

# Research Paper: Wh-Questions' Expression in Persian-speaking Children: A Comparison Between Spontaneous and Elicited Probes



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## ABSTRACT

**Objectives:** Studies have shown that most children before the age of 5 are capable to comprehend and express wh-questions in daily conversations. This study aimed at comparing the ability of wh-questions' production in 4-6-year-old children in spontaneous and elicited conditions.

**Methods:** In this descriptive-analytic study, 72 (n=72) 4-6-year-old Persian-speaking children were selected randomly from kindergartens of Hamadan, Iran. Three different probes were used to evaluate the spontaneous and elicited conditions in the expression of questions with "what, where, who, why, and when". In the first probe, children were encouraged to ask questions spontaneously about experimental pictures. While in the second probe, the verbal prompt was presented about wh-questions, and wh-words were provided as key-words in the third probe. Repeated measures analysis of variance test with between-subjects' factors of sex (male, female) and age group (4-5 years, 5-6 years) and within-subjects' factor of the method (I, II, III) was performed in the study.

**Results:** There was a main effect of probes in "where, who, and when" questions and the mean scores of the II and III probes were significantly higher than those of probe I. Children in probe I received higher scores for why questions than the other probes. "What" questions were expressed more by children in probe II. "Why, when, and where" scores were significantly higher for 5-6 years group than for 4-5 years group. There was no significant effect on all wh-questions.

**Discussion:** The higher accuracy of wh-questions in probe II and III compared to probe I suggested that this competence is significantly developed by the use of elicited procedures (verbal prompt or providing wh-words as key-words) in comparison with no elicitation.

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## Highlights

- The children aged 4-6 years can express questions via wh-words in both spontaneous and elicited conditions.
- Asking questions in preschool children is an indicator of development in terms of linguistic and cognitive domains.

## Plain Language Summary

The current study was conducted to assess the ability to ask wh-question. The result of the study indicated that 4- to 6-year-old Persian-speaking children can ask questions effectively in both spontaneous and elicited probes.

### 1. Introduction

**P** sycholinguists and language specialists believe that the ability to ask and answer a variety of questions is one of the essential landmarks of children's language development. The questions modeled by adults are used as a learning tool for children to obtain specific language skills, which could be a useful way to get information about the world and solve their problems [1]. The strategies, which are conducted by children for information exchange, are full of various questions that represent communicative functions. Questions raised in different ages reflect the linguistic and cognitive development of children [2].

Children's questions are a fundamental basis for engaging in conversations, demonstrating knowledge, and also leading to gathering information about themselves and the world around them [3, 4]. So, asking and answering questions is an important part of children's daily interactions [4]. Children use different types of questions, such as yes/no questions and questions with wh-words. Syntactically, wh-questions are interrogative sentences that begin with words, such as where and when within one-clause sentences, which represent missing information. Wh-questions framed with who, what, where, when, why, or how are more challenging than a yes/no question. This type of question either seeks for a missing argument (e.g., "What did she take?") or an adjunct (e.g., "Why did she take that?"). Moreover, the subject of a sentence can be found through asking an argument wh-question (e.g., "Who hits Sarah?"), as well as the object of a sentence (e.g., "Who does Sarah hit").

As wh-questions need more sophisticated verbal answers, they seem to contribute to the development of language directly in children [5]. While children are exposed to inconsistency or ambiguity in their current knowledge, they are receptive to gain the needed in-

formation. Studies have shown that the most important reason behind asking questions by children is acquiring informative answers; hence, if they do not obtain the beneficial ones, they will keep asking. The conceptual development of language is the main determinant of the content of children's questions. The studies on how children ask questions suggested that the constituents of the information requesting mechanism are in place in children. These components are utilized by children from early ages, whereas the type of information they seek changes across the time.

Asking questions and the information obtained through this way allows the children to bring their language knowledge closer to the adult language structure. Thus, this mechanism results in effective infrastructures for cognitive development [1]. Young children master a variety of wh-questions that receive extended information from the others. These include specification of objects with what-questions, regarding persons via who-questions, relating to locations through where-questions, information about reasons and causes by why-questions, how-questions for details about instruments or manners of action, and data about time with when-questions [6, 7].

The process of wh-question production provides a suitable platform for evaluating pragmatic skills, which are essential to school achievement in terms of literacy abilities. Asking the right wh-question to obtain specific information brings many functions, including perceiving the perspective of a communicator and the speech act of an ongoing conversation. Besides, a cohesive wh-question reveals the temporal relationships between events and refers to the basic characteristics of the mental states of others [6]. During language development, argument questions appear before adjunct questions, specifically, in the order of what/where > who > how > why > which/whose/when [8].

One of the factors determining the order of acquisition across question types is the cognitive/semantic complexity of the wh-words that can determine the sequence acquisition of different kinds of wh-question. Each wh-word carries a special underlying concept. According to Tyack and Ingram (1977), questions that represent more concrete concepts such as “what” and “where” relating to objects and places, respectively, are acquired before why, how, and when questions, encoding more abstract concepts regarding causality, manner, and time [9]. On the other hand, Bloom et al. (1982) suggested that the relative syntactic function of wh-words and the nature of the verbs used in those questions, as well, can determine the acquisition order of wh-questions. What, who, and where questions are expressed by pronominal references and all-purpose verbs (e.g., do and go in English). On the contrary, sentential references and more descriptive verbs (e.g., push and kick in English) are used by why, how, and when questions [10].

Regardless of the individual differences in the precise acquisition age for learning wh-questions, they emerge in speech with a relatively similar pattern and the expression of all types of wh-questions is acquired by the age of 4 or 5 [11]. For example in the English language, preschool children produce wh-questions in the same sequence, in which, firstly, what and where, then, who and whose, afterward, which, when, and how, and, finally, why are acquired and produced [12]. James and Seebach (1982) evaluated the age of acquisition in children from 2-5 years. “What-question” is usually the first question that emerges at the age of 2 and, then, the other questions with where, who, and why are acquired gradually as the child is growing. Eventually, when a child got 4-5 years, how and when questions appeared [7].

The communicative function of wh-questions is also effective in its acquisition order. Questions that express the interests and needs of children emerge earlier in the normal language development process [2]. Children’s exposure to their parents’ wh-questions promotes language development, including comprehension and production of these question types [13]. In the Persian language, Jalilevand et al. in a longitudinal study examined the use of wh-words in 2 children from 12 to 36 months. The first wh-words, which emerged in 18 months, were what and where. By the age of 36 months, who, why, and how questions as related to abstract concepts, were produced [14].

Generally speaking, the data of studies about wh-question production obtained from the spontaneous sample, which is restricted in types and a variety of wh-questions, may not be expressed. These limitations led to various

studies, which instead of examining the ability to express questions in spontaneous speech, have used some probes to elicit asking questions in children to assess specific wh-words across types in a short time [15]. The findings from the elicitation procedure can be a complement to the data from spontaneous examples [11].

To assess the pragmatic skills in children aged 4-9 years, Villiers used elicited production in some language competencies, which are crucial for children’s academic success in the first years of school. One of these skills was asking wh-questions. The pictorial stimulus and verbal prompts elicit the production of wh-questions. This material leads to constraining the children’s answers so that they just produced wh-questions. A picture was presented to the child, while a part of the information about objects, people, locations, tools, and causes of emotion was hidden. The child should ask the direct questions by what, who, where, how, and why to find out what happened. In the first condition, firstly, a semantic domain prompt was presented to the child to give him/her the general semantic category of the missing data.

“The boy is calling somebody. Ask me a correct question, and I’ll present you the answer”.

If the child could not ask a correct question, the examiner would provide the wh-word as a second prompt.

“Ask me a question with who. Who ...?”

In the second condition, there was no guidance and the child should only use the picture and ask the desired question [16].

“If you ask me the right question, I’ll give you the answer”.

Akbari et al. assessed the ability of comprehension and expression of wh-questions by 4- to 6-year-old Persian-speaking children. In the comprehension section, subjects answered some wh-questions about 2 pictures, and in the part of the expression, they produced questions with wh-words, which were elicited by a speaking puppet about 4 pictures. The results of this study showed that 5-year-old children in all wh-questions received higher scores than 4-year-old children, and these differences were significant [17].

In the current study, we aimed at comparing the ability of wh-question expression in normally developing 4- and 5-year-old Persian-speaking children in spontaneous and elicited conditions.

## 2. Methods

### Participants and study design

A total of 72 monolingual Persian-speaking children with normal language development (according to the parent report and informal assessment by the researcher) aged 4 to 6 years took part in this descriptive-analytic study. The children had no history of neurological problems, seizures, brain damage, or any other disorder and also no symptom of speech and language disorder. All subjects were recruited from 6 kindergartens in Hamadan, Iran, and then were entered into 4 and 5 years old groups. To evaluate the ability of comprehension of wh-questions, the examiner asked some questions about 2 pictures and the subjects' answers showed that all participants comprehended them.

### Procedures

According to the past studies on wh-question expression in other languages [11, 16, 18], in this study, 3 probes were considered and, then, the tasks were created. A speaker doll and several pictures were used as the main stimuli. Firstly, 3 Speech-Language Pathologists (SLPs) and a linguist, who was involved in the study, selected 21 simple and clear pictures about ordinary situations to motivate the children to ask questions. Then, the pictures were divided into 3 probes regarding the purpose of the study. In 3 different probes, 5 question types with "what", "who", "where", "why", and "when" were assessed. Next, a sample of 8 SLPs and 2 linguists by a 5-point Likert scale assessed the content validity ratio of the pictures and their directions.

The content validity ratio score (0.85) was acceptable. Finally, in each probe, there were 5 pictures, 1 picture as educational and the others as experimental ones. During the execution of the project, a frog doll was placed be-

side the laptop (The frog's talk was recorded by a puppet speaker in a studio). When the pictures were presented one by one (in the same order for all subjects), the frog spoke about them and described the instructions to the subjects via an educational item. No feedback was presented to the subjects.

On occasion, the investigator would complete the child's answer to maintaining the child's cooperation to make attempts to ask the right questions. It should be noticed that participants were evaluated individually in a quiet room. The experiment lasted about 40 minutes, and during the administration, 2 short breaks between the sections were given to the child. At the end of the experiment, the puppet was given to the child as a small award.

The following illustrates the procedures of a typical test item in each probe:

In probe 1 (Figure 1), without verbal prompt and only by the picture stimuli, the speaker puppet told the subject to ask questions about the pictures to know something about them. Then, the puppet provoked children to ask another question by saying "ask me another question".

In the elicitation procedure (Figure 2), the child has exhibited a picture along with a verbal prompt. Verbal prompts were designed to elicit a participant to ask a question. For each picture, 5 verbal prompts were considered to motivate the participant to ask a suitable wh-question by what, where, who, why, and when. In the verbal prompt, the same phrase was stated by the puppet to elicit the questions.

In part 3 (Figure 3), which was mainly a sentence completion task, the puppet went straight to "ask me the question with a wh-word, and the examiner will tell you the answer."



Look at this picture.

Ask me questions about something you don't know. I'll give you the answer.

Figure 1. Sample picture in probe I



Figure 2. Sample picture in probe II

Verbal prompt by a puppet

- You do not know who's fallen, ask me
- You do not know why Saeed is falling, ask me
- You do not know Where they are, ask me
- You do not know what the boy's name is, ask me
- You do not know when Saeed fell, ask me

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Figure 3. Sample picture in probe III

A description by the puppet:

Someone is sleeping here

Ask me a question with "what". What...?

Ask me a question with "who". Who...?

Ask me a question with "where". Where...?

Ask me a question with "why". Why...?

Ask me a question with "when". When...?

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### Statistical analysis

In the current study, continuous variables were provided as Mean±SD. Repeated measures analysis of variance (ANOVA) test with between-subjects' factors of sex (male, female) and age group (4-5 years, 5-6 years) and within-subjects' factor of the method (I, II, III) was performed on the study variables. Furthermore, partial Eta squared, which estimated the magnitude of the group differences, was calculated. All statistical tests were two-sided and a P-value of less than 0.05 was accepted as statistically significant.

### 3. Results

Table 1 presents the Mean±SD scores of a continuous variable (what, where, who, when, and why) in both age groups between girls and boys in 3 probes.

Table 2 presents the results of repeated measures ANOVA test with between-subjects' factors of sex (male, female) and age group (4-5 years, 5-6 years) and within-subjects'

factor of the method (I, II, III), as well as partial Eta squared, which estimated the magnitude of the group differences.

Besides, we compared the performance of subjects in each wh-question in 3 probes based on gender and age groups.

#### What questions

There was a main effect of methods ( $F [1.59,108.17]=52.62, P<0.001, \eta^2P=0.463$ ). The mean score of the II method was significantly higher than that of the I and III methods, and the mean score of the I method was significantly higher than that of the III method. There were no significant effect for sex ( $F [1,68]=0.91, P=0.342, \eta^2P=0.013$ ), age group ( $F [1,68]=1.88, P=0.174, \eta^2P=0.027$ ), and interaction effects (all  $P_s>0.05$ ).

#### Where questions

The repeated measures ANOVA test showed the main effects of probes ( $F [2,136]=161.28, P<0.001, \eta^2P=0.703$ )

**Table 1.** The Mean±SD scores of wh-questions between different methods, genders, and age groups

Variables	Gender	Age Group (y)	Probes		
			Mean±SD		
			I	II	III
What	Male	4-5	2.06±2.04	2.67±1.33	0.39±0.85
		5-6	0.83±1.50	3.11±1.02	0.94±1.11
	Female	4-5	1.28±1.67	2.67±1.37	0.67±0.84
		5-6	2.17±2.87	3.72±0.57	0.78±0.94
Where	Male	4-5	0.28±0.57	2.67±1.37	2.67±1.68
		5-6	0.44±0.78	3.28±1.07	2.94±1.66
	Female	4-5	0.28±0.46	2.33±1.28	2.83±1.38
		5-6	0.50±0.86	3.50±0.71	3.50±0.99
Who	Male	4-5	0.11±0.32	3.17±1.04	2.50±1.42
		5-6	0.17±0.51	3.11±1.05	2.67±1.41
	Female	4-5	0±0	2.72±1.41	2.94±1.21
		5-6	0.06±0.24	3.67±0.49	3.11±1.18
When	Male	4-5	0.06±0.24	2.83±1.38	2.67±1.71
		5-6	0.39±1.04	3.06±1.21	3.11±1.60
	Female	4-5	0.28±0.75	2.61±1.50	2.78±1.52
		5-6	0.39±0.98	3.56±0.86	3.67±0.84
Why	Male	4-5	2.67±4.01	2.72±1.27	3.06±1.43
		5-6	6.50±4.74	3.28±0.96	3.56±1.10
	Female	4-5	5.11±3.86	2.78±1.40	3.33±1.19
		5-6	5.39±4.17	3.56±0.86	3.50±1.29

Values are given as Mean±SD

and age groups ( $F [1,68]=7.68, P=0.007, \eta^2P=0.102$ ). The mean score of II and III probes was significantly higher than that of probe I. In addition, 5-6 years group obtained significantly higher scores than 4 to 5 years group on the “where” score. There was no significant effect for sex ( $F [1,68]=0.35, P=0.554, \eta^2P=0.005$ ) and interaction effects (all  $P_s>0.05$ ).

### Who questions

A main effect of probes was  $F [1.71,116.87]=219.39, P<0.001, \eta^2P=0.763$ . The mean scores of the III and II probes were significantly higher than that of probe I. There were no significant effects for sex ( $F [1,68]=0.86, P=0.356, \eta^2P=0.013$ ), age groups ( $F [1,68]=2.53, P=0.116, \eta^2P=0.036$ ), and interaction effects (all  $P_s>0.05$ ).

**Table 2.** The comparison of the mean of the wh-questions between different methods, genders, and age groups

Variables	F	P	Partial Eta Squared ( $\eta^2P$ )	Comparisons	
What	Method	52.62	<0.001	0.436	II > I > III
	Gender	0.91	0.342	0.013	-
	Age	1.88	0.174	0.027	-
Where	Method	161.28	<0.001	0.703	II, III > I
	Gender	0.35	0.554	0.005	-
	Age	7.68	0.007	0.102	5-6 y > 4-5 y
Who	Method	219.39	<0.001	0.763	II, III > I
	Gender	0.86	0.356	0.013	-
	Age	2.53	0.116	0.036	-
When	Method	137.00	<0.001	0.668	II, III > I
	Gender	1.18	0.280	0.017	-
	Age	7.55	0.008	0.100	5-6 y > 4-5 y
Why	Method	11.11	<0.001	0.141	I > II, III
	Gender	0.67	0.416	0.010	-
	Age	7.01	0.010	0.093	5-6 y > 4-5 y

### When Questions

There were main effects of probes ( $F [2,136]=137.00$ ,  $P<0.001$ ,  $\eta^2P=0.668$ ) and age groups ( $F [1,68]=7.55$ ,  $P=0.008$ ,  $\eta^2P=0.100$ ). The mean scores of the III and II probes were significantly higher than that of the I probe. The 5 to 6 years group obtained significantly higher scores than the 4-5 years group on the “when” score. There was no significant effect of sex ( $F [1,68]=1.18$ ,  $P=0.280$ ,  $\eta^2P=0.017$ ) and interaction effects (all  $P_s>0.05$ ).

### Why Questions

There were main effects of methods ( $F [1.23,84.15]=11.11$ ,  $P<0.001$ ,  $\eta^2P=0.141$ ) and age groups ( $F [1,68]=7.01$ ,  $P=0.010$ ,  $\eta^2P=0.093$ ). The mean score for the I probe was significantly higher than those of the II and III probes. “Why” score was significantly higher for 5-6 years group than for 4-5 years group. There was no significant effect for sex ( $F [1,68]=0.67$ ,  $P=0.416$ ,  $\eta^2P=0.010$ ) and interaction effects (all  $P_s>0.05$ ).

## 4. Discussion

One of the special structures of language and social communication is asking questions. This ability begins at the age of 2 and develops between the ages of 4 and 6 [19]. Thus, the current project was conducted to compare the ability of 4- to 6-year-old children to express wh-questions. Procedures were specifically designed to extract wh-questions in both spontaneous and elicited conditions. The results of this study showed that, in general, children aged 4 and 5 years showed varied performances in 3 probes.

According to the finding of this study, there was a main effect of probes in where, who, and when questions and the mean scores of the II and III probes were significantly higher than those of the probe I. Children in probe I received higher scores for why questions in comparison with the other probes. “What” questions were expressed more by children in probe II. Also, children aged 5 to 6 years indicated better function in asking questions by where, why, and when.

This diversity is an indicator of the acquisition of underlying cognitive concepts about the place, causality,

and time [1]. Besides, according to James and Seebach, as well as Chan, children start asking the question around the age of 2 and develop it to the age of 5-6. Therefore, the better performance of 5-year-old children in this study implies the relative linguistic and cognitive development of this skill compared to the 4-year-old subjects [7, 11]. It should be noticed that there was no significant effect on sex in all wh-questions.

Data analysis indicated that in the first probe, which included asking questions by pictorial stimuli, both groups of children aged 4 and 5 years expressed fewer questions with the desired wh-words (what, where, who, and when) than those of probe II and III. On the other hand, in this trial, when there was no prompt to extract questions, the children mainly asked questions with what and why to get general information about the object and causality of the pictures' events.

"What questions" grow earlier than the rest of the wh-questions, as they are closely related to the immediate environment, and refer to the name of persons and objects [3]. The top scores of "why questions" appeared across probe I in 5- to 6-year-old boys and also in girls in both age groups; this indicates the importance of this question for resolving the ambiguities and understanding the causal relationships in an event [1]. In this probe, children produced questions on their purpose without a verbal prompt or wh-words, which limited them to ask a particular question. But, to compare 3 probes, only specific questions with wh-words were recorded.

In the elicited probe, verbal prompts by the puppet provide felicitous opportunities for children to ask appropriate questions by what, who, where, why, and when to get necessary information about the object, subject, place, time, and cause of the event in the picture stimulus. Furthermore, when children encounter a gap in their knowledge such as some ambiguities and inconsistencies, they ask a variety of questions to solve them [1]. Therefore, in this part, subjects received higher scores in comparison with probe I. In the elicited part of this study, children who were capable to ask an appropriate question would probably understand it because each question was extracted for getting specific data [11]. Moreover, these findings imply that wh-questions have embedded pragmatic function to seek desired information, which is unknown, and the speaker assumes that the addressee is aware of it [20].

In the third probe, in which children complete a sentence completion task, where, who, and when questions preserved the same degree of accuracy across both age groups, while children received lower and higher scores

by what and why questions, respectively. This finding was correspondent with the outcomes of the Villiers' study. It seems that providing wh-word as a prompt enhanced the ability to express correct questions by all given wh-words except "what" [16]. One possible reason for this unexpected score could be that "what" word was the less motivating stimulus to elicit what questions, while both first and second probes facilitated children's production of "what" questions.

## 5. Conclusion

Children master to generate questions efficiently, using their existing conceptual knowledge. This competence not only results in gathering the needed information but also teaches children how to learn about the world and solve problems in it. Preschoolers' questions play an important role in their cognitive development. The child's understanding and formulation of simple wh-questions act as a basis for developing skills in communicating, generalizing, and processing information in his/her environment. The results of this study showed that children aged 4-6 years have reached a degree of linguistic and cognitive development to be able to express questions. The higher accuracy of expressing wh-questions in probe II and probe III in comparison with probe I implied that this competence is significantly developed by the use of elicited procedures (verbal prompt or providing wh-words as key-words) in comparison with no elicitation.

## Ethical Considerations

### Compliance with ethical guidelines

This study was confirmed by the Ethics Committee of Tehran University of Medical Sciences on 4/5/2009 as a part of the MSc thesis in SLP. The participants were free to withdraw at any stage of the study.

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### Authors' contributions

Validation, investigation, writing original draft, and project administration: Rezvan Akbarimanie; Conceptualization, visualization, supervision: Nahid Jalilevand; Methodology and software and formal analysis: Maryam



Tarameshlou and Saman Maroufizadeh; Writing review and editing: Raheleh Izadifar.

### Conflict of interest

The authors declared no conflict of interest.

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