taught in the class (Table 1), which was calculated to be .82. The internal consistency of the questionnaire was calculated to be high ( $r=0.91$ ).



## Data Collection

The present study was carried out through an exploratory post-test group design in which participants had to fill out two questionnaires to provide data for the analysis. One questionnaire that the participants received was a perceptual style questionnaire intended to distinguish them in terms of their learning styles. This questionnaire was administered on the final days of the semester after the participants had almost finished their course. A session of strategy training was performed at the beginning of the next semester for guessing the unknown words aiming at encouraging the students to learn how to deal with lexical challenges of the texts. At the end of the semester and after the administration of the first questionnaire, a strategy questionnaire was administered concurrently with the reading test to explore the strategies learners would use while inferring the meanings of the unknown words. Further detailed description of the procedure is provided as follows.

At the end of the semester, the first questionnaire (*PLSPQ*) was administered to the participants to indicate their learning style preferences. Then, they received the reading texts as the lexical inferencing test, underlined the words they did not know, and decided on the types of strategies (based on the strategy questionnaire) that they used while inferring the meaning of the unknown words. The test lasted for 70 minutes. Since we assumed participants were different in their lexical ability, we did not prepare a single list of unknown words to be inferred through a decontextualized lexical test, but every participant carried out the job individually depending on his/her own lexical capacity, i.e. the participants were asked to first underline the unknown words and then try to guess the meanings. At the same time, the participants provided information over their use of the strategies while tackling the lexical inferencing problem. They designated on a strategy questionnaire (See 'Instruments' above) which of the strategy or strategies they applied in inferring the unknown lexical items encountered in the two texts.

## Data Analysis

First, the *PLSPQ* questionnaire data was analyzed and the ability in lexical inferencing was assessed by giving 1 point to either the correctly provided or semantically acceptable meaning for each unknown word. Then, the scores of the participants in each category of learning styles were averaged and the mean score obtained for them within each

perceptual style category was converted into the percentage via the comparison between the actual (number of unknown words underlined by the participants) vs. the obtained scores (number of correctly inferred words). This percentage indicated the correct inference achieved in the text for each perceptual learning style category. Following Shen (2010), the researchers gave the full score (1 point) to the answers with approximate meanings (semantically acceptable answers) because this approach pushes participants to do their best to derive meanings of the unknown words.

The data of the strategy questionnaire was analyzed for the types of strategies used by the participants. The participants were asked to tick the relevant strategies they used to infer the meaning of each unknown word. Moreover, we determined the density of the texts, which was viewed to be the ratio of the known to the unknown words of the selected passage (Hu & Nation, 2000; Laufer, 1997). In fact, the more the number of known words, the lower the text density. Additionally, the parts of speech of unknown words were also investigated as another text related issue which might be influential in lexical inferencing. The researchers analyzed and scored the participants' inferences separately and then resolved their differences.

At the beginning of the semester, all the students were taught how to infer the meanings of the unknown words and then they were required to apply the strategies to the reading texts of their course. The strategy training design was borrowed from Shen (2010). This design involved explicit instruction model (Winograd & Hare, 1988) combined with inductive procedure presented by Clark and Nation (1980). The following table (Table 1) shows that the explicit model dealt with what, why, and how of the strategies, and inductive procedure demonstrated how to successfully exercise the lexical meaning guessing game.

**Table 1:** Strategies of lexical inferencing

Strategies	Inductive Procedures
1. Lexical Knowledge: Using feature analysis to figure out word meaning based on its similarity with other words (i.e. similar spelling) or word parts (i.e. verb, noun, or adjectives).	Step 1: Decide on the part of speech of the unknown word. (Part of speech)
2. Monitoring: Elaborating the	Step 2: Look at the immediate

meaning by talking to themselves, such as "Let me think." "Well." "Oh-oh." "Is this right?"

context surrounding the unknown word, simplifying it grammatically if necessary. Examine the relationship between the unknown word and the known words surrounding it. (Local context)

3. Repeating: Repeating a word or a phrase either to show their difficulties in decoding the meaning or to allow themselves sufficient time for processing.

Step 3: Look at the wider context of the word, i.e. the relationship with adjoining sentences or clauses. Examine the relationship between the unknown word and the known words before or after the sentences with the unknown word. (Global context)

4. Syntactic Knowledge: Using knowledge of grammatical function within or between sentences & monitoring.

Step 4: Make connections between prior knowledge and text information. (Background knowledge)

5. Prior Knowledge: Associating a word together with another word based on background knowledge of the real world.

Step 5: Guess. (Guess)

6. Self-inquiring: Asking oneself questions about the words already inferred.

Step 6: Check the guess by arousing metacognitive knowledge. For example, substitute the guess for the unknown word. Monitor the guess by asking yourself: "Does it fit comfortably into the context? Does it make sense? ". Evaluate the guess to decide whether to accept the idea or reject it and then try again or seek outside assistance. (Metacognitive knowledge)

7. Evaluating: Evaluating and judging themselves on their accuracy when inferring the meaning of a word.

## RESULTS

### Language Learners' Learning Style Preferences

The first question in the study was intended to distinguish the participants in terms of their learning style preferences. As can be seen in Table 2, most of the learners are kinesthetically inclined which means they prefer to be practically involved in learning the language (number of kinesthetic learners=35). This finding may originate from the fact that learners at a university of technology in which practice outweighs theory prefer to follow the same practical trajectory of affairs, thus paying more attention to kinesthetic activities.

Another conspicuous finding of this study on learners' learning preferences concerns the last two categories of 'auditory and visual' with 18 and 17 learners in each category, respectively. This is important because while language learning activities in the university classes are predominantly centered on verbal and visual actions, a relatively lower proportion of class members can take advantage of the dominant method of instruction as it is not in their favor. This means that the auditory and visual learners are only attended to; therefore, kinesthetic learners seem to be ignored. With this being the trend among the learners of the language, teachers and language planners must radically redefine their instructional designs to optimize the class conditions for all other learning preferences as well. The other two categories of learning styles, "individual vs. group," as social dimensions of learners also indicate that quite a few of learners belong to these two categories, with 'individual' outnumbering the "group." This individual orientation in the language classes seems unproductive in view of the fact that language classes are generally structured around collaboration and cooperation, which may not be conducive to their learning.

**Table 2:** Learners' style preferences and lexical inferencing ability

Learning Preferences	N	Min/Max	Mean	Rank	SD
Kinesthetic	35	18/46	26.9	4	24.15
Individual	28	20/45	23.4	5	21.12
Group	24	17/48	27.5	3	19.8
Tactile	20	14/41	21.8	6	23.07
Auditory	18	22/53	33.6	2	24.6
Visual	17	29/68	35.7	1	16.05

	df	SS	MS	F-ratio	Prob.
Between Groups	5	6434.2	1286.84	5.63	0.045
Within Groups	136	78314.1	575.83		
Total	141	84748.2			

$p < 0.05$

## Learning Style Preferences and Learners' Lexical Inferencing

This research also investigated whether perceptual learning style preferences could affect lexical inferencing. Table 2 demonstrates the minimum, maximum, and mean scores of lexical inferencing successfully accomplished by different learning style categories of learners. The table reveals that “visual and auditory” learners have obtained the first and second place, respectively, followed by “group and kinesthetic” categories. On the whole, Table 2 reveals that lexical inferencing results are statistically different ( $F=5.63$ ,  $P<0.05$ ), indicating that learning styles play a meaningful role in the learners' success in deriving meaning of unknown words.

As learners of different learning preferences have variably tackled the problem of lexical inferencing, the next important point is to find out if these styles bear any shared grounds. In other words, the identified categories of styles in this study constitute *major* styles of learners and yet are not supposed to be mutually exclusive. Thus, it would be informative to investigate the extent to which the categories overlap. Results from Table 3 indicate that Tactile, Kinesthetic and Group learners are meaningfully interrelated. This finding implies that learners with these three major styles may demonstrate almost the same abilities.

**Table 3:** Means, standard deviations, and correlations between perceptual styles in lexical inferencing

Perceptual Styles	M	SD	1	2	3	4	5	6
1. Vi	35.7	16.05	1					
2. Au	33.6	24.6	.6	1				
3. Ki	26.9	24.15	-.03	.06	1			
4. Tac	21.8	23.07	.6	.04	.82**	1		
5. Gr	27.5	19.8	.04	.07	.51***	.29**	1	
6. In	23.4	21.12	.3	.02	.05	.11	-.61***	1

**Notes:** V=variable; Vi=Visual; Aud=auditory; Ki=kinesthetic; Tac=tactile; Gr=group; In=individual

\*Correlation is significant at the .05 level (2-tailed).

\*\*Correlation is significant at the .01 level (2-tailed).

\*\*\*Correlation is significant at the .001 level (2-tailed).

The same table also shows the negative correlation between Individual category of learning style and the Group category. This finding confirms that individually oriented learners may not be able to take advantage of the integrated contexts of learning in the same manner as the Group may. The observations we have carried out in this study cast serious doubt over inviolability of apparently fixed learning characteristics.

### **Learning Style Preferences and Learners' Strategies in Lexical Inferencing**

In addition to the above inquiries, the study focused on the relationship between learning styles and strategies in lexical inferencing. Nassaji (2006) believes that learners go through certain processes of meaning construction to arrive at the meaning of unknown words. That is, learners adopt certain strategies to settle certain lexical problems (Paribakht & Wesche, 1999). Table 4 shows the types and mean frequencies of strategies used by learners of different learning styles. As can be observed, based on the order of frequency, strategies of "lexical knowledge, evaluation, and prior knowledge" are the three most frequently used ones. As for the relationship between perceptual preferences and strategies, the table reveals that "visual" learners opt for "syntactic knowledge" most ( $r=.69$ ) and "audio" learners choose "lexical knowledge" in their attempts to extract lexical meanings ( $r=.62$ ). This finding is interesting in that those learners with visual inclination like to work out the problem of unknown words through the strategy that comes within their sense of vision (syntax). On the other hand, auditory learners rely on their memory (rather than their vision) and repertoire of meaning they have already received to derive the meaning of unknown words. Another eye-catching finding is that "individual" learners appeal to "monitoring and prior knowledge" as their preferred strategies. This may arise from the fact that such learners rely on egocentric strategies because they are inclined to act independently to solve their problems. Learning style preferences are all shown to be

meaningfully related to the strategies, especially to “lexical knowledge” and “monitoring”. Among other strategies “repeating” is adopted by auditory learners, “syntactic knowledge” is strongly related to auditory and visual styles and to some meaningful extent with the Group and Individual orientations. Auditory, group and individual learners use “Prior knowledge”, as another strategy. However, “self-inquiry” or asking oneself questions show no relationship with any of the learning style preferences. The two learning style preferences “kinesthetic and tactile” show no meaningful relationship with any of the strategies. This last point may indicate that these two categories of perceptual preferences are accounted for in other styles, which, of course, demand an in-depth investigation of possibly factorial design to show the exact loadings of variables on the underlying construct.

Further analysis of the same issue reveals that learners with “Visual styles” have relied on fewer strategies. These learners have meaningfully resorted to three types of strategies, “syntactic knowledge”, “monitoring”, and “lexical knowledge”. By contrast, “Auditory learners” have used six different strategies, two times more than those used by visual learners.

Another finding as demonstrated in Table 4 is that the two learning styles of “individual and group” are meaningfully associated with most of the strategies, though “individual” slightly outweighs the other (also associated with “evaluation”). The important point to explain is that these two categories may have other styles as minor tendencies included, that is, one learner with these two major categories probably possesses other minor learning preferences, as well. It is also possible that the two social categories (Group vs. Individual) constitute a construct separate from other perceptual styles.

**Table 4:** Means, standard deviations, and correlations between perceptual styles and strategies

Categories		Strategies	Lk	Mo	Re	Sk	Pk	Si	Ev
		M	24.4	14.6	15.7	19.8	20.3	14.7	20.9
Perceptual	M	SD	18.5	13.2	12.1	14.4	19.3	11.3	16.7
styles									
1. Vi	35.7	16.05	.33*	.64*	.23	.69**	.17	.15	.20
2. Au	33.6	24.6	.62**	.31*	.51**	.61*	.40*	.21	.42**
3. Ki	26.9	24.15	.05	.04	.09	.12	.14	.16	.13
4. Tac	21.8	23.07	.18	.05	.07	.21	.19	.13	.03
5. Gr	27.5	19.8	.56**	.61**	.11	.41*	.43**	.17	.12
6. In	23.4	21.12	.43*	.68***	.07	.24**	.65*	.20	.41*

**Notes:** Vi=Visual; Aud=auditory; Ki=kinesthetic; Tac=tactile; Gr=group; In=individual; Lk=lexical knowledge; Mo=monitoring; Re=repeating; Sk=syntactic knowledge; Pk=prior knowledge; Si=self-inquiry; Ev=evaluation

\*Correlation is significant at the .05 level (2-tailed).

\*\*Correlation is significant at the .01 level (2-tailed).

\*\*\*Correlation is significant at the .001 level (2-tailed).

## **Text Density, Parts of Speech and Lexical Inferencing**

The next part of this investigation deals with the text variables including text density, parts of speech, and strategies to explore how they interact to achieve lexical inferencing. These text variables have been suggested effective in lexical inferencing (Hue & Nation, 2000). To justify the possible links, we may argue that because lexical inferencing is a strategic attempt on the part of learners to cope with unknown words in a text (de Bot, Paribakht, & Wesche, 1997), using different types of strategies is consequently mediated by the density of the text and parts of speech. As shown below in Table 5, lexical inferencing is affected by the density of the text and demands particular strategies to be fulfilled.

It was already shown that different strategies are closely tied with different perceptual styles for the purpose of lexical inferencing. Now, it is essential to dissect another dimension of the effective strategy role, that is, to discover how different strategies may work together or function identically to this end. This leads us to investigate to what extent strategies overlap. The findings reveal that almost all the strategies play combinatorial roles in settling the lexical problems. In other words, strategies are not discrete tools of problem solving not showing any sort of overlapping function. This role is pronounced very clearly for the “syntactic knowledge” and “lexical knowledge” ( $r=0.95$ ), followed by “evaluation” and “prior knowledge” ( $r=0.78$ ) as the most related paired strategies.

As for the relationship between the text density and use of strategies, the findings reveal important points. Density is negatively related to the strategy “lexical knowledge” ( $r=-.28$ ) which means that through increased density, learners’ knowledge of lexis proportionally reduces, thus being of little assistance to the learners. Instead, the density seems to evoke the strategies of “self-inquiry, syntactic knowledge, and evaluation” and makes them the top priorities for the learners to cope with their lexical ambiguities. While acknowledging the link between lexical density and the choice of strategies, the results



further indicate that learners tend to take advantage of their resources flexibly. That is, in case of having no access to the knowledge resources (i.e., syntactic and lexical knowledge), probably arising from increased density or high proportion of unknown words, learners try to dig into other areas through other tools available to bridge the discrepancy, for example, they use “self-inquiry” for possible chance of finding a way out. As subcategories of lexical density, Ns. (nouns) are meaningfully tackled through “self-inquiry” strategy, Adjs. (adjectives) fall within the domain of the strategy “evaluation” while showing a negative relationship with “lexical knowledge” ( $r=-0.18$ ), Vs. (verbs) are meaningfully inferred through “syntactic knowledge”, and finally Advs. (adverbs) show no meaningful relationship with the strategies. The fact that Advs. show no relationship with strategies can be explained with the following two reasons: the first reason is that there were very few adverbs selected as unknown per person ( $M=2.1$ ) which might have led to no relationship. Secondly, it is assumed that Adverbs are comparatively restricted in their reliance on contextual clues, especially in the case of our study where the texts were around 100 words long, which should indicate that the texts were very dense with little redundancy for possible correct guesses.

The final investigated issue in this study concerned whether lexical inferencing is related to the use of strategies and lexical density. As the analysis is shown in the following table, the two variables of strategies and text density are both found effective in determining the success of lexical inferencing; however, correlation cannot involve causality. Lexical inferencing, as shown below, is thus correlated with strategies of “syntactic knowledge” ( $r=.86$ ), “lexical knowledge” ( $r=.75$ ), “prior knowledge” ( $r=.58$ ), and “evaluation” ( $r=.43$ ) listed based on the order of frequency. The findings seem to empirically support the notion that learners' conceptual and semantic systems help them appeal to their prior knowledge of lexis, syntax, morphology, word derivation, and association and successfully infer the meanings of unfamiliar words (de Bot et al., 1997; Nation, 2001; Nassaji, 2006). The challenging point discovered in this study seems to be the slightly bigger role of “syntactic knowledge” ( $r=.86$ ) compared with “lexical knowledge” ( $r=.75$ ) in lexical inferencing.

Lexical inferencing similarly demonstrates a rather strong negative relationship with text density ( $r=-.52$ ). That is to say, as the density increases, learners are less likely to derive the meanings of the

unfamiliar words successfully. This point makes us feel that lexical inferencing is possible only when the proportion of unknown to known words does not exceed a certain upper limit. That is, if density of the text transcends a certain limit or threshold level, it will not be possible for the learners to derive the meanings. Of the subcategories, Adj. and Adv. reveal a negative relationship with inferencing while Ns. and Vs. have a positive relationship with inferencing. This shows that the former pair is probably more context dependent and because of the increased density and reduced context, learners fail to find out the correct meanings while the latter pair is probably less context independent and thus is not affected by such a condition.

**Table 5:** Means, standard deviations and correlations among strategy use, text density, parts of speech and lexical inferencing

V	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
Strategies														
1. LK	24.4	18.5	1											
2. Mo	14.6	13.2	.36*	1										
3. Re	15.7	12.1	.21	.66*	1									
4. SK	19.8	14.4	.95*	.07	.06	1								
5. PK	20.3	19.3	.41*	.33*	.58*	.64*	1							
6. SI	14.7	11.3	.38*	.21	.14	.31*	.43*	1						
7. Ev	20.9	16.7	.41*	.08	.11	.78*	.57*	.65*	1					
Text variables														
8. De	35.7	16.3	-.28*	.16	.07	-.31*	.08	.41*	.22*	1				
9. N	16.4	5.2	.09	.02	.05	.21	.03	.27*	.13	.33*	1			
10. Adj	11.1	3.1	-.18*	.04	.01	.01	.14	.06	.21*	.16		1		
11. Ad	2.1	1.7	-.07	.00	.00	.02	.03	.00	.01	.06	.09	.00	1	
12. V	6.1	4.8	-.12	.1	.01	-.52*	.02	.00	.02	.19	.16	.02	.01	1
Lexical Inferencing														
13. Inf.	28.1	21.4	.75*	.17	.21	.86*	.58*	.11	.43*	-.52*	.32*	-.41*	-.17	.39*

**Notes:** Lk=lexical knowledge; Mo=monitoring; Re=repeating; Sk=syntactic knowledge; Pk=prior knowledge; SI=self-inquiry; Ev=evaluation; De=density; N=Noun; Adj=adjective; Ad=adverb; V=verb; Inf=inferencing

**Density** refers to the ratio of the unknown to the known words.

**Inferencing** refers to the correct meanings of the unknown words provided by the learners.

\*Correlation is significant at the .05 level (2-tailed).

\*\*Correlation is significant at the .01 level (2-tailed).

\*\*\*Correlation is significant at the .001 level (2-tailed).

To further analyze the data, an attempt was made into the predictable power of variables. For this purpose, as displayed in Tables 6 and 7 and explained below, a multiple regression analysis was conducted in order to identify the best predictors of the learners' lexical inferencing performance (as dependent variable or DV) using the discussed variables including, perceptual learning style preferences, strategies, density of text, and parts of speech (as independent variables or IVs). To perform regression analysis, at first, assumptions of linear regression were checked, followed by examining the multivariate outliers (Tabachnick & Fidell, 1996), which resulted in the deletion of 4 cases to minimize their effect on the R-square value and beta-coefficients. Then, a standard (forced entry) regression was performed by plugging all the potential predictors into the equation at the same time. The result indicated that all four variables were influential in lexical inferencing success ( $F(4,138)=63.4, P<0.001$ ). In addition, the coefficient of determination ( $R^2$ ), or the squared value of the multiple correlation coefficient was found to be 0.73 ( $P<0.01$ ). This shows that all the independent variables (IVs) collectively accounted for 73 percent of the variance in lexical inferencing (Table 6). In order to assess the exact contribution of each variable, a hierarchical regression analysis was run using information from standard regression. The results are presented in the following tables.

**Table 6:** Prediction of lexical variables

Step	<i>R</i>	$R^2$	Incremental $R^2$	Incremental <i>F</i>
1	.57	.32	.32	215.7**
2	.73	.53	.21	68.1**
3	.82	.67	.14	21.4**
4	.86	.73	.06	7.03*

Note: \* $P<.05$ , \*\* $P<.001$

Step 1. Perceptual learning style preferences (PLSP)

Step 2. Perceptual learning styles, Strategies (St)

Step 3. Perceptual learning styles, Strategies, Density (De)

Step 4. Perceptual learning styles, Strategies, Density, Parts of speech (PS)

**Table 7:** Hierarchical regression analysis for variables predicting lexical inferencing

Step	Predictor	<i>B</i>	<i>SE</i>	<i>Beta</i>
4	Constant	12.43	3.7	
	PLSP	7.8	4.9	.20**
	St	14.8	6.6	.31**
	De	.20	2.7	.13*
	PS	.06	.04	.11*

Note: \* $P < .05$ , \*\* $P < .001$

As shown in Table 7, all the IVs played a significant role in the inferencing of lexical items. From among the four IVs, strategies have made the greatest contribution to the lexical inferencing ( $Beta = .31$ ) followed by PLSP ( $Beta = .20$ ). The other two (Density and Parts of Speech) are also shown to be significant contributors although beta values are small and marginal. Taking the information from above tables into consideration, we can conclude that strategies and perceptual style preferences are the best predictors of lexical inferencing in the context of English as a foreign language.

## DISCUSSION

The first question of the study concerned the learners' learning style preferences. It was shown that the majority of learners are kinesthetically inclined. These learners probably find the language class atmosphere inactive, dull, and vapid compared with other courses in engineering at our university wherein students are compelled to move around in a lively and jubilant manner while attending workshops and some other field activities. To interpret the results, it is worthwhile to note that these learners have been asked to provide data at the end of the semester after they have received almost all their instruction inside the classroom and mostly through verbal practice. That is probably the reason why they are inclined to abandon such a passive atmosphere of the class in favor of more animate, spirited, and physical activities, thus showing their inclination to be kinesthetic. This interpretation is in line with Oxford's (1990) argument that learners may achieve their internal potentials for learning only if they are placed in an atmosphere where their learning needs are catered for very closely. The learners' probable

re-orientation of learning preferences in line with classroom conditions may seem to contravene the idea of fixity and stability of cognitive styles (Keefe, 1979) but the issue can be argued away assuming that the learners are initially some way off their inclinations, and their potentials are achieved only when enough attention is redirected to them. Further, this style fixity is probably perpetuated and guaranteed once learners' consciousness of what suits them is in place. The finding necessitates further investigation of learners' preferences under a neutral condition as well, for example at the beginning of the course when the instruction has yet left no pronounced mark on their internal tendencies.

Furthermore, the findings indicated that auditory and visual preferences account for a big proportion of learners of the study, which can point to the fact that class environments have to be geared towards more socio-constructivist approaches to learning. A social constructivist perspective of language (Vygotsky, 1978) construes the contextual interactions among learners essential, for which in the case of individual orientation teachers must work out some solution to accommodate the large number of learners as well.

As for the effects of the learning preferences on the lexical inferencing, it was demonstrated that "visual", "auditory", and "group" associated learners have achieved the highest inferencing ability. This can be argued to have resulted from the predominance of audio-visual activities in the classroom. Though fewer learners are categorized under these two learning styles, they are privileged as the class structure is configured in their favor. Moreover, the "group" category also benefits from the classroom interactional atmosphere and ranks third. This finding calls for more emphasis to be put on the conditions in the classroom. Thus, we may cautiously conclude that L2 learners' failure to effectively take in what is presented in the classroom may stem from the incompatibility between the instructional procedure and learners' inherent characteristics (Kroonenberg, 1995).

In addition, the results showed that learning preferences are not mutually exclusive, with the three tactile, kinesthetic, and group categories revealing much overlapping (Table 3). Interestingly, this result from our learners complies with similar research attempts by Doyle and Rutherford (1984) who consequently suggested merging tactile and kinesthetic styles into one. Following the same finding, Oxford (2001) subsequently used the two learning styles interchangeably. The implication of this finding is that such learners can

react flexibly to the diverse classroom conditions if they belong to any of these three categories. That is, if a classroom condition is arranged for these learning styles, the respective learners can enhance their processing ability through combined modes of learning; and if teaching is configured around any one single style then they can also interchangeably benefit from the sole condition provided. Meyers (1980) discusses such learners as being comfortable processing information through more than one sensory channel and calls them multisensory learners.

Another finding of the study demonstrated that “visual learners” comparatively benefited from few strategies to infer the meanings of unknown words. One explanation for this finding is that while learners with visual styles tend to learn from what they find within their visibility span and are limited to minimum available strategies, auditory learners seem to be using other modes of meaning construction such as “prior knowledge” or “evaluation” as well. This can empirically support the idea that auditory learners combine their phonological, morphological, syntactic knowledge, and semantic resources with their minor style of visual orientation and broaden their inferential scope (Matthews, 1996). To explain, since auditory learners fall short of any significant relationship with other learning styles (See Table 3), they have to seek some remedial modes for their repertoire deficit by using more and various strategies to achieve their purpose of inferring unknown words. Likewise, it can be argued that auditory learners deal with the lexical problems through componential analysis, which requires different strategies to be achieved. Componential analysis postulates that lexical inferencing is breaking down the words into their semantic features (Beheydt, 1987). The intake of such features into the available network of knowledge necessitates the gradual process of semantization, which in turn involves the use of varied strategies and methods.

On the whole, this study confirms that almost all the strategies are for different reasons and differentially utilized for solving the lexical problems (Table 5). This bears testimony to the fact that learners rely on multiple sources of knowledge and auxiliary resources to arrive at the proper extraction of meaning. This strong relationship may also be interpreted as the advantage of *the knowledge based* strategies (i.e., syntactic and lexical knowledge) in lexical inferencing over other manipulative actions such as “repeating, monitoring, or self-inquiry”.

As Table 5 demonstrated, learners used syntactic knowledge more in comparison with lexical knowledge to derive meanings. This finding shows that learners primarily rely on their knowledge of vocabulary to derive meanings from contexts (Laufer, 1997; Nation, 2001) but if a context is a reduced one (Cummins, 1984) coupled with the increased lexical density, learners are compelled to appeal to their basic knowledge of language, which can be wider use of grammar along with word derivation techniques, morphological analysis, inflectional cues, etc to infer the meaning of unknown words. The use of basic knowledge together with strategies may be at work to deduce the meanings of unknown words (Nagy, 1997).

Finally, the results indicate that text related variables such as density and parts of speech play a peripheral role in the enhancement of learners' ability to extract meaning compared with strategy and learning preferences. This low prognostic power of textual elements may allude to the learners' agentive role in compensating for the discrepancies in their linguistic backgrounds and the fact that arriving at meaning potential (Halliday, 1985) tends to be of reconstructible rather than discoverable nature (Nassaji, 2004).

## **CONCLUSION AND IMPLICATIONS**

The present study examined several factors that may be effective in helping L2 learners extract the correct meaning of unknown words in the texts. The results revealed that all the four variables including perceptual style preferences, strategies, density of text, and parts of speech make differential contributions to the L2 learners' lexical inferencing with strategies having the first and perceptual styles the second important role. Of course, the other two variables, "density" and "parts of speech", were marginally involved in lexical inferencing. The findings support the theory that learners' adoption of modalities for facing the learning challenges are to a large extent determined through their inherently developed learning styles providing learners with adequate knowledge base and strategies to make use of contextual and extra-contextual clues in inferencing (Nassaji, 2006). In literature, it is usually hypothesized that linguistic clues are the strongest signposts for the learners to guess the meaning of unknown words (Parry, 1993). However, the results of the present study provide conflicting evidence as it is shown that the reliance on the clues for the meaning reconstruction is modified by the learners' learning preferences, strategies they use,

density of text, and parts of speech. Another finding of the study which casts doubt over previous studies is that use of strategies for lexical meaning reconstruction is not bound to one single strategy, for example word analysis only (Huckin & Block, 1993) but on a variety of strategies depending on the conditions within the text and the learners' semantic and syntactic systems (de Bot et al., 1997).

Additionally, the results showed that the text factors of density and parts of speech are effective in deriving lexical meaning, but apparently, their small role implies that learners' conceptual and strategic systems stand at the heart of the inferencing and these two variables play a secondary role only. This finding is consistent with the view that meaning exists not in the text but in the readers' minds and the orthographic clues provide signals for the re-activation of meaning residing in the readers' minds (Halliday, 1985).

The results of the study can have important theoretical and practical implications for the pedagogues working in the English as a foreign language context as well as language education in general. One theoretical implication is that lexical inferencing has to be dissociated from the reductionistic perspective, which argues for an economical architecture of knowledge in the context of language learning. Practically, teachers and other stakeholders can apply the findings to their real classroom contexts for the enhancement of lexical inferencing capacity of learners.

The present area of research seems to be varied and wide in scope, which cannot apparently be formulated in one-study design to do justice to the issues concerned. Nor is it possible to rigorously include or exclude the intervening variables, as a researcher may desire. Thus, the following points are represented to show both the limiting factors and the future tracks of investigations so that more rigorous conclusions and generalizations may gradually become possible to draw. First, this study could be enhanced using larger numbers of participants and broader categories of proficiency levels, especially through more standardized placement tests of language command. The larger sample of participants can also justify the use of inferential statistics, which are usually ignored in small-scale studies. Second, other demographic issues of age, sex, and educational background can also cast light on the results and conclusions to be arrived at. Third, the single method of data collection (questionnaire in this study) can be complemented using self-reports, participant observation, oral interview, etc to substantiate the results and



generalizability of the study. Fourth, this study collected and analyzed the data on group rather than individual basis, which could confound the realities with individuals. Thus, future studies may care for this discrepancy and compare and contrast the results with the group based findings. Finally, as learning style preferences are not taken to be fixed across time and contexts, next investigations can be directed to study the longitudinal effect of maturation and learning styles and the differences they make on learners' use of strategies in comprehending the texts.

### Bio-data

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