Research Article

Education and Grammaticality Judgments on Persian Principles and Parameters

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A R T I C L E   I N F O

A B S T R A C T

Introduction: The innateness of language faculty and universal constraints, especially its independency from other mental disciplines, is a robust theory yet under investigation. This study is another contribution to making decisions on competence through performance.

Methodology: The project applied an expressive grammaticality judgment task on principles and parameters of the Persian language and tested 24 native speakers' claims on the statements in question.

Results: The children judged sentence stimuli of two types (principles and parameters), each having two subcategories (Structure dependency and Projection principles, Head and Null-subjects (5-year-old) performance on principle- and parameter-judgments differed from their older counterparts (9-year-old), indicating the superior ability of the school-age group in distinguishing grammatically well-formed and ill-formed Persian principles and parameters.

Conclusion: Since the older group attended elementary level (third grade), the interpretation of such results may pertain to education

1. Introduction

Grammar has been defined as the overall description of the structure of a language and the way to combine units to form sentences (Richards & Schmidt, 2002). The definition takes into account the knowledge of meanings and functions too. In absolute terms, syntax concerns how words combine to form sentences. To put it another way, it includes the rules that govern the formation of sentences (Richards & Schmidt, 2002). The rendition of the word "grammar" by scholars differ, it is necessary to specify the description to the one concerned by this article; that is, the Chomsky's assertion in cognitive science. The specific tenet of Chomsky's theory was the introduction of grammar as a logico-mathematical system with precisely significant formal properties that restrict the range of possible language grammars. Chomsky prefaced these limited formal properties as UG (Chomsky, 1963, cited in Ingram, 2007). Universal grammar (UG) by Chomsky (1988) and Cook (1985) is the language faculty that serves as a guiding force in the process of language acquisition. Its central concept refers to "the system of principles, conditions, and rules that are elements or properties of all human languages… the essence of human language…" (Chomsky, 1976, p. 29).

UG is a faculty of principles and parameters (conditions) which govern human language (Chomsky, 1993). Principles of language are defined as universal aspects of human language, while parameters are various from one language to another within tightly set limits (Cook, 2008, p.33). The knowledge is built-in and subconscious. The principles govern and judge the language both in input and output according to UG constraints (Figure 1.).

The principles and parameters of languages are numerous so that dealing with all of them is out of the concern of this paper, so we proceed through some famous examples:

According to this principle, the syntactic function of the constituents depends on the syntactic relationships rather than on their linear ones. In other words, the syntactic operations are more concerned than the formal word-order (Chomsky, 1988, cited in Cook & Newson, 1998).

E.g.: '**passive rule**':

In English: John buys a book.
                    1   2   3

GRAMMAR

(C_HL) Computation for Human Language

AUDITORY INTERFACE

PHONOLOGY/PHONETICS

CONCEPTUAL INTERFACE

LOGIC, MEANING, SEMANTICS

PRAGMATICS

USE OF LANGUAGE: inference from the *code* to the *world* or the *world* to the *code*
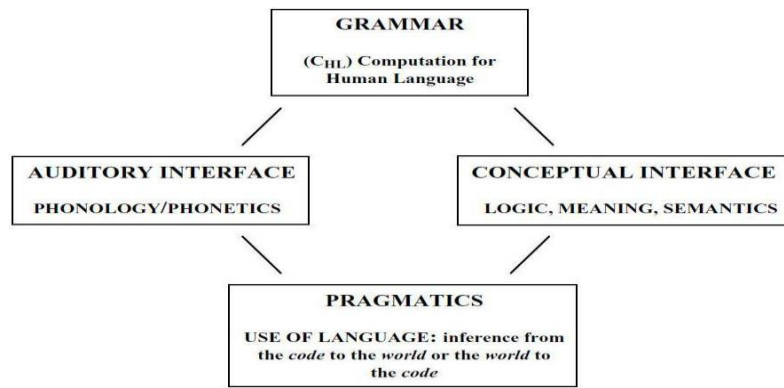
Figure 1.

The Architecture of Language Faculty (Chomsky, 1995, cited in Fletcher & Garman, 1986)

The book is bought by John.

    3   2   1

In Persian: علی کتاب خرید.

کتاب توسط علی خریده شد.

The rule is '3+be+2+by+1' for passives. The passive sentences are grammatically sound and do not violate the syntactic operations though they change the basic word order of the language.

Or '**ellipsis**' as another example of "Structure dependency principle" they can be nominal, verbal or phrasal:

1.'**Verbal ellipsis**'

In English: He knew that after his death, his house would be occupied and his car ø taken by his nephew.

The second "would be" is omitted.

In Persian: من به مسجدø و از آنجا به کتابخانه رفتم کتابی به امانت گرفته و آن را خواندم.

The first verb "رفتم" is omitted.

2.'**Nominal ellipsis**'

In English: This is a fine hall you have here; I have never lectured in a finer ø.

The second "hall" is omitted.

In Persian: چه سالن بزرگی دارید تا به حال ø بزرگتر از این ندیده بودم.

The second "سالن" is omitted.

3.'**Phrasal ellipsis**'

In English: Has everyone gone home? I hope not.

"Everyone hasn't gone home" is replaced by "not".

In Persian: همه رفتن خونه؟ امیدوارم که اینطور نباشه.

"همه نرفته باشند خونه" is replaced by "اینطور نباشه".

Projection principle is based on the idea that the syntactic and semantic information of lexical items is projected to higher levels in order to make phrasal categories (Chomsky, 1985, cited in Cook & Newson, 1998). To put it another way, the elements of a sentence project the occurrence of the related elements: the phrases are derived under the auspices of the principles and parameters.

E.g. in English: Fabio reads the newspaper.

"Reads" (the verb) needs an object, so projects an NP ("the newspaper"). An English speaker cannot use "Fabio reads" as a complete sentence.

In Persian: علی کتاب خواند.

The verb "خواند" needs object so projects an Np ("کتاب").

c. **Null-subject parameter**

Languages are classified into pro-drop and non-pro-drop ones. For example English is a non-pro-drop language that is subject cannot be omitted from the structure of a sentence while Persian is a pro-drop language since the verbs in Persian imply their subjects so they can be omitted.

In English: ø opened the door.

We need presentation of a subject otherwise the sentence is nonsense.

In Persian: در را باز کردم.

The sentence is complete since the subject "م" is implied in the verb "باز کردم".

d. **Head-parameter**

According to this parameter, the headword can be preceded or follow its complement. Some languages are head-initial like English, and some are head-final. Persian is head-initial, except for the verbs.

E.g. in English: education for life

    head (N) complement (PP)

read the newspaper

head (v) complement (NP)

In Persian: روزنامه را خواند

    head (v) complement (NP)

درخت زیبا

complement (adj) head (N)

According to innatism, language faculty in mind consists of two components: the innate grammatical knowledge and the innate grammatical discovery procedure; that is, UG principles and parameters (Snow, 1986, cited in Fletcher & Garman, 1986). There are some properties for this faculty: the possessors never violate the conditions or constraints imposed by the language, so that they never make errors exceeded the language bounds, and it permits the possessors to learn all kinds of human languages (Goodluck, 1986, cited in Fletcher & Garman, 1986).

The notion prompts the idea of "no wild grammar" by nativists. This idea denotes that the human language faculty

is biologically programmed, and everything is tightly governed under certain conditions and rules, and nothing is arbitrary. For instance, a 3-year-old child adheres precisely to his/her language constraints and knows all of them: whether the language is configurational/non-configurational, or left/right-branching (Goodluck, 1986, cited in Fletcher & Garman, 1986). To put it in a nutshell, according to Chomsky and other nativists, each speaker of a language is an excellent judge of his/her language (Chomsky & Lasnik, 1993).

Psycholinguistics tries to investigate the processes of language perception and production using different methodologies such as caveat, timed grammaticality judgments, self-paced reading, eye-tracking, electrical neuron studies. Though these procedures seek to explain different aspects of the same phenomenon (as the ones by linguists), their relationship to grammaticality is not well understood, and the paradigms are not sensitive enough to answer specific questions about grammar, at least not practically (Ingram, 2007). With this regard, linguists follow their own qualitative and quantitative methodologies to measure grammaticality. One of the most famous measuring tools in linguistics is grammaticality judgment tasks (McDonald, 2000).

To estimate the ability of the children to distinguish well- and primitive-formed wh-questions, Scholl and Ryan (1975) utilized listening and pointing grammaticality judgment task. The analysis of the results revealed that the performance of the two age groups (5- and 7-year-old children) did not differ; since as the complexity of the wh-word questions increased, their beckoning to the adults' picture increased as well; indicating that the adults in pictures were more expected to produce complex sentences than the children in the photos. The performance of school-age children regarding semantic inconsistency was investigated through an auditory sentence grammaticality judgment task (Windsor, 1999). Children with and without language-learning disabilities judge grammatically and semantically sound sentences correctly, while they were not able to distinguish the ungrammatical sentences which were semantically correct. Similarly, the children's ability to correct grammatical violations of word-order was examined by Brinton (1987). The results indicated the superiority of the older children's performance on grammatical corrections. Moreover, certain authors (e.g., Kail & Bassano, 1997; Mandell, 1999; Winitz, 2011; Zyzik, 2008) used grammaticality judgment tasks like testing and instructional tools in a second language context.

Discussing the idea in general, there are two major concerns when addressing this ability: language autonomy, that is, is it independent from other mind systems- this idea corresponds to the modularity of language by Chomsky- or is it a continuity of development of other aspects of intelligence? The latter idea refers to language development rather than language growth (Eliot, 1981). While Chomsky and other nativists elaborate language as a subconscious knowledge, Piaget and the proponents of the "development theory" denote language as a byproduct of manipulation of and interaction with the environment. The proponents of language development believe in language knowledge as another extension of a child's communication skills (Snow,

1972).

The perceived concept of language as a result of environmental factors make it challenging to decide about the innate ability of grammatical judgment; since, many factors are involved in the process of language acquisition: whether this ability is due to the manipulation of the physical environment as mentioned by Piaget or something intact and built-in as asserted by Chomsky. With this regard, and considering schooling as an environmental tool in the process of mental development, the current project seeks to reveal the effect of education on children's grammaticality judgment. To that end, the study made use of certain principles and parameters of the Persian language (L1) to check the change in judgment ability in two groups of children, school- and pre-school-age.

The follow-up project tried to answer these questions:

1. Are there any significant differences between pre-school- and school-age children regarding grammaticality judgments?
2. Are there any significant differences between pre-school- and school-age children in grammaticality judgments regarding principles and parameters?

2. Methodology

2.1. Participants

A total of 24 Persian children of both genders (11 boys and 13 girls) were randomly selected for the listening task. They were assigned to two age groups; 12 pre-school-age (5-year-old) and 12 school-age (9-year-old) children. The 9-year-old participants enrolled in grade 3 elementary-level, and as mentioned by their teacher, they had studied the rules related to all of the principles and parameters used in the study. While the pre-school age children (kindergarten-level) never attended any grammatical courses.

2.2. Instruments

A listening grammaticality judgment task on principles and parameters of the Persian language was administered to the groups in question. The task includes 16 well- and ill-formed sentences on principles and parameters in Persian (Appendix A).

2.3. Procedure

The task required children to decide whether an auditory presented statement is grammatically well- or ill-formed. The 16 statements were presented in two sessions, and the participants individually were asked to judge each read statement separately. The pre-school children (5-year-old ones) were supposed to stamp their feet if they thought the statement was not sound and clap their hands when the heard sentence was well-formed.

3. Results

To have more reliable and tangible results, each correct

Table 1.
The Independent Sample T-test Statistics Related to the Mean Scores of the Two Groups

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
									Lower	Upper
Score	Equal variances assumed	4.416	.047	6.023	22	.000	8.33333	1.38352	5.46408	11.20259
	Equal variances not assumed			6.023	18.097	.000	8.33333	1.38352	5.42778	11.23889

Table 2.
The Paired Sample Comparison between the Principles and Parameters Mean Scores in the School-age Group

| | Paired Differences | | | | | t | df | Sig. (2-tailed) |
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
				Lower	Upper			
Score1-8 Principles Score9-16 Parameters	.83333	3.01008	.86894	-2.74585	1.07918	-.959	11	.358

answer by the participants was given 2 points (Appendix B). For instance, if a child scored 20 out of 32, he/she judged 10 sentences correctly out of 16.

Since the sample is small, its normality should be checked (Hosseini, Niroomand & Moghaddaszadeh, 2007). The results of the Kolmogorov-Smirnov test (p in the first group = .760 > .05, and p in the pre-school-age group = .572 > .05) suggested the homogeneity of the population under question. Since the population was homogenous, the parametric statistical tests could be assigned to the data. The descriptive statistics revealed higher mean scores (M = 27.83, SD = 2.4) for the school-age children than the pre-school-age ones (M = 19.50, SD = 4.10). The application of the Independent Sample t-test to the mean scores supported the significant difference between the mean scores (Table 1.).

To scrutinize the results regarding the scores on principles and parameters, the task was divided into two sets of questions for each group. The first set of 8 sentences were the Persian principles in question, while the second set of sentences (9-16) asked the parameters (Appendix A). The application of the Kolmogorov-Smirnov test to the two

sets suggested the normality of the distributed sample (p > .05), indicating the possibility of the parametric statistics use.

The results of the Paired sample t-test calculation revealed no significant difference between the mean score of the first eight sentences in school-age children in comparison to the mean score of the second set of the statements (Table 2.).

The same statistical analysis was assigned to the two mean scores related to the two sets of sentences in question in the pre-school-age group. The results indicated no significant differences between the mean score on principles and the one on parameters (Table 3.).

The two groups were compared concerning the differences in their principle and parameter judgments. The results of the descriptive statistics reported higher mean scores for the school-age children in both principle and parameter judgments (Table 4.).

The application of the Independent Sample t-test calculations on the two sets of scores indicated the significance of the differences between the mean scores of

Table 3.
The Paired Sample Comparison between the Principles and Parameters Mean Scores in the Pre-school-age Group

| | Paired Differences | | | | | t | df | Sig. (2-tailed) |
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
				Lower	Upper			
Score1-8 Principles Score9-16 Parameters	1.33333	2.60536	.75210	-.32203	2.98870	1.773	11	.104

Table 4.
The Descriptive Statistics of the Mean Scores on the First and Second Sets of Judgments in the Two Groups

		Group	N	Mean	Std. Deviation	Std. Error Mean
Principles	Score 1-8	School-age	12	13.3333	1.55700	.44947
		Pre-school-age	12	10.5000	2.84445	.82112
Parameters	Score9-16	School-age	12	14.1667	2.32900	.67232
		Pre-school-age	12	9.1667	2.16725	.62563

Table 5.
The Independent Sample T-test Statistics of the Mean Scores on the First and Second Sets of Judgments in the Two Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Score1-8 Principles	Equal variances assumed	4.552	.044	3.027	22	.006	2.83333	.93609	.89200	4.77466
	Equal variances not assumed			3.027	17.049	.008	2.83333	.93609	.85879	4.80788
Score9-16 Parameters	Equal variances assumed	.765	.391	5.444	22	.000	5.00000	.91839	3.09538	6.90462
	Equal variances not assumed			5.444	21.887	.000	5.00000	.91839	3.09481	6.90519

the two groups regarding principle and parameter judgments (Table 5.).

4. Discussion

The results of the quantitative data analysis showed that the two groups of children, school-age (9-year-old) and the pre-school-age (5-year-old) ones, differ significantly in their grammaticality judgments. The higher ability of the school-age group in both the principle- and parameter-judgment tasks seems to bear testimony to the claims that language acquisition is a developmental process (Piaget, 1896, cited in Brainerd, 1973).

Donov and Donova (2011) discussed Piaget's developmental theory, adaptation, and his idea of assimilation and accommodation. According to Piaget (1971), biological organisms (human beings) are open systems that always require cognitive adaptation as a result of environmental interactions (cited in Donov & Donova, 2011). Therefore, environmental factors are central to Piaget's "cognitive development theory." One of these environmental issues affecting the open systems, humans, is schooling. Grammar courses attended by school-age children (in this study) might affect their cognitive schema positively. Since language develops as a result of exposure (Piaget, 1971, cited in Donov & Donova, 2011), the ungrammatical statements (non-adaptive components) dissipate in the cognitive schema through exposing to the courses (Donov & Donova, 2011). In this view, grammaticality judgment ability is the outcome of cognitive development and corresponds to an improvement of reasoning, and language is considered a byproduct of the development of other mind systems.

Probes of the children's answer-statements led the research to explore the responses, undertaking the children's attributes. According to Wells (1974), the rate and route of a child's linguistic behavior are under the influence of social background, inherited attributes, style of linguistic interaction, and situation activity. Besides, the quantification of linguistic data in child studies should take into account the participants' sex, intelligence, personality, and learning styles (Wells, 1974). For example, some of the pre-school girls, when encountered with some ill-formed grammatical statements (such as an ungrammatical null-subject parameter), answered emotively: "It is correct but is clumsy, but… true… but ill-looking …but it issssssssss trueeeeeee." Maybe they are right since they are the native speakers of their language and excellent judges to Chomsky !! And maybe our way of exploring their competence was wrong.

5. Conclusion

Though making obvious claims without enough empirical evidence is somehow ambitious, the testimony pertains to a plethora of theoretical evidence in the field. Nevertheless, scholars should be skeptical about announcing such interpretations. By addressing the above arguments and findings, the present study encourages scholars and researchers to conduct a more comprehensive study to examine the effect of different factors on children's performance in grammaticality judgments. This consensus deals with a great compromise, yet there are many factors intact in child language acquisition to be investigated.

Declarations

Competing interests

Funding

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Appendix A.
Statements of the Grammaticality Judgment Task

Statement	type	Well-formed	Ill-formed
1..من به کتابخانه رفتم کتابی به امانت وآنرا خواندم	Structure-dependency Principle (verbal ellipsis)		x
2. .گربه از دیوار پایین و موش را گرفت وخورد	Structure-dependency Principle (verbal ellipsis)		x
3..خرسها پشم دارند و پنجه های قوی	Structure-dependency Principle (verbal ellipsis)	x	
4..مریم به مسجد رفته نماز خواند و برگشت	Structure-dependency Principle (verbal ellipsis)	x	
5..علی با دوستانش فوتبال بازی کرد	Projection principle (V+NP)	x	
6..مهسا با دوستانش خرید	Projection principle (V+NP)		x
7. .چه اتاق بزرگی داری تا به حال به این دلبازی ندیده بودم	Structure-dependency Principle (Nominal ellipsis)		x
8. چه کیف قشنگی داری بزرگتر از این هم داری؟	Structure-dependency Principle (verbal ellipsis)	x	
9..سارا به کتابخانه رفت وسارا کتاب خواند و او برگشت	Null-subject parameter		x
10. .لیلا به درسه رفت درس خواند و برگشت	Null-subject parameter	x	
11. .برد علی کیک را	Head-parameter (head-final)		x
12. خوشمزه شیرین کیک	Head-parameter (head-initial)		x
13.بچه های باهوش پر فکر دبستانی	Head-parameter (head-initial)	x	
14. .حتما خواهیم این فیلم را دید	The agreement-parameter (tense)		x
15..علی میخ را کوبید با چکش	The agreement-parameter (V)		x
16. .گروه بچه های مدرسه سرود خواند	The agreement-parameter (V)	x	

گروه بچه های پشم دارند و پنجه های قوی..3

Appendix B.
The Scores Given to the Two Groups of Participants (Pre-school- and School-Age)

School-aged (9-year-old)	Sentences																Score
	Principles										Parameters						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	2	2	2	2	2	0	0	2	2	2	2	2	2	2	2	2	26
2	2	2	2	2	2	2	0	2	2	2	2	2	2	0	0	0	24
3	2	2	2	2	2	2	0	2	2	2	2	2	2	2	0	0	26
4	0	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	28
5	2	2	2	2	2	0	0	2	2	2	2	2	0	2	0	2	24
6	0	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2	28
7	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32
8	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30
9	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	0	28
10	2	2	2	2	2	0	0	2	2	2	2	2	0	2	0	2	28
11	0	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	30
12	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	30

Pre-school (5-yearr-old)	Sentences																Score
	Principles										Parameters						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	2	0	0	2	2	2	0	0	2	0	0	0	2	2	0	2	16
2	0	2	2	2	2	0	0	2	2	2	0	0	0	0	0	2	16
3	0	0	2	2	2	0	0	2	2	2	0	2	2	0	0	2	18
4	0	0	0	2	2	2	0	0	2	2	0	0	2	2	0	0	14
5	2	2	0	2	2	0	0	2	0	2	2	2	2	2	0	0	20
6	2	2	2	2	2	2	0	2	2	2	0	2	0	2	2	2	26
7	0	0	2	2	2	0	0	2	0	2	2	2	2	2	0	0	18
8	0	2	2	2	2	0	0	2	0	2	0	2	0	2	0	0	16
9	2	2	0	2	2	2	2	2	2	2	2	2	2	0	2	0	24
10	2	2	2	2	2	0	2	2	0	2	2	2	2	0	0	0	22
11	0	0	2	2	2	2	0	2	2	2	2	0	2	0	0	0	18
12	2	2	2	2	2	2	0	2	2	2	2	2	2	2	0	0	26