The Effect of Explicit and Implicit Written GJ Tasks on the Nature of EFL Learners’ Grammatical Proficiency When Rendering WH-Questions

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Abstract
This study is a truly experimental quantitative research with repeated measures design investigating the true nature of L2 grammatical proficiency by focusing on its component parts. It examines the performance of 60 female EFL learners at two levels of proficiency (i.e. High- and Low-Intermediate) using two types of computerized Grammaticality Judgement Tasks in different orders (i.e. explicit and implicit written GJ tasks) per each participant at a one week interval for two weeks to determine the extent to which L2 learners’ performance is

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affected by different independent variables chosen and manipulated out of many others that exist (i.e. explicit and implicit knowledge of WH-movement) as well as the effect of proficiency level on the dependent variable (i.e. L2 participants’ performance on the two GJ tasks) while focusing on subjacency. The null hypothesis is that no relationship exists between the explicitness or implicitness of a GJ task and the EFL participants’ performance on WH-questions. Results from analyzing the elicited measurement data indicate that the performance scores of the two proficiency groups in the two GJ tasks did not differ significantly, and, as a result, the null hypothesis was not rejected.

**Key Words:** Explicit Written GJ Task, Grammaticality Judgement Task, Implicit Written GJ Task, L2 Grammatical Proficiency, Repeated Measures Design, Subjacency.

1. **Introduction**

Research has indicated the importance of syntax ever since the influence of Chomsky’s ideas on linguistics. Within syntax, the syntactic operation of *merger*, which views languages to have a potentially infinite number of sentences, allows words, phrases, and clauses to form sentence structures and leads to the formation of grammatical sentences in all languages. Such structures are projections of overt constituents such as words, phrases, and clauses. Moreover, they consist of covert, null, and empty constituents. One of the important aspects of syntactic structures is the *empty category*, which is of immense significance in the formation of WH-questions. Trace is a sample of empty categories resulting from different movement types. Traces are of significance in the processing of different sentences. Tree diagrams, which are binary-branching diagrams, represent different syntactic structures and consist of three positions (i.e. specifier, head, and complement) (Radford, Atkinson, Britain, Clahsen & Spencer, 2009).
The syntactic structures of sentences are independent of their related meanings, hence the ability to study such syntactic structures independently of their associated semantic contents. However, the sentential ordering of syntactic structures, according to Chomsky, only permits specific orderings, hence the ungrammaticality of some sentences. A variety of grammar models, which are derivations of UG, try to explain the rationale behind such specific orderings and explore the computational properties of humans responsible for the syntactic processing of sentences in general. Hence, UG is an appropriate choice in this regard because it is of great complexity and power in syntax.

Syntactic computation, which is a major property of human language faculty, is structure-dependent. In addition, humans’ language faculty can compute and build such binding relations as c-command and indexation that are parts of the resources that constitute their language faculty (Isac & Reiss, 2008). Syntax is a universal combinatory system of humans’ linguistic competence, which is an integral part of language faculty and constitutes the basis for all human language instantiations (Ramchand, 2008).

Interrogatives are one type of complex syntactic structures and are of two types (i.e. closed and open). Whereas the former shows subject-auxiliary inversion, the latter shows the fronting of the nonsubject interrogative phrase that involves a WH-word with the ability to trigger subject-auxiliary inversion, and, as a result, the occurrence of WH-movement. In addition, such interrogatives can be in the form of multiple WH-questions (Collins, 2006). Interrogatives are multi-clausal sentences that are syntactically related to each other via subordination because their clauses show unequal syntactic status (Huddelestone & Pullum, 2006).

An important point in WH-questions is movement. Movement is a process in generative grammar and a syntactic operation by which constituents move and leave behind silent trace copies. Movement, which was formulated from the early 1970s, "move[s] as few
constituents as possible the shortest distance possible" (Radford et al. 2009, p.301). In 2000s, traces were reformulated in terms of copying according to which units in one position were duplicated in another (Matthews, 2007).

Movements are either A-movements or A-bar movements. In cases where an expression, such as an NP, is moved to a position that can only be occupied by argument expressions, such as the case of passivization, A-movement occurs, whereas in cases where an expression, such as a WH-phrase, is moved to a position that can be occupied by both arguments and adjuncts, A-bar movement occurs (Radford, 2004). Another type of syntactic movement is head-movement, such as the cases where a V moves to I (Hawkins, 2001).

Movement can occur both overtly (i.e. before spell-out) and covertly (i.e. after spell-out at LF). Feature checking triggers WH-movements. One of the major characteristics of movements is the resultant chain that is formed between the moved WH-phrases (i.e. head of the chain) and the traces left behind by such movements (i.e. foot of the chain). The syntactic form of movement acts as a distinguishing factor among languages and, as a result, differs from language to language. Whereas in some languages like Japanese and Chinese, questions are formed without movement, in others, such as English, they require movement. Variable movements exist in other languages such as the case of Turkish (Cook, 1993).

Movements are constrained by a UG principle termed the subjacency principle (Radford, 1997). Subjacency, which was formulated by Chomsky in the late 1970s, refers to the syntactic constraints that block the movement of a unit if that unit crosses more than one bounding node. WH-movement is constrained by subjacency and refers to the movement of WH-forms to the beginning of a sentence or even a clause resulting in the formation of WH-traces. The extracted constituents make short-step moves because long moves give rise to ungrammaticality in constructions. In addition, the Q
The effect of explicit and implicit morpheme of complementizers requires WH-phrases to move into the clause-initial specifier CP-position.

Whereas IPs and NPs (DPs) are the bounding nodes in English, NPs and CPs are the bounding nodes in Persian. Hence, WH-movement must be, in English, to the nearest empty CP to avoid subjacency violations, whereas it must be, in Persian, to the nearest empty IP to avoid subjacency violation. Subjacency is an example of "subtle parameter variation" that extends far beyond L2 input and cannot be developed by L1 grammar. In bounding nodes, parametric variation is seen across languages (White, 1989, p.111). In some languages where WH-forms are not preposed, such as Persian, WH-forms are called in-situ; however, such WH-in-situ questions are used as echo questions in English. Feature strength triggers operator movements in English; that is, the WH-feature of probe is strong in English and, as a result, the noninterpretable feature of the probe attracts its interpretable counterpart on goal overtly, that is before spell-out, and the moved WH-form c-commands its trace (Radford, 1997).

Upon reaching LF, the checking process checks and deletes the noninterpretable formal features, which have no semantic content, because such features are the viruses of the system, unlike the interpretable formal features that are reserved and interpreted. WH-phrases either move to check (i.e. the operation Attract, or rather Enlightened Self-Interest) or to be checked (i.e. the operation Greed) (Lotfi, 2003).

Many of the UG principles are parameterized because they function with varying degrees of effects in different languages. As for the principle of subjacency, certain construction types are islands; that is, extraction is impossible out of them. Such syntactic islands fall into four categories, namely object noun complements, subject noun complements, complex NPs, and WH-islands. Accordingly, certain general constraints limit the freedom of the WH-movement rules such as the A-over-A condition, subject condition, the complex noun
phrase constraint (CNPC), and WH-island constraint. All of these constraints can be reduced to the cases of subjacency (White, 1988).

Every language is made up of linguistic ingredients, and such ingredients are arranged based on a set of rules called grammar. One part of grammar that deals with the sentence structures is called syntax. As such, the major concern of syntax is word order, and those linguists who work within generativism have taken into account syntactic universals as the best piece of evidence for UG. Such universals have even been of constructive contribution in SLA research because they apply to all language types (Magni, Scalise & Bisseto, 2009).

Grammar is a single and complex unit that generates syntactic structures and assigns representations to such structures at two levels, namely phonological form (PF) and logical form (LF). Different opinions have existed about the grammar structure since the start of generative linguistics in the 1950s; however, all such different opinions have agreed that grammar is abstract and is not located in space or time. A speaker's grammar is his knowledge object because such a grammar has information about his language.

In addition, such a grammar is represented in the speakers' minds because grammars serve in the speaker/hearers' mental processes and mediate the production and perception of speech. Moreover, the study of grammar is highly effective in understanding the nature of linguistic ability of humans because when people speak a language, they follow its formal rules, such as rules of syntax (George, 1989).

L2 acquisition theories distinguish between two types of linguistic knowledge (i.e. *implicit* and *explicit knowledge*). Whereas some researchers (e.g., Dekeyser, 1998) adopt an interface position where explicit instruction leads to the development of both explicit and implicit knowledge, others (e.g., Doughty, 2003) adopt the position where explicit knowledge only leads to the development of explicit knowledge.
In the explicit instruction type, learners focus on some rule during their learning process and develop metalinguistic awareness towards that rule. It is a deductive process where a rule is given to the learners. Furthermore, explicit instruction is directed towards intentional and explicit learning. In the implicit instruction type, on the other hand, learners are directed to infer rules without awareness, hence its being inductive in process. Implicit instruction is directed towards incidental learning. Whether implicit and explicit knowledge types are separate or two poles on a continuum is a controversial issue. However, most researchers (e.g., Ellis, 2005) have argued for the former case. In addition, some researchers (e.g., Krashen, 1981) have argued against the existence of interaction between these two knowledge sources, whereas others have argued for the existence of an interface position.

Much research in subjacency (e.g., Schachter, 1988) has indicated that different L2 learners’ access to the UG principle of subjacency and the proper observance of it in GJ tasks can be either attributed to UG or the effect of L2 learners’ L1; that is, in cases where L2 learners’ L1 resembles L2, L2 learners’ observance of subjacency could be either due to UG or their L1 (such as the case of Dutch native speakers learning English), whereas in cases where L2 learners’ L1 does not resemble their L2, L2 learners’ observance of subjacency could only be due to UG (such as the case of Korean native speakers learning English). In addition, such researchers have only tested their L2 learners’ knowledge of subjacency under uniform and like conditions and have oftentimes concluded that subjacency is a part of the L2 learners’ unconscious knowledge, or rather grammatical proficiency, although it may not be consistently obeyed. Other researchers (e.g., Bley-Vroman, Felix & Ioup, 1988) have only emphasized UG availability while rendering GJ tasks on subjacency and have concluded that this availability of UG is, at times, only overridden by other factors in performance (White, 1990).
In another experiment, researchers (e.g., Schachter, 1989, 1990) have indicated that learners fail to recognize violations of UG principles, such as subjacency, unless these principles also operate in their L1; therefore, Korean and Chinese speakers cannot recognize subjacency violations in English, whereas Dutch speakers can (White, 1996).

Research on the effect of proficiency on the observance of subjacency (e.g., White, Travis & Maclachlan, 1992) has indicated that all the High-Intermediate adult Malagasy learners of English and only half of the Low-Intermediate group has performed like a native English-speaking control group. In addition, results have proved that L1 is not the only source of the learners' UG-like knowledge and that UG principles remain available in adult L2 acquisition. This obtained result has, however, contradicted Bley-Vroman's belief stating that access to UG is only via the L1. Moreover, it has opposed the belief of those who claim no access to UG at all such as Clahsen and Muysken (1986) (White, 1996).

Research on the role of implicit and explicit knowledge in rendering WH-questions on GJ tasks (e.g., Green & Hecht, 1992) has indicated that tests show different kinds of sensitivity to the subjects' implicit and explicit knowledge. That is, in most cases, subjects' guessing over-estimates their implicit knowledge, and their formulating of a rule to decide between two competing forms under-estimates their explicit knowledge (Dekeyser, 2003).

Some researchers (e.g., Cleeremans & McClelland, 1991) have claimed that implicit learning is restricted when subjects are to establish relationships between distant elements in sentences. Moreover, subjects' ability in grammaticality has not provided hard evidence to prove that abstract issues are learned implicitly. Researchers have constantly argued that only simple knowledge can be implicitly learned and not more complex knowledge. Much research (e.g., Ellis, 2003) has indicated that a generative account of language makes a distinction between implicit and explicit knowledge.
The former implies the manifestation of language knowledge in performance with no awareness, whereas the latter refers to that language knowledge of which speakers are aware and can verbalize. When rendering implicit grammatical judgements, subjects are at a loss when it comes to explaining how they can make a correct grammatical judgement. The widely-held belief is that whereas implicit knowledge is easy to have rapid access to, explicit knowledge is not, but proficiency is of effect in this regard; that is, with constant practice, access to explicit knowledge can be increased; however, some researchers (e.g., Hulstijn, 2002) have believed that practice only results in false automatization and cannot resemble implicit knowledge.

The null hypothesis in this study is that there is no relationship between the explicitness or implicitness of a GJ task and the EFL participants’ performance on WH-questions. Hence, the purpose of this study is to determine whether any relationship exists between the explicitness or implicitness of a GJ task and the EFL participants’ performance on WH-questions because language is a part of our mental structure and a cognitive system. As a result, different means of receiving linguistic input have different effects on our language processing such as the difference between receiving input via pictures (i.e. implicit written GJ task), or visual sentences (i.e. explicit written GJ task). The reason is that different psychological processes are triggered by such different input types.

2. Method
2.1. Participants
Sixty female EFL university students of the Islamic Azad University (Khorasgan Branch), within the 19-30 age range, participated in our study. Participants were randomly selected from the accessible EFL student population of Islamic Azad University and divided into two proficiency groups (i.e. High- and Low-Intermediate groups) as
determined by the Grammar and Listening Modules of the Oxford Placement Test (OPT) (2004). Participants had been permanent residents of Iran and lived in Esfahan. Participants were treated according to the “Ethical Principles of Psychologists and Code of Conduct” (American Psychological Association, 2001).

2.2. Materials
Two two-choice GJ tasks with the same number of WH-questions were used to tap female EFL participants’ knowledge of forming WH-questions. The GJ tasks examined the effects of two independent variables (i.e. explicit and implicit ways of presenting WH-questions) on the High- and Low-Intermediate EFL participants’ performance in GJ tasks.

The first GJ task (i.e. explicit written GJ task) was a 30-question form-focused task based on which female EFL participants’ explicit knowledge of constraints governing WH-movements in English was tested. That is, participants were instructed to determine whether the written WH-questions served as proper questions for the explicitly written stimuli that preceded such WH-questions four seconds ago. Implicit written GJ task, on the other hand, was a 30-question meaning-focused task based on which female EFL participants’ use of congruence strategy was tested. That is, participants were instructed to determine whether the presented on-screen pictures were congruent with their respective WH-questions that would pop up on the screens four seconds after the pictures. The AUTHORWARE software (2005), which is an SAT-based software (i.e. speed and accuracy tradeoff), was used to develop the two GJ tasks.

The two GJ tasks tested different cases of subjacency: (a) A-over-A condition where WH-elements are extracted out of an object noun complement; (b) subject condition where WH-elements are extracted out of a subject noun complement; (c) complex noun phrase constraint (CNPC) where WH-elements are extracted out of a
complex NP; and (d) WH-island constraint where WH-elements are extracted out of a wh-clause. In all such subjacency cases more than one bounding node (NP, PP, S or $Ś$) has been crossed.

The two GJ tasks included both grammatical and ungrammatical WH-questions of equal complexity, vocabulary, and structure. In addition, filler items were included in the two GJ tasks. Participants were instructed to select only one of the two choices for each question, namely either acceptable or not acceptable. The tasks investigated syntactic islands in English; that is, those construction types that are islands with respect to movement.

2.3. Procedure
The research strategy in his study was to manipulate the independent variables (i.e. explicit and implicit written GJ tasks) to determine their effects on the dependent variable (i.e. female EFL participants’ performance on the GJ tasks). A repeated-measures experimental design was used in this study to test the null hypothesis and the problem via administering the two GJ tasks to all the participants over two weeks.

Testing occurred in two consecutive sessions for each participant one week apart. In each session, one of the two GJ tasks was used for each participant, and in another session, the other GJ task was used for the same participant. The presentation of the two GJ tasks was counterbalanced for each group. That is, in the first session, the explicit written GJ task was used for the first group, whereas the implicit written GJ task was used for the second group. In the second session, the implicit written GJ task was used for the first group, whereas the explicit written GJ task was used for the second group.

After receiving thorough verbal instructions on how to take the tasks, each participant took her seat and used the laptop to take part in the experiment. On the explicit written GJ task, participants, first, received a written stimulus in the form of a sentence for each item that
would then be followed by a related WH-question four seconds later to be judged for grammaticality. On the implicit written GJ task, the stimuli were in the form of pictures; that is, each question item consisted of a picture that would appear on the screen four seconds prior to its related WH-question to be judged for congruency. Neither the stimuli nor their respective WH-questions would fade out until answered. Participants were instructed to left-click for acceptability and right-click for unacceptability.

Each participant took part in the computerized GJ tasks separately in a totally empty university class where no distractions existed. Further, an attempt was made to observe the same class lighting, time, silence, and words used in instructions for each participant so that each participant would take the tests in nearly similar testing conditions. A coding sheet was dedicated to each participant to gather the required experimental data and record the scores of each participant.

2.4. Data Analysis

The statistical test of two-way repeated measures ANOVA was used for testing the null hypothesis in this study. Since the intention was to compare participants’ performance on more than one GJ task, the repeated measures ANOVA was used. As a result, the overall performance of the High-Intermediate group was compared with the overall performance of the Low-Intermediate group. Each participant in both High- and Low-Intermediate groups did all the two GJ tasks. Hence, there were four sets of results to be compared for each group; that is, two sets of scores from the performance of the High-Intermediate group on both explicit and implicit written GJ tasks, and two sets of scores from the performance of the Low-Intermediate group on both explicit and implicit written GJ tasks.

Each group was analyzed separately using the repeated measures ANOVA to measure how a single group performed on multiple
measures (i.e. the two GJ tasks) and to measure if the effects of those measures were independent. In addition, the overall performance of one group was statistically compared with the overall performance of the other group to see if proficiency was of any effects on the overall performance of the groups.

3. Results
The resultant indispensable general tendencies of the obtained data as well as the overall spread of the scores, or rather measures of central tendency and variability, are shown in Table 1.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>N</th>
<th>Range</th>
<th>Mean</th>
<th>Standard Error of the Mean</th>
<th>Standard Deviation</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LG_EXP_WRI</td>
<td>30</td>
<td>15</td>
<td>17.03</td>
<td>0.726</td>
<td>3.978</td>
<td>15.826</td>
</tr>
<tr>
<td>LG_IMP_WRI</td>
<td>30</td>
<td>11</td>
<td>15.93</td>
<td>0.538</td>
<td>2.947</td>
<td>8.685</td>
</tr>
<tr>
<td>HG_EXP_WRI</td>
<td>30</td>
<td>11</td>
<td>17.60</td>
<td>0.513</td>
<td>2.811</td>
<td>7.903</td>
</tr>
<tr>
<td>HG_IMP_WRI</td>
<td>30</td>
<td>13</td>
<td>17.37</td>
<td>0.568</td>
<td>3.113</td>
<td>9.689</td>
</tr>
</tbody>
</table>

Two of the descriptive statistics that figure prominently in statistical analyses are mean and standard deviation. The numerical values of mean indicated that HG-EXP-WRI did better than the other three independent variables because the mean value was weighted in its favor. In cases where standard deviations are smaller than means, such as the case in this study, means can better capture the behavior of the samples.

The numerical values of standard deviation and variance gave us exact ideas of the typical behavior of the two groups and showed that HG-EXP-WRI had the least variability (i.e. more homogeneous in terms of performance on the explicit written GJ task) whereas LG-EXP-WRI had the most variability and was, as a result, less...
homogeneous. Hence, HG-EXP-WRI showed the most degree of homogeneity whereas LG-EXP-WRI showed the least degree of homogeneity.

Moreover, the calculated standard deviation statistics portrayed in Table 1 show how scores are dispersed around the means. The examination of standard deviation and mean values in relation to one another led to the conclusion that LG-IMP-WRI and HG-EXP-WRI were more or less equally dispersed from the means, whereas HG-IMP-WRI and LG-EXP-WRI were differently dispersed from their means, with LG-EXP-WRI showing the most degree of dispersion.

In addition, the difference between the calculated mean statistics of the two Low-Intermediate means (i.e. 17.03 and 15.93) and the two High-Intermediate means (i.e. 17.60 and 17.37) showed that proficiency level had been of effect on the performance of groups; that is, there was more clustering of scores around the midpoint and, as a result, less variability in the two performance types of the High-Intermediate group than the Low-Intermediate group. Hence, the more the proficiency level of a group, the more the homogeneity between the performance of that group under different conditions (i.e. GJ tasks).

The level of significance (alpha level) set as the criterion and standard for rejection and acceptance at the onset of this study was 5% (.05). Hence, the results of the two-way repeated measures ANOVA tests, or rather the univariate F-tests, were analyzed at the .05 level to indicate that a 95% probability existed that the difference between the different performance types of the groups had been due to the experimental treatment rather than to sampling error.

Two-way repeated measures ANOVA, which compares participants' performance on more than one task, is a robust parametric test, and one of the assumptions underlying such parametric tests is that data points are independent, but this assumption does not hold for a repeated measures design because, in repeated measures design, data for different conditions have come
from the same people, hence the relatedness of data from different experimental conditions. This issue gives rise to an additional assumption according to which the relationship between pairs of groups is equal, that is the variances of the differences between levels of the repeated measures factor are equal in a within-subjects design. This assumption is called *sphericity* or *circularity*, which resembles the homogeneity of variance assumption in between-subjects ANOVA. Sphericity should not be violated because its violation causes loss of power in terms of an increased probability of a type II Error and not being able to compare the *F* statistic to the normal tables of *F*. In addition, the software used cannot calculate a significance value. However, the SPSS software package includes a procedure called *mauchly's test* that determines if the assumption of sphericity has been violated. Mauchly’s test can determine whether the condition of sphericity has been met; that is, it tests the hypothesis that the variances of the differences between conditions are equal. Table 2 shows the findings of running mauchly’s test for the null hypothesis in this study.

*Table 2: Mauchly's Test of Sphericity*

<table>
<thead>
<tr>
<th></th>
<th>Within Subjects</th>
<th>Approx. Chi</th>
<th>Epsilon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Green-House</td>
</tr>
<tr>
<td>Effect</td>
<td>Mauchly’s W Square df Sig.</td>
<td>Geisser</td>
<td>1.000</td>
</tr>
<tr>
<td>Group</td>
<td>1.000</td>
<td>0.000</td>
<td>0</td>
</tr>
<tr>
<td>Treatment</td>
<td>1.000</td>
<td>0.000</td>
<td>0</td>
</tr>
<tr>
<td>Group*Treatment</td>
<td>1.000</td>
<td>0.000</td>
<td>0</td>
</tr>
</tbody>
</table>

If Mauchly’s test statistic is significant (i.e. a probability value less than .05), it will indicate the existence of significant differences between the variance of differences and, as a result, the violation of
sphericity; in this case, the $F$-ratios cannot be trusted. If, on the other hand, mauchly’s test statistic is nonsignificant (i.e. a probability value more than .05), it will indicate lack of significant differences between the variance of differences and, as a result, the observance of sphericity. Since the significance values, as shown in Table 2, were $<.05$, the conclusion was that there was a significant difference between the two GJ tasks. In addition, there was a significant difference between the two proficiency levels; however, this test does not determine which GJ task or proficiency level differed from the other. In fact, the epsilon value, Table 2, was checked to decide which of the three corrections to use (i.e. whether to use Green-House Geisser, Huynh-Feldt or Lower-Bound).

Epsilon is a descriptive statistic that indicates the degree to which sphericity has been violated. In cases where the epsilon value is more than 0.75 (i.e. $>0.75$), such as the case in Table 2, the Huynh-Feldt correction must be used, whereas in cases where the epsilon value is less than 0.75 (i.e. $<0.75$), the Greenhouse-Geisser correction must be used. Since in this study the epsilon values from the Mauchly’s test values were 1.000 (i.e. Table 2) and all of the three values were $E >0.75$, the less conservative Huynh-Feldt corrected values were used to adjust both within-subject and between-subject degrees of freedom, as shown in Tables 3, 4, and 5.

The corrected tests, as shown in Tables 3, 4, and 5 (i.e. tests of within-subjects effects) were used in this study as a result of using the corrections in Table 2 (i.e. under the heading of epsilon) to adjust the degrees of freedom for the averaged tests of significance. The application of the Huynh-Feldt correction epsilon value, as shown in Table 3, led to no significant differences between the two proficiency groups in terms of their performance on the two GJ tasks. That is, the corrected $F$-ratio of the Huynh-Feldt correction procedure showed the significance value of (.208) according to which High- and Low-Intermediate proficiency groups showed no significant differences in
their performance in the two GJ tasks over two weeks while rendering WH-questions. Hence, no understanding was obtained as to which proficiency group showed significant effects in its performance in the two GJ tasks while rendering WH-questions.

Table 3: Tests of Within-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Sphericity Assumed</td>
<td>30.000</td>
<td>1</td>
<td>30.000</td>
<td>1.660</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>30.000</td>
<td>1.000</td>
<td>30.000</td>
<td>1.660</td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>30.000</td>
<td>1.000</td>
<td>30.000</td>
<td>1.660</td>
</tr>
<tr>
<td></td>
<td>Lower-Bound</td>
<td>30.000</td>
<td>1.000</td>
<td>30.000</td>
<td>1.660</td>
</tr>
</tbody>
</table>

The application of the Huynh-Feldt correction epsilon value, as shown in Table 4, led to no significant differences in the effects of different treatments of GJ tasks (i.e. explicit and implicit GJ tasks) on the performance of female EFL participants while rendering WH-questions. That is, the corrected $F$-ratio of the Huynh-Feldt correction procedure showed the significance value of (.118) according to which no significant differences existed between the two GJ tasks in terms of their effects on the female EFL participants’ performance while rendering WH-questions in the explicit and implicit written GJ tasks. Hence, no understanding can be obtained as to which of the two GJ tasks is of the significant effect on the performance of female EFL participants while rendering WH-questions. The exact significance levels in Table 4 are the result of comparing the $F$-ratios against a critical value for 1 and 29 degrees of freedom.
Table 4: Tests of Within-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>13.333</td>
<td>1</td>
<td>13.333</td>
<td>2.601</td>
<td>0.118</td>
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<tr>
<td>Sphericity Assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Greenhouse-Geisser</td>
<td>13.333</td>
<td>1.000</td>
<td>13.333</td>
<td>2.601</td>
<td>0.118</td>
</tr>
<tr>
<td>Huynh-Feldt</td>
<td>13.333</td>
<td>1.000</td>
<td>13.333</td>
<td>2.601</td>
<td>0.118</td>
</tr>
<tr>
<td>Lower-Bound</td>
<td>13.333</td>
<td>1.000</td>
<td>13.333</td>
<td>2.601</td>
<td>0.118</td>
</tr>
</tbody>
</table>

Since the statistical analysis used is the two-way repeated measure ANOVA, where one factor is varied between subjects (i.e. proficiency level) and the other within subjects (i.e. explicit and implicit GJ tasks), the interaction between a within-subjects factor (i.e. the two treatments of the explicit and implicit written GJ tasks) and a between-subjects factor (i.e. group in terms of the two proficiency levels [High- and Low- Intermediate levels]) was analyzed for the two experimental groups, but since there was violation of sphericity, the interaction, using Table 5, was not taken into consideration without a correction, hence the application of the Huynh-Feldt correction epsilon value, as shown in Table 5. The application of the Huynh-Feldt correction epsilon value, as shown in Table 5, did not lead to any significant interactions between the within-subjects factor (i.e. the two treatments of the explicit and implicit GJ tasks) and the between-subjects factor (i.e. group in terms of the two proficiency levels) for the two experimental groups. That is, the corrected $F$-ratio of the Huynh-Feldt correction procedure showed the significance value of (.361) according to which no significant interaction existed between the within-subjects factor (i.e. the two treatments of the explicit and implicit GJ tasks) and the between-subjects factor (i.e. group in terms of the two proficiency levels) for the two experimental groups.
Table 5: Tests of Within-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group* Treatment</td>
<td>Sphericity Assumed</td>
<td>5.633</td>
<td>1</td>
<td>5.633</td>
<td>0.863</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>5.633</td>
<td>1.000</td>
<td>5.633</td>
<td>0.863</td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>5.633</td>
<td>1.000</td>
<td>5.633</td>
<td>0.863</td>
</tr>
<tr>
<td></td>
<td>Lower-Bound</td>
<td>5.633</td>
<td>1.000</td>
<td>5.633</td>
<td>0.863</td>
</tr>
</tbody>
</table>

The nonsignificant interaction indicated that the groups were not changing in terms of performance over different treatments. Hence, no understanding can be obtained as to whether the interaction of Group and Treatment is of any significant effects on the ability of female EFL participants while rendering WH-questions in either of the proficiency groups. The exact significance levels in Table 5 are the result of comparing the $F$-ratios against a critical value for 1 and 29 degrees of freedom.

Hence, mauchly’s test indicated that the assumption of sphericity had been violated (chi-square = .000, p <.05), therefore degrees of freedom were corrected using the Huynh-Feldt estimates of sphericity (epsilon = 1.000). The results show that the performance scores of the two proficiency groups (i.e. High-Intermediate and Low-Intermediate proficiency groups) in the two Grammaticality Judgement Tasks (explicit written and implicit written Grammaticality Judgement Tasks) did not differ significantly, and, as a result, the null hypothesis was not rejected, Group F(1.000, 29.000) = 1.660, P>.05; Treatment F(1.000, 29.000) = 2.601, P>.05; Group*Treatment F(1000, 29.000) = .863, P>.05. Post hoc tests revealed that the performance scores of the two proficiency groups in the explicit and implicit written Grammaticality Judgement Tasks did not show significant
differences. That is, neither group’s performance was significantly better than the other group in the two GJ tasks (i.e. explicit and implicit written GJ tasks) (p>.05).

The statistical analysis of the performance data of Persian female EFL participants somewhat supports the stance adopted by Schachter (1988) where she asserts that in cases where L2 learners’ L1 does not resemble L2 in WH-movement, such as the case of Persian participants in this study, L2 learners’ observance of subjacency could only be due to UG and not L2 learners’ L1. In fact, participants of this study did show signs of L1 (i.e. Persian) interference while rendering WH-Questions; that is, in cases where L1 and L2 showed similarities, even the slightest ones, participants violated subjacency in their L2 (even most of the High-Intermediate participants), whereas in cases where no such similarities existed, participants observed subjacency, hence the positive role of UG in this regard. In a similar vein, the obtained results of this study are in line with the assertions of such researchers as Bley-Vroman, Felix and Ioup (1988) because they have not only emphasized UG availability but also the fact that the availability of UG is, at times, overridden by other factors. In this study, EFL participants’ access to UG is overridden by their L2 in cases where L1 and L2 show similarities. Hence, the findings of this study have proved the simultaneous roles of both UG and L1 in rendering GJ tasks on subjacency. However, the results of this study oppose the views held by Schachter (1989, 1990) because the female EFL participants did recognize violations of UG principles in cases where such principles did not operate in participants’ L1.

Since the difference between the performance of High- and Low-intermediate groups was not significant in this study, the obtained findings oppose the assertions made by White, Travis & MacLachlan (1992) according to which all the High-Intermediate adult Malagasy learners of English, and only half of the Low-Intermediate
group performed like a native English-speaking control group in an experimental study. All in all, the results of this study have proved that L1 is not the only source of the learners' UG-like knowledge and that UG principles remain available in adult L2 acquisition. Similarly, the results of this study have contradicted Bley-Vroman's belief according to which access to UG is only via learners’ L1 because the female EFL participants in this study managed to properly observe subjacency cases in English even in cases where sentence structures had no counterparts or equivalences in Persian. Moreover, such results have opposed the belief of those who claim no access to UG at all such as Clahsen and Muysken (1986).

The obtained results of this study do not support the assertions made by such researchers as Green and Hecht (1992) because the GJ tasks used in this study by no means showed different kinds of sensitivity to the female EFL participants’ implicit and explicit knowledge of subjacency. The reason is that the difference between the performance of participants on both explicit and implicit written GJ tasks was not statistically significant.

The results of this study do not even support the stance adopted by such researchers as Cleeremans and McClelland (1991) because the implicit written GJ task used in this study does provide hard evidence to prove that abstract issues can be learned implicitly; otherwise, participants would not have been able to implicitly decipher the on-screen presented pictures within which complex abstract issues existed.

The findings of this study are in line with the generative account of language regarding the distinction between implicit and explicit knowledge as held by such researchers as Ellis (2003); that is, implicit knowledge implies the manifestation of language knowledge in performance with no awareness, whereas explicit knowledge refers to that language knowledge of which speakers are aware and can
verbalize. In addition, when rendering implicit grammatical judgements, subjects are at a loss when it comes to explaining how they can make a correct grammatical judgement, but this is not the case when rendering explicit grammatical judgements.

The results of this study oppose the assertion made by Hulstijn (2002) because it is indeed the case that whereas implicit knowledge is easy to have rapid access to, explicit knowledge is not, and that proficiency is of effect in this regard; that is, constant practice does increase access to explicit knowledge rather than false automatization.

Given the theoretical implications of this study, new teaching methods need to be planned for teaching the subjacency cases in English because different conditions, such as explicit and implicit conditions, do not necessarily require the use of different processing strategies on the part of students to be able to form grammatically-correct WH-questions. That is, students’ processing abilities use rather similar processing strategies to form WH-questions in explicit and implicit conditions. Moreover, proficiency level is of no significant effects on observing subjacency.

The theoretical implications of this study can change our long-held approach towards the observance of subjacency on students’ part because current methods of teaching WH-questions at schools, universities, and like academic settings focus on the use of different teaching methods for teaching the use of subjacency under different conditions, but this study has simplified our stance in this regard. Moreover, such findings can lead to revising the established theories on learning WH-questions because subjacency is one aspect of how languages work, and facts about lack of existence of differences between the explicit and implicit modes of language presentation in terms of learners' grammatical proficiency can pave the way for not differentiating between such modes in teaching and testing on the teachers' part.
4. Conclusion
The rationale behind the obtained linguistic theories of the hypothesis in this study is to explain an aspect of the process of SLA in a measurable way (i.e. the degree to which explicit and implicit modes of input presentation affect the EFL learners’ ability to observe subjacency). The resultant theoretical implications of this study did not establish an interaction between SLA theory-based explanations (e.g. SLA as a cognitive process) and the data gathered by administering the GJ tasks (i.e. explicit and implicit GJ tasks) on such constructs because no significant differences were seen between the explicit and implicit modes of receiving input, which are cognitive issues, in the performance of the High- and Low-Intermediate female EFL participants. In fact, the performance of the Low-Intermediate group bore a close resemblance to the performance of the High-Intermediate group in both explicit written and implicit written GJ tasks; a fact indicating that both of the groups had been under the influence of the symbolic aspects of the WH-questions and not the cognitive-semantic relationship between the stimuli and WH-questions. The scores of most of the High- and Low-Intermediate participants were rather high in both explicit written and implicit written GJ tasks (i.e. the performance of both of the groups was above 15 in both explicit and implicit written GJ tasks [15 out of 30 questions]; that is, the performance of the Low-Intermediate group was 22/30 in the explicit written GJ task and 17/30 in the implicit written GJ task; similarly, the performance of the High-Intermediate group was 22/30 in the explicit written GJ task and 21/30 in the implicit written GJ task). A fact indicating that other factors, other than the explicit/implicit dichotomy, must have affected the performance of participants.

Hence, the obtained findings from the null hypothesis in this study point to the conclusion that the generative view of language can be adhered to (i.e. language is indeed a symbolic system which is
independent of cognition) because the female EFL participants did not show significant differences in their performance in the explicit written and implicit written GJ tasks in this study. In other words, the explicit/implicit dichotomy of the GJ tasks failed to trigger participants’ cognitive processing capabilities despite the fact that participants were in two proficiency levels; the reason is that participants were primarily focused on the symbolic aspects of the WH-questions and not the semantic-cognitive relations between the explicit/implicit stimuli and WH-questions. A fact that leads us to conclude that female EFL participants are primarily under the influence of the symbolic aspects of the L2. Hence, language is indeed highly complex, and such learning strategies as inductive learning strategies, deductive learning strategies, or general problem-solving strategies can by no means lead to language acquisition.

The overall conclusion drawn from the results and discussion of the null hypothesis is that the examination of the nature of female EFL participants’ grammatical proficiency from the explicit/implicit standpoint does not result in viewing the explicit/implicit dichotomy as a distinct component part of female EFL participants’ grammatical proficiency. That is, the adoption of a separate explicit/implicit approach towards the investigation of the nature of L2 grammatical proficiency does not trigger distinct levels of comprehension of English WH-questions on EFL female participants’ part. Hence, this issue cannot lead to a major shift in SLA researchers’ long-held view towards EFL learners’ grammatical proficiency because the verification of the null hypothesis in this study attests to the long-held view of grammatical proficiency as a unified solid whole and not a unit made of numerous component parts with each part being triggered by a distinct task type. Otherwise, EFL female participants would have shown significant differences in their performance in the explicit and implicit written GJ tasks.
Accordingly, such independent variables as the implicit way of input presentation, and the explicit way of input presentation do not have different effects of the EFL female participants’ comprehension of English WH-questions; that is, High- and Low-Intermediate EFL female participants perform similarly across the explicit and implicit independent variables because they use the same cognitive, linguistic, and psychological bases for processing such variables. In fact, explicit and implicit means of receiving linguistic input do not have different effects on female EFL participants’ language processing because similar psychological processes are triggered by the explicit and implicit types of linguistic input. Hence, the explicit/implicit dichotomy does not serve as a separate subcomponent of L2 grammatical proficiency because the explicit and implicit forms of linguistic input have similar effects on female EFL learners’ performance in the explicit written and implicit written GJ tasks.

The basic pedagogical implication of this study is that teachers can adopt a single teaching method for the practical use of explicit and implicit teaching stimuli while teaching subjacency operations to EFL learners of different proficiency levels.

References


