

## The Comprehension of Garden-Path Structures by Iranian EFL Learners

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### ABSTRACT

The present study sought to investigate the comprehension of Garden-Path structures by Iranian EFL learners. 50 female students of Kharazmi English Language Institute in Karaj participated in this study. All of the participants were native speakers of Persian studying in Kharazmi English language institute in Karaj, Iran. They ranged from 18 to 30 in terms of age. The participants were administered two tests. A multiple choice test for English language proficiency test (PET) to determine the level of the participants and a multiple choice garden-path test including garden-path and non garden-path questions to measure the possible effect of garden path structures on subjects' comprehension and to measure the participants' knowledge of garden-path structures. The same tests were presented to participants of advanced and intermediate level. Repeated measure ANOVA procedures were applied to analyze the obtained data. The findings showed that the advanced group performed better on the garden-path test. There was a significant dependency between the English language proficiency level and comprehension of garden-path structures. We can claim that language proficiency affects Iranian EFL learners' comprehension of garden-path structures and garden-path structures influence Iranian EFL learners' comprehension. The findings of the present study may have implications for L2 learners and teachers.

**Key Words:** Ambiguity, Comprehension, Garden-path sentence, Psycholinguistics, Syntax

### Introduction

Garden path (GP) phenomenon is a special linguistic phenomenon which comprises processing breakdown and backtracking. A large number of studies have shown that people have trouble understanding that garden path sentence when it is presented without any internal punctuation. When we start reading garden path sentences, we believe that one interpretation is true, however, we get to the end of it, we need to reanalyze our own understanding of the whole sentence and often read it once or twice more. Then we are sure that we fully understood the actual meaning of the sentence. These sentences exist in most languages. Due to the nature of English, that many words can simultaneously be used as nouns, verbs or adjectives, where there are many homophones, this language has various forms of garden path sentences. One can find garden path sentences in most daily newspapers, especially in the headlines, and in other written materials, such as blogs, magazines or books. Furthermore, these sentences can be a fun and engaging way for students to learn that many words in English have several meanings. Psycholinguistics as a branch of science investigating how we comprehend and produce sentences, has been interested in the research of these sentences and how and why they are sometimes difficult to distinguish.

Marcus (1980) says garden path sentences are sentences which have perfectly acceptable syntactic structures, yet which many readers initially attempt to analyze as some other sort of construction, i.e., sentences which lead the reader "down the garden path". The following is a classic garden path: 1- The horse raced past the barn fell. In each sentence of this type, there is a point where two possible analyses are possible, i.e., at "raced". The need to backtrack is a result of

selecting an analysis differing from that demanded by the rest of the sentence. For each garden path sentence there is a corresponding sentence that does not require backtracking, e.g., 2-The horse raced passed the barn. This non-garden path partner has the same two possible readings at the same point, but the analysis selected is that demanded by the rest of the sentence. Such a pair of sentences will be called a pair of potential garden path sentences. Each potential garden path sentence may or may not cause a garden path. Of the pair of potential garden path sentences, one is a garden path and the other is not, although which is the garden path is available. Why do these sentences cause problems for people? Crain and Coker (1979) note: "Bever as Chomsky and Lasnik have argued convincingly that unacceptability of GPs is due to processing difficulty." They say "garden path sentences result from the omission of all syntactic markers which signal that one is parsing a Complex NP". This explanation suggests that all garden path sentences should be a problem of un-marked relative clauses. The ambiguity of certain nouns, verbs etc, makes this possible, and is therefore used by linguists to construct sentences made specifically to trick the human mind, Garden-path Sentences are a great example of this.

“To take someone down the garden path“ means to deceive someone, to lead them into believing something is true, before they realize they were misled. There is a special kind of sentences which can do the same. They are known as the garden path sentences. When we start reading them, we are lead to believe one interpretation is true, however, by the time we get to the end of it, we need to redefine our own understanding of the whole sentence and often read it once or twice more. Only then are we sure that we fully understood the actual meaning of the sentence. These sentences exist in most, if not all, languages. Due to the nature of English, where many words can simultaneously be used as nouns, verbs or adjectives, where there are many homophones and homographs, this language is particularly rich in various forms of garden path sentences. Psycholinguistics, as a branch of science investigating how we comprehend and produce sentences, has been interested in the research of these sentences and how and why they are sometimes difficult to discern.

Another example of a garden path sentence is “The old man the boat. “ At first, when reading this sentence, we believe that the old man is the subject, the person who does something in the sentence, but then we realize something else is happening and we need to read it again before we finally realize that “the old“ are the subject and the word “man“ is actually the verb. The meaning of the sentence is that people who are old are in charge of controlling the vessel.

The aim of the present study was to investigate the comprehension of garden path structures by Iranian EFL learners. And to investigate whether or not students with high level of language proficiency have the capability to comprehend GPSs . Previous studies on garden path structures have demonstrated the positive effect of having high level of proficiency on comprehending garden path structures. The term paper will move on to consider if the students manage to successfully decrypt the sentences into fully understandable Persian.

### **Garden path sentences can be either simple or complex.**

#### *Simple*

Garden-variety garden path sentences are examples of parapsydokian, where the latter part of an utterance or discourse is unexpected and causes the reader or listener to have to think about what he previously heard in a new light. A common example is a pun employing antanaclasis: a word or phrase appears; it then reappears and is (at first) understood as a grammatical or rhetorical

parallel to what had gone before. however, the rest of the sentence makes it clear that the second use must be different from the first.

### *Complex*

-The horse raced past the barn fell.

Most readers initially parse this as a basic noun phrase followed by the ordinary active intransitive verb "raced" and the prepositional phrase "past the barn", but stumble when reaching the word "fell". At this point, the reader is forced to backtrack and look for other possible structures. It may take some rereading to realize that "raced past the barn" is in fact a reduced relative clause with a passive participle, implying that "fell" is the main verb. The correct reading is then "The horse—(that was) raced past the barn—fell." "being a noun (meaning "mountain") may reach the end and still treat "raced" as the verb and "barn fell" as "the fell by or at the barn". Fell is also an adjective that means "dreadful" or "wicked". Chiefly archaically and poetically, adjectives may follow their noun leading to the somewhat nonsensical "The horse raced past the dreadful barn.

### **Statement of the Problem**

Sentences containing temporary local ambiguities such as the “garden-path sentence” have been exploited by psycholinguists for decades (Ferreira & Henderson, 1991; Frazier & Rayner, 1982). Garden-path sentences reveal the learner’s preferences for resolving syntactic ambiguities and for recovery when incorrect syntactic decisions are initially made. An incorrect choice in GP sentence usually is readers' most likely interpretation, leading readers initially into an improper parse. Thus the processing breaks down and backtrack to the original status to search the given information again for alternative route to the successful decoding. Comprehenders often fail to understand certain garden-path structures. One characteristic of garden-path sentences that seems to strongly influence ease of reanalysis concerns the syntactic relationship between the error signal and the head of the phrase that has been misanalysed (Ferreira & Henderson, 1991, 1998).

Very often, improper punctuation can cause a sentence to be a garden path. As mentioned earlier, the garden path effect is most common in written language, because when we speak, we make small pauses in places where commas should be and the proper intonation helps us understand the sentences better. An incorrect choice in GP sentence usually is readers' most likely interpretation and leads readers into a default parse which, however, finally proves to be a dead end.

### **Significance of the Study**

The aim of this study is to investigate whether or not students with high level of language proficiency have the capability to comprehend GPSs. A major focus of this research was the identification of those situations in which people use the semantic processor to make a decision in order to assist with the resolution of ambiguity and the sentences in which this occurs. We will observe that more people mistake "registered" for the main verb in garden path sentences. And to determine whether skillful reader can understand garden path structures more easily than elementary one. We will argue that this study will has important implications for models of sentence comprehension and reanalysis. We also believe that the research is of interest. Clearly, the field of sentence comprehension would benefit.

The reason why EFL teachers should be interested in this is the fact that garden path sentences are so common, and yet, can cause problems even for native speakers. One can find garden path sentences in most daily newspapers, especially in the headlines, and in other written materials, such as blogs, online forums, magazines or books. Furthermore, these sentences can be a fun and engaging way for students to learn that many words in English have several meanings, they can learn proper pronunciation, punctuation, and their overall awareness of the language could be developed.

Very often, improper punctuation can cause a sentence to be a garden path. For instance, “Fat people eat accumulates“ is a sentence which has no commas, so we are led to believe fat people are the subject. If this sentence was written as: “Fat, which people eat, accumulates. “ there would have been no problems in understanding it properly. A teacher can provide several of these sentences to her students and have them put proper punctuation. This type of garden path sentences is particularly good for learning and revising relative clauses, reduced relative clauses and relative pronouns.

### **Research Questions of the Study**

In accordance with the objective of the study, the following research questions are formulated:

- 1) Do garden-path structures affect Iranian EFL learners' comprehension?
- 2) Does language proficiency have any effect on Iranian EFL learners' comprehension of garden- path structures?

and then , because of later evidence, must go back and reanalyze, or at least correct the mis-analysis. Here are Marcus and Woods' definition of garden-path:

### **Previous Research on Garden-Path Sentences**

Christiansson (2001) published a research paper which deals with specific problems regarding GPS. Christiansson states that “it is generally assumed either that people completely repair their initial incorrect syntactic representation to yield a final interpretation whose syntactic structure is fully consistent with the input string or that the parse fails” (Christiansson ,2001). In this study, Christiansson makes an effort to explore the possibility to prove that this is not the case and that partial reanalyses takes place when you encounter a GPS.

In Christiansson’s experiment, they investigated the phenomenon of “incomplete reanalysis using a unique class of verbs such as *bathe*. These verbs are traditionally referred to as semi-reflexive verbs...”(Christiansson, 2001), or verbs where the reflexive pronoun may be omitted with little or no change of meaning.

Christiansson (2001) states that it is also assumed that if a sentence is an easy garden path, people fully reanalyze that said sentence, e.g. *The man hunted the deer paced in the zoo*, but if it is a difficult garden path as in it is assumed that some initial phrasal mistake is done but also recognized; the problem lies in whether recovery is hindered or prevented because of syntactical limitations. However the assumptions do not stop at this: for example if a person evaluates a GPS as ungrammatical or requires an extremely long time to process the GPS then Christiansson states

that it is likely that no interpretation will ever be reached, or at least no more than a guess based on the information the reader received from the combination of words and phrase meaning.

Bever (1970) was the first to supply sentences that seemed to have a different psychological effect than any other sentences (examples will follow), making those potential candidates for the study of human performance. These so-called garden path sentences became the object of psycholinguistic research. It was Kimball in his 1973 article that postulated seven principles of parsing performance in natural language, relying on garden path sentences, among others. At the time, it seemed that the seven principles Kimball (1973) had postulated were observations on parsing performance, and had nothing to do with grammatical competence. Research was continued mainly by Frazier & Fodor (1978) and Frazier (1978). What later came to be known as “the garden path model” was an attempt to construct a model, which was less descriptive of the phenomena Kimball had previously pointed out, but rather had a more predictive nature. His seven principles were reduced to a theory of two, and it became the most influential and prominent theory of human sentence parsing among psycholinguists to this day. In practice, “the garden path model” deemphasized grammatical theory in natural language processing. On the other side of the spectrum, other researchers (Marcus 1980; Berwick & Weinberg 1984, 1985) held the opinion that grammar rather than the parser had a role in parsing performance and that one cannot simply rely on observations on performance. It was Pritchett (1988, 1991, 1992), who delineated in practice and with much detail the relationship between parsing performance and grammatical competence using garden path sentences. In this, he challenged Frazier’s theory especially with regard to the descriptive and predictive argumentations in her theory. Pritchett’s theory is still being disregarded by psycholinguists in the claim that parsing performance is not a branch of theoretical grammar. Additionally, theoretical linguists are not occupied with performance issues, as their main concern is grammatical competence. This is the reason why Pritchett’s theory remains relatively unknown.

### **Participants**

The participants of this study were 50 female EFL students at intermediate and advanced level of English language proficiency. All of the participants were native speakers of Persian studying in Kharazmi English language institute in Karaj, Iran. They ranged from 18 to 30 in terms of age. The participants were administered two three tests.

### **Instruments and Materials**

In the present study, the following instruments were utilized:

- 1– Preliminary English language proficiency test(PET)
- 2 – Garden-Path test
- 2–1- Non Garden-Path test

### **Preliminary English Test**

In the present study, in order to determine the participants' level of language proficiency, a PET test was used. PET test is one of the famous and standard tests for specifying the EFL learners' level of language proficiency. This test contains 85 multiple-choice items, 30 items tested the grammatical knowledge, and 25 items examined the vocabulary knowledge of the learners. 30

items of the test also contained four reading comprehension exercises including matching, true-false, comprehension questions and a text with gaps. (A copy of the test is given in appendix A).

### **Garden-Path Test**

A 60-item multiple choice garden-path test was administered in order to estimate the possible effect of garden path structures on subjects' comprehension and to measure the possible ability of subjects' comprehension of garden-path sentences. That 20-item was garden-path sentences. The other 40-item was non garden-path sentences. Each item consisted of a short sentence which included garden-path structure. The time allocated to this test was 15 minutes. (A copy of the test is given in appendix B).

### **Non Garden-Path Test**

A 40-item multiple choice non garden-path sentences were included in garden-path test that was administered in order to estimate the possible ability of subjects' comprehension of non garden-path sentences.

### **Procedure**

In order to achieve the aim of the study, the following procedures were followed. The data that is used in this study is the results of the two tests that were administered, that is, the Preliminary English Test (PET), the Garden-Path test. First of all, PET test was administered to 73 participants to determine their English language proficiency level. Based on the results of PET, those 50 students whose scores were one standard deviation (9.39) plus and minus the mean (54.66) (scores between 45 and 64) were selected. The selected students were divided into two groups: Intermediate and Advanced. It consisted of 85 grammar, vocabulary and reading comprehension questions. Throughout this study, the researcher sought to examine the possible effect that garden path structures and language proficiency may have on the ability to comprehend sentences. Then, to achieve this goal, the two groups took the same garden-path test including (garden-path and non garden-path questions). We scored the garden-path and non garden-path answers separately to estimate the possible ability of EFL learners' comprehension. After the papers were scored, statistical procedures were being employed to measure the descriptive statistics of the results which will be reported. The results will then be used in verification of the research hypothesis.

### **Reliability Statistics**

In order to assess the reliability indices for PET and garden path test that were used in this study, a group of 27 EFL learners who were similar to the main population of the study participated in the piloting stage. The results as represented in Table1, revealed that the reliability of PET, consisted of 85 items, was estimated as 0.90 using KR-21 which is quite high. In addition, the first draft of garden path test contained 65 items and 50 items which had unacceptable reliability index, item facility, and item discrimination were excluded. In fact the reliability of final version of garden path test, composed of 60 items, was assessed 0.84 using Cronbach Alpha which is good indicator of internal consistency.

Table1

*Reliability Statistics of PET and Garden Path Test*

Test	No. of Items	Method	Reliability index
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PET	85	KR-21	0.91
Garden Path Test	60	Cronbach Alpha	0.81

**4.3. PET Results**

PET was administered to 73 participants to determine their English language proficiency level. The descriptive statistics, as shown in Table2, reflects that the mean, median and mode of PET scores are 54.66, 54, and 60 respectively. These central parameters are not very far from each other denoting that the scores are dispersed around the mean normally.

Table2  
*Descriptive Statistics for PET*

N	Mean	Median	Mode	SD	Skewness	Kurtosis
73	54.66	54.00	60	9.396	.273	-.651

Based on the results of PET (Table2 above), those 50 students whose scores were one standard deviation (9.39) plus and minus the mean (54.66) (scores between 45 and 64) were selected. The selected students were divided into two groups: Intermediate and Advanced. The students who scored median (54) and below median, were considered intermediate ( $N = 26$ ), and those whose scores were above the median formed the advanced group ( $N = 24$ ). Also Table2 shows that the PET scores are normally distributed as the ratios of skewness and kurtosis over their respective standard errors do not exceed the ranges of +/- 1.96.

Figure 4.1 below displays the distribution of the PET scores on a normal curve.

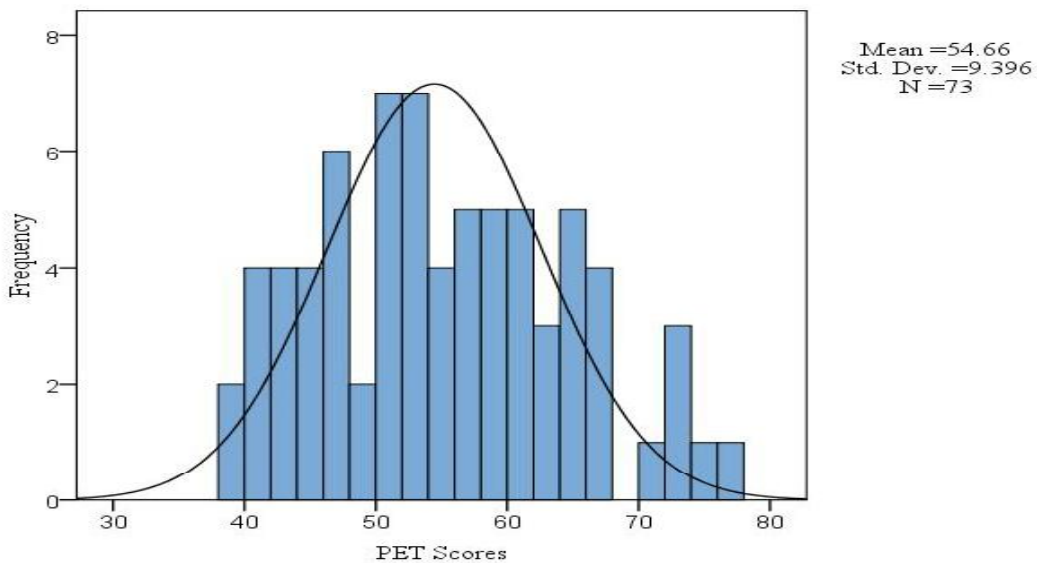


Figure 4.1 Distribution of PET scores

### Analysis of the Research Questions

The first research question of this study aimed at exploring whether garden-path structures affect Iranian EFL learners' comprehension. And the second research question asked if language proficiency affects Iranian EFL learners' comprehension of garden-path structures. In order to answer the research questions of this study, a repeated measures ANOVA was applied. Garden-path structure was the within-subject factor, and language proficiency was considered as the between-subject factor. Table3 represents the results of the descriptive statistics. Table3 indicates that the mean score of garden path structure ( $\bar{x} = 46.72$ ,  $SD = 13.28$ ) is considerably more than the non-garden path structure ( $\bar{x} = 60.00$ ,  $SD = 13.02$ ).

Table3  
*Descriptive Statistics for Comprehension of Garden Path and Non-Garden Path Structures at Two Levels*

	Level	N	Mean	Std. Deviation
Garden path	Intermediate	26	35.46	5.472
	Advanced	24	58.92	6.685
	Total	50	46.72	13.280
Non-garden path	Intermediate	26	48.88	4.958
	Advanced	24	72.04	6.590
	Total	50	60.00	13.020

As Table4 below shows, the assumption of homogeneity of covariance for running ANOVA was not violated (Box's  $M = 3.05$ ,  $p > .05$ ).

Table4  
*Box's Test of Equality of Covariance Matrices*

Box's M	F	df1	df2	Sig.
3.059	.974	3	530484.255	.404

The results of Levene's test (Table5) indicated that the assumption of homogeneity of variance was met too since the significance value was higher than .05 for both types of structures.



Table5  
*Levene's Test of Equality of Error Variances (Pre-test)*

Structure type	Levene Statistic	<i>df1</i>	<i>df2</i>	<i>Sig.</i>
Garden path	.850	1	48	.361
Non-garden path	2.790	1	48	.101

RM one-way ANOVA was conducted to see whether garden-path structures affect Iranian EFL learners' comprehension; the results of which are provided in Table6. Based on Table6., Greenhouse-Geisser correction indicated that the mean score differences for comprehending garden path and non-garden path structures are statistically significant ( $F_{(1, 48)} = 183.17, P < .01$ ).

Table6  
*Test of Within Subjects Effects RM ANOVA for Comprehending Structure Type*

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Structure type	Sphericity Assumed	4397.954	1	4397.954	183.171	.000	.792
	Greenhouse-Geisser	4397.954	1.000	4397.954	183.171	.000	.792
	Huynh-Feldt	4397.954	1.000	4397.954	183.171	.000	.792
	Lower-bound	4397.954	1.000	4397.954	183.171	.000	.792
Type * Level	Sphericity Assumed	.554	1	.554	.023	.880	.000
	Greenhouse-Geisser	.554	1.000	.554	.023	.880	.000
	Huynh-Feldt	.554	1.000	.554	.023	.880	.000
	Lower-bound	.554	1.000	.554	.023	.880	.000
Error(fac tor1)	Sphericity Assumed	1152.486	48	24.010			
	Greenhouse-Geisser	1152.486	48.000	24.010			
	Huynh-Feldt	1152.486	48.000	24.010			
	Lower-bound	1152.486	48.000	24.010			

As it can be seen in Table7 below (multivariate tests), the partial eta square index is .79, which shows that 79 percent of the variance in the comprehending scores is due to structure type; this is quite a large effect size (.792 > .138). The attained results for Wilks' Lambda ( $F_{(1, 48)} = 183.17, P < .01$ ) indicated that structure type (i.e., garden path and non-garden path) influences comprehending significantly. Accordingly, the first null hypothesis that states garden-path structures do not have any effect on Iranian EFL learners' comprehension is rejected and we can claim that garden-path structures influence Iranian EFL learners' comprehension.

Also multivariate tests (Table7) showed that the interaction effect of structure type and language proficiency was not significant ( $(F_{(1, 48)} = .02, P > .05)$ )

Table7

*Multivariate Tests<sup>b</sup> RM ANOVA for Comprehending Structure Type*

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Structure type	Pillai's Trace	.792	183.171 <sup>a</sup>	1.000	48.000	.000	.792
	Wilks' Lambda	.208	183.171 <sup>a</sup>	1.000	48.000	.000	.792
	Hotelling's Trace	3.816	183.171 <sup>a</sup>	1.000	48.000	.000	.792
	Roy's Largest Root	3.816	183.171 <sup>a</sup>	1.000	48.000	.000	.792
Type * Level	Pillai's Trace	.000	.023 <sup>a</sup>	1.000	48.000	.880	.000
	Wilks' Lambda	1.000	.023 <sup>a</sup>	1.000	48.000	.880	.000
	Hotelling's Trace	.000	.023 <sup>a</sup>	1.000	48.000	.880	.000
	Roy's Largest Root	.000	.023 <sup>a</sup>	1.000	48.000	.880	.000

a. Exact statistic

b. Design: Intercept + Level  
Within Subjects Design: factor1

Table8 provides us with the results of tests of between-subjects effects that were performed to test the second null hypothesis investigating the effect of English language proficiency (as the between-subjects factor) on comprehending structure types.

Table8

*Tests of Between-Subjects Effects (Language Proficiency)*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	289261.579	1	289261.579	6205.606	.000	.992
Level	13557.619	1	13557.619	290.855	.000	.858
Error	2237.421	48	46.613			

Tests of between-subjects effects (Table 8 above) detected a statistically significant effect for language proficiency ( $F(1, 48) = 290, p < .05$ , Eta square = .85) in comprehending garden path and non-garden path structures. As a result, the second null hypothesis as language proficiency does not have any effect on Iranian EFL learners' comprehension of garden-path structures was rejected as well, and therefore, it can be claimed that language proficiency affects Iranian EFL learners' comprehension of garden-path structures. A line chart was drawn to illustrate the results. As evident from Figure 4.2, the students at advanced level could comprehend the garden path ( $\bar{x} = 58.92$ ), and non-garden path ( $\bar{x} = 72.04$ ) structures better than the intermediate students on the garden path ( $\bar{x} = 35.46$ ), and non-garden path ( $\bar{x} = 48.88$ ) structures.

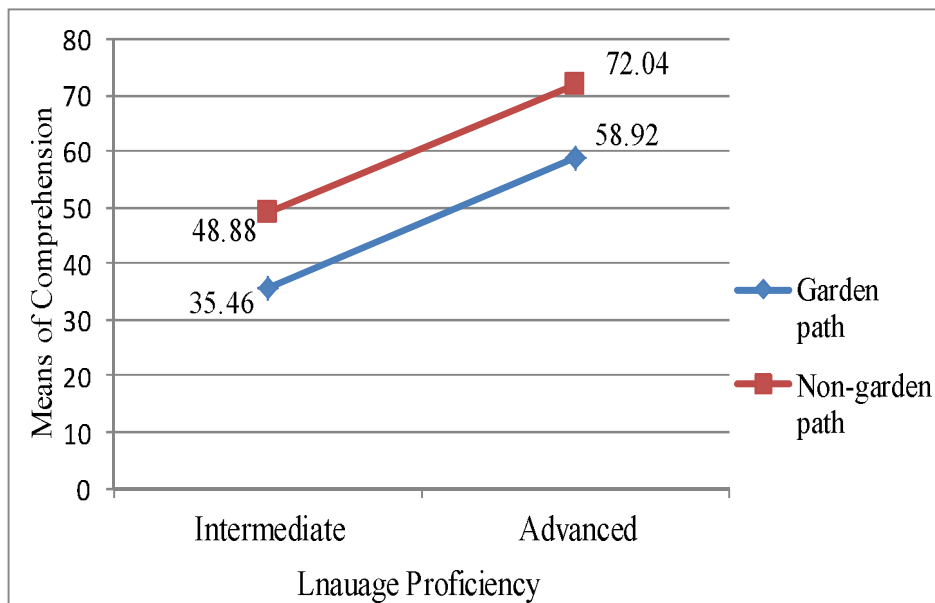


Figure 4.2 Comprehension means on the two structure types at two levels

## Discussion

The present study attempted to investigate the possible effectiveness of garden-path structures and language proficiency on Iranian EFL learners' comprehension. The results indicated that the performance of the advanced group on the comprehension of garden-path test was significantly better than the intermediate group. Regarding the first research question, the results revealed that garden-path structures do affect Iranian EFL learners' comprehension, the differences among the results of the garden path test and non garden-path test on Iranian EFL learners were statistically significant. GP sentences were judged the most difficult sentences because of the largest percentage of people that had indicated the sentences are difficult, in comparison to the percentages of other sentence types. This finding of the present study is consistent with a number of studies some of which were reviewed in chapter 2, such as Christiansson (2001), who pointed out the verbs in the GPS “may be more frequently transitive than intransitive and the sentences in the test lacks a comma. Several things in the sentence points to the use of a transitive analysis, but this must be undone when the error signal from the second verb is encountered” This corresponds to the tests and results found by Christianson (2001). Caron writes that “The way words are combined to form sentences obeys a set of rules which constitute the syntax of a language” He also writes that because of this all speakers of a certain language know implicitly the syntax of that said language that they speak. The speakers are able to produce and comprehend sentences that follow these rules. They can also know if a sentence is well formed (Caron, 1992). One also needs to know as stated before that a normal sentence usually contains a subject, a verb and an optional object or S-V-(O). The information that objects may be optional may be what is lacking in the grammar being taught in advanced groups. Maybe the S-V-(O) is being taught with such a quick pace that students do not get it and believe that all subjects have a verb and all verbs must have an object. All these studies confirmed the significant effect of level of English language proficiency on comprehension of garden-path structures.

Regarding the second research question of this study, the outcomes supported the positive effect of having high English language proficiency on garden-path comprehension. In agreement with the findings from earlier L2 processing studies (e.g., Juffs, 2004; Juffs & Harrington, 1996; Williams, 2006; Williams et al., 2001), participants showed evidence of processing the input incrementally. The findings go against the idea that L2 learners may be less sensitive to certain higher level plausibility information than native speakers, and as a result, rely more strongly on structural information. This is in line with the findings of other L2 studies, for instance, the plausibility effects observed in the learners in Williams et al.'s (2001) and Williams' (2006) studies, as well as with preliminary evidence suggesting that nonnative comprehenders are more sensitive to discourse-pragmatic information than native ones (Felser, Sato, & Bertenshaw, 2009; Roberts, Gullberg, & Indefrey, 2008). There are several reasons why the advanced learners may have been less troubled by our plausibility manipulation than the intermediate learners. Although the experimental materials were based on those from a study undertaken by English monolinguals (Pickering & Traxler, 1998), we adapted them so that they would be appropriate for L2 learners, keeping them comparatively simple. Among the various factors that have been found to affect the relative strength of GP effects in native speakers is the structural distance between the ambiguous NP and the disambiguating element (e.g., Christianson et al., 2001; Ferreira & Henderson, 1991).

It is worth noting that one important reason why the participants of the advanced group had the highest scores in language proficiency and garden-path tests could have been related to the background knowledge ability. Participants' ability to answer our comprehension questions can provide useful information about whether or not they ultimately managed to recover from being garden-pathed. Recall that in the current study participants were asked to read the sentences for meaning and subsequently answer questions that always targeted the grammaticality. On the basis of results from earlier studies, it was predicted that the L2 intermediate learners would find interpreting GP sentences more difficult overall than the L2 advanced learners, indicated by lower accuracy scores. It is very striking therefore that this was not generally the case here. Our L2 group's high accuracy scores are in stark contrast to those found in some earlier L2 processing studies that have used metalinguistic judgment tasks (Juffs & Harrington, 1996; Williams et al., 2001; but see Juffs, 2004).

Juffs and Harrington(1996) found that both the learners and native speakers took longer to judge GP sentences than non-GP sentences and also had similar difficulties accepting GP sentences as grammatical. The analysis of the participants' word by word RTs showed that the L2 learners patterned with the native speakers in that both groups showed elevated RTs on the disambiguating verbs in the GP sentences.

Although the above findings suggest that nonnative readers may be garden pathed to at least the same extent as native readers, relatively little is known about the role of semantic or pragmatic cues to interpretation in L2 ambiguity resolution. Williams, M'obius, and Kim (2001) investigated the on-line use of plausibility information in L2 learners' processing of temporarily ambiguous sentences containing wh - dependencies.

In other words, the native speakers may have been able to correct their initial parsing error before having had a chance to commit strongly enough to the wrong interpretation for plausibility to have any measurable effects on reanalysis difficulty. Our results suggest that the plausibility of the ambiguous NP affected the participants' ability to recover from their initial misanalysis, but differently so for the two types of GP sentence under investigation. As stated earlier, models of sentence comprehension differ in how reanalysis is handled (e.g., Gibson, 1991; Hale, 2003; Levy, 2008; Spivey & Tanenhaus, 1998; Trueswell & Kim, 1998) but all assume that weak and strong GPs would elicit different processing costs. For instance, according to structurally based parsing theories (e.g., Gorrell, 1995; Pritchett, 1992; Weinberg, 1999), the process of reanalyzing the ambiguous NP as a complement clause subject in weak GP sentences may involve relatively little computational effort because only minimal changes to the representation built thus far are required. That nonnative readers should have difficulty performing on-line reanalysis in strong GP sentences is actually not surprising, given findings from earlier L2 processing studies showing that learners' syntactic processing abilities may be reduced or less automatized compared to native speakers' (Felser & Roberts, 2007; Felser, Roberts, Gross, & Marinis, 2003; Hahne & Friederici, 2001; Marinis, Roberts, Felser, & Clahsen, 2005; Papadopoulou & Clahsen, 2003).

The only way to explain it from a psycholinguistic point of view is that every "...person's brain contains a lexicon of words and the concepts they stand for...and a set of rules that combine the words to convey relationships among concepts (a mental grammar)" (Pinker, 1994). This lexicon of words and the set of rules that form a mental grammar are obviously different from student to student because of what they have put into their rucksack previously. The many factors

that have to be taken into consideration make every student unique. The only thing that combines them is the teaching they have all received in school. That is a common factor. One study does report slower reading time in an ambiguous region than in a corresponding unambiguous region that cannot be dismissed as an effect of implausibility or superficial factors like a preceding function word (Ni et al. ,1996). These researchers measured eye fixations while their subjects read sentences and found slower reading times for the initial part of the phrase following the initial verb when the verb permitted a main verb object analysis than when it did not.

We do need to acknowledge, of course, that this study was a short period experiment, the general findings of which would need to be replicated before any firm conclusions can be drawn. For one thing, the number of participants was small and their sex was limited to female learners. For another, the answering to garden-path test experiment in the institute without instruction was a new experience for the participants.

Comprehenders often fail to understand certain garden-path structures. This finding is particularly striking given that the subordinate-main clause ambiguity is not among the most difficult ones to resolve; the reduced relative structure, for instance, is generally thought to be more challenging. We have argued that this discovery has important implications for models of sentence comprehension and reanalysis. We also believe that the research is of interest to those interested in architectural issues in cognitive science more generally, because it seems to suggest that comprehension may be based on superficial and somewhat distorted representations. Clearly, the field of sentence comprehension would benefit if more work were conducted that focuses directly on trying to uncover people's interpretations of language. As we have seen, there is much to be learned from studies designed to reveal the content of people's representations for sentences.

As mentioned earlier, the garden path effect is most common in written language, because when we speak, we make small pauses in places where commas should be and the proper intonation helps us understand the sentences better. A teacher can put students into small groups and provide several of these sentences. Their task would be to read them out loud properly, so that there is no garden path effect noticeable, and students from other groups can understand them. With higher-level students, a teacher can have them go through newspaper titles, magazines and other online media and find sentences which they think can be classified as garden path sentences.

As a follow up to these activities, or as a separate one, a teacher can provide her students with many English words which can serve as nouns, verbs, adjectives and other parts of speech, give some examples, and have them create their own garden path sentences.

These are some of the ideas which could help students understand the English language better, and they would be able to tackle the problematic garden path sentences when they come across them.

### **Summary of the Findings**

The present study was an attempt to answer the question of whether there are possible effectiveness of garden-path structures and language proficiency on Iranian EFL learners' comprehension.

Results of the garden-path test revealed that the group with high level of English language proficiency (Advanced) had the best performance on comprehending garden-path sentences. The other group with low level of English language proficiency (Intermediate) had the lowest mean

and hardly comprehend these structures that are grammatically true. Likewise, the Repeated Measure ANOVA procedures indicated that differences between both of the advanced group and the intermediate group were statistically significant. Therefore, it can be concluded that learning more grammatical rules and being English language proficient facilitates comprehension of garden-path structures. This is because having /un/conscious ability and an /un/conscious awareness of linguistic structure led to deeper processing, better comprehension and enhanced understanding of GP structures. With regard to the effects of language proficiency on garden-path comprehension, the finding of the study showed that there are significant differences among the effect of different language proficiency levels on learners' knowledge of grammatical rules in garden-path sentences. Some of the students manage to fully reanalyze the sentences presented in front of them. Some of them fall into the trap and are led 'up the garden path'. Not even the English teachers where the test was performed managed to understand the GPSs correctly.

### **Conclusion**

The present study attempted to investigate the comprehension of garden path structures by Iranian EFL learners. The findings showed that the group with high level of English language proficiency (Advanced) had the best performance on comprehending garden-path sentences. Also, the results indicated that although the performance of the advanced group on comprehending GP sentences was better, the differences among the advanced and intermediate groups on the GP sentences comprehension test were statistically significant. The work we have described here and in Christianson *et al*(2001). (in press) has yielded an important empirical result: Comprehenders often fail to understand certain garden-path structures. This finding is particularly striking given that the subordinate-main clause ambiguity is not among the most difficult ones to resolve; the reduced relative structure, for instance, is generally thought to be more challenging.

The results showed that when they tried to analyze the sentences they ran into the obstacle with whether or not a verb, in this case, is transitive or intransitive. Hence the /re/analysis of the sentences failed, which is exactly what Christiansson (2001) stated in his study as well, “it is likely that no interpretation ever will be reached, or at least no more than a guess based on the information the reader received from the combination of words and phrase meaning” (Christiansson , 2001).

To conclude, the addition of more suitable ways of teaching such sentences facilitates comprehension of GP structures.

### **Pedagogical Implications**

The results of this study may have some pedagogical implications. As it was mentioned in the previous chapters, the garden path effect is most common in written language, because when we speak, we make small pauses in places where commas should be and the proper intonation helps us understand the sentences better. A teacher can put students into small groups and provide several of these sentences. Their task would be to read them out loud properly, so that there is no garden path effect noticeable, and students from other groups can understand them.

With higher-level students, a teacher can have them go through newspaper titles, magazines and other online media and find sentences which they think can be classified as garden path sentences. As a follow up to these activities, or as a separate one, a teacher can provide her students



with many English words which can serve as nouns, verbs, adjectives and other parts of speech, give some examples, and have them create their own garden path sentences.

These are some of the ideas which could help students understand the English language better, and they would be able to tackle the problematic garden path sentences when they come across them.

The findings of the present study can have significant implications for teachers. First, instead of encouraging students to read a text in a word by word or sentence by sentence fashion, they can help them to understand features of garden-path structures to interpret the text. Secondly, by knowing the advantages of understanding a text in relation to its context of situation, they can use formal teaching of register to help students in their general comprehension of a passage. Teaching types of garden-path structures in general, and for language learning in particular, can have positive and notable outcomes. Consequently, teaching weak garden path structures gradually toward strong garden-path structures facilitate comprehension and enhance retrieving the meaning of garden-path sentences, using this instruction mode can be useful for both intermediate to advanced learners.

The present study may also have implications for material writers, textbook authors, EFL package designers in that it may encourage them to be aware of garden-pathed input.

The above-mentioned significant issues should be thoroughly considered, and revised. In addition to that, further experimental research is essentially the purpose of elucidating whether there are significant effects of prior or subsequent discourse contexts on proper parsing of the complexity, as well as the ambiguity resolution of, garden path sentences.

Taken together, these studies present a challenge for the fundamental assumption in psycholinguistics that comprehension is based on the creation of full, accurate, and detailed representations. It appears, instead, that people work on sentences until they reach a point where it subjectively makes sense to them and then processing may cease. The criterion that an individual sets may vary depending on the particular circumstances in which the linguistic communication is taking place. If a casual conversation is happening in a noisy bar or restaurant, then the criterion will likely be set quite low; at the other extreme, if the comprehender is a participant in an experiment in which she knows that her ability to read and understand sentences is being measured, then the criterion will be set much higher. An implication of this view is that the participants in our experiments were likely setting quite a stringent criterion for what they would consider adequate comprehension and yet they still failed to understand these garden-path sentences completely. This observation suggests that these garden-path sentences somehow produce an illusion of comprehension in our participants. These sentences, then, might form a class with the items used in Moses illusion studies and perhaps even the stimuli that elicit visual illusions. They will be misinterpreted despite the best attempts of the comprehender to come up with a correct analysis.

### **Suggestions for the Further Research**

This study focused on the possible effectiveness of garden-path structures and language proficiency on Iranian EFL learners' comprehension. For those who are interested in conducting

research in the area of the garden–path comprehension and the effect of level of English language proficiency on comprehending ,following questions are suggested for further research:

1. Investigating the impact of garden-path instruction on comprehending can be another area for research.
2. Further investigation is needed to provide stronger evidence for the effectiveness of different levels of language proficiency on reading comprehension.
3. This study used multiple-choice questions to test learners' reading comprehension. Other ways of testing reading comprehension may provide more precise results.
4. The sample size in the present study was small and limited to intermediate and advanced learners. So this research can be conducted with a larger sample and with students at different levels of proficiency.
5. The age and gender of the participants were not considered as variables, so further research can take these variables into consideration.
6. We also believe that the research is of interest to those interested in architectural issues in cognitive science more generally, because it seems to suggest that comprehension may be based on superficial and somewhat distorted representations.
7. Clearly, the field of sentence comprehension would benefit if more work were conducted that focuses directly on trying to uncover people's interpretations of language.
8. The grammatical theory of sentence processing has many internal theoretical assumptions that need to be studied further.

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