

# Children's Answers to Yes–No Questions: A Developmental Study in English, French, and Korean

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A cross-linguistic study of the development of answering systems to yes–no questions was conducted, with particular emphasis on the answering systems for negative questions (e.g., “Wasn’t John at the party?”). In English, the answer depends on the underlying affirmative proposition of the question, using a positive/negative (P/N) system, whereas in Korean it depends on the surface form, using an agreement/disagreement (A/D) system. French uses the P/N system for true negative (TN) questions, but a contrapositive form for false negative (FN) questions. Longitudinal and cross-sectional studies of children between 1 year 7 months and 3 years 3 months show that, across the three languages, children go through three similar developmental stages before they acquire the adult system. Language-specific phenomena include difficulty in using the A/D system for FN questions by Korean children and late acquisition of the contrapositive form by French children. The results suggest that universal cognitive development, pragmatic factors, and language-specific input interact in the development of the question-answering system.

A number of studies suggest that processing negation is more complex than processing affirmation on both syntactic and semantic levels. This phenomenon seems to be universal and has been shown to continue from childhood through adulthood. In child grammar, although children produce a negative word (e.g., *no* in English) early in development, they acquire syntactic negation by going through a number of stages (Bellugi, 1967, for English; Choi, 1986, for Korean; Wode, 1976, for German).

Children’s acquisition of various semantic/pragmatic functions of negation is also accomplished in stages: Children first use negative morphemes for rejection/prohibition of an action, and later use them to deny the truth of a proposition (Bloom, 1970, for English; Choi, 1986, for Korean, French, and English; Hahn, 1981, for Korean; McNeill & McNeill, 1973, for Japanese). In adult speech, a number of studies have shown that it takes longer to verify the truth of negative statements than to verify corresponding affirmative statements and also that inherently negative concepts (e.g., absent, forget) take longer than affirmative concepts (e.g., present, remember; Clark, 1974; Clark & Chase, 1972; Wason, 1959; see Just & Carpenter, 1975, for a cross-linguistic study).

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The greater complexity of negation carries over into question-answering (QA) as is shown in the answering patterns of different languages: Whereas all languages seem to have a straightforward pattern of responses to affirmative yes–no questions—a positive response for agreement, and a negative response for disagreement—the answering system to negative questions varies from language to language (Moravcsik, 1971; Pope, 1973; (hereafter, *questions* refers to *yes–no questions*). This seems to be due to the fact that negative questions such as “Wasn’t John at the party?” carry some additional pragmatic information about the questioner’s belief besides doubt of the truth of the proposition. As Givón (1979, 1982) pointed out, negation is used only to deny a specific supposition that exists in the mind of the speaker or the listener in the form of affirmation. That is, a negative question implies that the questioner had believed (or still believes) the affirmative counterpart.

The answering systems of yes–no questions can be further complicated by the fact that the statement form of the question (e.g., “John was *not* at the party”) can be either true or false. As will be shown below, some languages (e.g., French) treat true negative and false negative questions differently, using a unique form for false negative questions only.

In this study, the mastery by children of the three different answering systems present in English, French, and Korean is investigated. The study may ultimately shed light on the interaction between universal cognitive development and language-specific input. First, I examine the adult answering systems of the three languages.

## Answering Systems in English, French, and Korean

There are four possible types of yes–no questions (Wason, 1959): true affirmative (TA), false affirmative (FA), true negative (TN), and false negative (FN). The terms *affirmative* and *negative* reflect the absence and presence, respectively, of a nega-

tive marker in the question. Thus, a question such as "Is this a cat?" is affirmative, and a question such as "Isn't this a cat?" is negative. The terms *true* and *false* reflect match and mismatch, respectively, of meaning between the statement form of the question and the situation referred to. Thus, when a dog is depicted, "Isn't this a cat?" is a true negative question, since the meaning of its statement form, namely, "This isn't a cat" matches the situation. Conversely, in the same situation, "Isn't this a dog?" would be a false negative question.

For yes-no questions, the adult answerer typically uses minimal answer forms. Each language has an affirmator for a positive answer (*yes* in English, *ing* in Korean, and *oui* in French), and a negator for a negative answer (*no* in English, *ani* in Korean, and *non* in French). In addition, Korean and French have contrapositive terms that are used only for FN questions (*mace* in Korean, *si* in French). By using the contrapositive term, the answerer asserts the questioner's supposed positive belief and at the same time contradicts the negative meaning embedded in the question form. Thus, specific relationships exist between the question type and the answer form: Each of the four types of questions requires a specific minimal answer, as shown in Table 1.

In all three languages, the same answering system applies to affirmative questions: the affirmator for TA questions and the negator for FA questions. However, the answering systems to negative questions differ in the three languages. In English, the answerer responds to the *core* proposition of the question, that is, the underlying positive belief. Thus, to the question "Isn't this a ball?" referring to a ball (i.e., an FN question), the English speaker would say "yes," or "yes, it is," responding to the core proposition [this ball]. Such a system, in which the answer is related to the core proposition, is called the positive/negative (P/N) system (Pope, 1973).

In French, the P/N system is used to the extent that the negator (*non*) is used for TN questions in English. However, a contrapositive term, *si*, is used for FN questions. As mentioned earlier, *si* has a positive value and asserts the questioner's underlying belief. At the same time, it contradicts the negative meaning in the question. Thus, in using the contrapositive term, the answerer has to pay attention to two aspects of the question: the underlying affirmative supposition and the negative meaning embedded in the question.

In Korean, the affirmator (*ing*) and the negator (*ani*) are used in relation to the *surface form* of the question, that is, the proposition with the negative meaning. For example, consider the following negative question in Korean:

ike say-ka            an-i-ya?  
this bird-Subject Neg-be-Ending form  
"Isn't this a bird?"

If it is a TN question (e.g., the referent is a butterfly), the Korean speaker would answer with the affirmator, *ing*, responding to the surface meaning [this Neg bird]. If it is a FN question (i.e., the referent is a bird), he or she would answer with the negator, "ani," to deny the meaning of the surface form. Thus, the Korean speaker uses the affirmator or the negator depending on whether he or she agrees or disagrees with the negative meaning of the question, that is, it is not a bird. This system is called the agreement/disagreement (A/D) system (Pope, 1973). In Korean, there is an option, however, in which one can use a contrapositive form, *mace*, for FN questions. *Mace* has a positive sense, meaning literally "(you are) right". This answer responds to the underlying affirmative proposition and has a function similar to *si* in French. This suggests that, although Korean basically has the A/D system, it allows a form (i.e., *mace*) that responds to the core proposition for FN questions.

To summarize, the three languages show the following four possible answering systems: (a) the simple P/N system (English), (b) the simple A/D system (Korean), (c) the use of a contrapositive form for FN questions within the P/N system (French), and (d) the use of a contrapositive form for FN questions within the A/D system (Korean optional system). These are the four most common systems found in Pope's (1973) cross-linguistic survey.

Different answering systems may be related to differences in the degree of belief of the underlying affirmative supposition. As mentioned previously, in all three languages, negative questions are based on some previous belief in the form of an affirmation. For example, "Wasn't John at the party?" implies that the questioner previously believed the corresponding affirmative statement ("John was at the party") but now he or she has doubts about the supposition because of some recent contradicting information. However, the degree of belief of the affirmative counterpart conveyed by negative questions may vary across languages. In English (the P/N system), negative questions may also be used when the questioner strongly believes the affirmative counterpart. This can lead to a purely rhetorical use of negative questions (Wason, 1959): The speaker may use a negative question to emphasize its positive meaning and thereby try to persuade the listener to the positive supposition (Bublitz, 1981). Thus, in negative questions in English, there can be a discrepancy between form and meaning: Although the form of the question is negative, it conveys a positive supposition.

Table 1  
*Question-Answering Systems in English, Korean, and French*

Question	Referent	Q Type	English	Korean	French
Is this a cat?	[cat]	TA	Aff (yes)	Aff (ing)	Aff (oui)
Is this a tree?	[flower]	FA	Neg (no)	Neg (ani)	Neg (non)
Isn't this a bird?	[butterfly]	TN	Neg (no)	Aff (ing)	Neg (non)
Isn't this a ball?	[ball]	FN	Aff (yes)	Neg (ani/ CP (mace))	CP (si)

*Note.* Q type = question type. TA = true affirmative; FA = false affirmative; TN = true negative; FN = false negative. Aff = affirmator; Neg = negator; CP = contrapositive.

tion. For example, the speaker may ask, "Isn't this a cup?" to emphasize his belief that it is a cup, and also to lead the listener to agree with his positive belief. The degree of persuasion in negative questions, however, may depend on the particular linguistic form and intonation used. In contrast, in Korean, negative questions are rarely used for purely rhetorical functions. Instead, they are used when the questioner had believed the truth of a proposition but now has some doubts. For rhetorical functions, Korean has a distinct form (*-ci?*) at the end of the affirmative sentence, which specifically asks the listener's agreement. The French system is similar to the Korean: Negative questions (e.g., "C'est pas un ballon?" ["This isn't a ball?"]) are used when the questioner has doubts about the truth of the core proposition but not for the rhetorical function of emphasizing the affirmative proposition.

### Previous Studies

#### *Adult Studies*

Although the processing of yes-no questions in adult speakers per se has not been a focus of psycholinguistic research, the issue has been indirectly addressed by studies of sentence verification procedure (Clark & Clark, 1977). Clark and Clark stated that "formally, . . . verifying assertions is virtually identical to answering yes-no questions" (p. 101). In the sentence verification task, subjects verify whether a statement, which is presented either in the affirmative or negative, is true or false in relation to a picture. These studies have consistently showed that negative or false statements took longer to verify than affirmative or true statements. To account for these data, researchers have proposed a cognitive processing model that requires additional mental operations (and therefore more processing time) for processing negation and falsity (Clark, 1974; Clark & Chase, 1972; Just & Carpenter, 1975; Wason, 1961).

There is an apparent difference, however, between verifying negative statements and answering negative questions (Akiyama, 1979): In the former task, the truth or falsity index must correspond to the surface form of the statement (i.e., negative statement), whereas in the latter task, depending on the language-specific system, the affirmer and negator may correspond to the core proposition (English), that is, a proposition without the negative marker, or to the surface form (Korean). In French, whether the answer corresponds to negative meaning or not depends on the question type. Given these cross-linguistic differences, the degree of cognitive complexity for question-answering tasks may differ from language to language. For example, the Korean system, which responds to the surface form of the negative question, may be cognitively more complex than the English system, which responds to the underlying affirmative proposition.

#### *Child Studies*

In child language research, early and late phases of the development of answering systems have been studied. Steffensen (1977) studied the answering systems of two English-speaking children between 1 year 5 months and 2 years 2 months. She found that the children were aware of the conversational/inter-

actional requirement of yes-no questions from early on: at around 1 year 5 months, they understood that a yes-no question requires an answer, and they gave a verbal response consistently when a question was asked, even though their responses were not semantically appropriate from an adult's point of view. Steffensen also noted that there were differences between the two children in the specific strategy adopted to answer questions. One child copied the whole or a part of the question with a falling intonation. The other child used the affirmer or negator, which were expressed in various forms (e.g., *un-un*, *no*, *un-huh*, etc.), but showed fluctuations between predominant use of affirmer or negator from one session to another. Steffensen concluded that children acquire the interactional function of the question-answering system before its truth function, and also that their answering strategy is unstable during the early period.

Later development of answering systems has been investigated by Akiyama (1979, 1984) and Akiyama and Guillory (1983) in conjunction with the development of a sentence verification system. Akiyama (1979) studied the question-answering (QA) systems in English and Japanese-speaking children between 3 and 6 years of age. This is particularly relevant to the present study because the Japanese use the A/D system in a similar fashion to Korean. Akiyama's cross-sectional data suggest a relative ease of acquisition of the English system compared with the Japanese system: English-speaking children acquired their language-specific system earlier than Japanese children, and Japanese-English bilingual children preferred to use the English system even when they were speaking Japanese. Akiyama suggests that this may be because in the English system only the core proposition (e.g., *this ball*) is processed and the negative meaning is disregarded, whereas in Japanese the negative meaning (e.g., *this Neg ball*) has to be processed. In Akiyama's Japanese data, there are also differences of performance between TN and FN questions: For Japanese children (between 4 and 11 years old) FN questions are slightly more difficult than TN questions, but for English-speaking children, there are no differences between the two types of questions. However, Akiyama did not discuss this phenomenon. Akiyama and Guillory (1983) studied both question-answering (QA) and sentence verification of English-speaking children (between 4 and 7 years old) and found that for younger children, answering negative questions was much easier than verifying negative statements. These authors suggested that the acquisition of a QA system may be the basis for the acquisition of sentence verification.

In his study of the development of sentence verification in English- and Japanese-speaking children, Akiyama (1984) specifically discussed the differences between the two types of negative statement, that is, TN and FN statements. His study shows that although the English-speaking children found TN statements most difficult, the Japanese-speaking children found FN statements most difficult. Akiyama suggested that English- and Japanese-speaking children process negation differently in sentence verification, and that the difference is related to the language-specific QA system. However, conflicting data have been reported. In Kim's (1985) study of sentence verification, English- and Korean-speaking children showed similarities in processing TN and FN statements. Contrary to

Akiyama, Kim suggested that the two groups process negative statements similarly. Thus, whether children use universal or language-specific strategies for processing negative statements has been an issue in recent years (Akiyama, 1986; Kim, 1986).

A number of questions arise from these studies. First, how do children develop from the time they acquire the interactional function of yes-no questions to the time they acquire the language-specific answering system? Little information is available on children's performances during this period. Second, how do different answering systems affect the course of development? That is, do children acquire their language-specific system directly from the beginning or do they acquire it after going through some common stages? Third, are TN and FN questions treated differently in the acquisition process and, if so, are the differences language-specific? If the acquisition of sentence verification is developed from the QA system, as Akiyama suggested in reference to English, the processing differences between TN and FN questions may occur from early on when children acquire their QA system. In the present study, two types of data were collected to address these questions: In Study 1, children's answers to yes-no questions in longitudinal spontaneous speech data of English, French, and Korean were analyzed, and in Study 2, a cross-sectional experiment was conducted specifically to elicit children's answering strategies in the three languages.

### Study 1: Longitudinal Study

The overall purpose of the longitudinal study was to investigate several aspects of the development of negation. The acquisition of the answering system constituted one part of this study (Choi, 1986).

#### Method

##### Subjects

The subjects were two English-, two Korean-, and four French-speaking children (see Table 2). The English and Korean data were collected in the U.S., and the French data in France.

Table 2  
*Longitudinal Data: Subjects and Study Period*

Name	Age range (years, months)	MLU range <sup>a</sup> (in sec)	Interval (in weeks)
English			
Patrick	1, 11-3, 2	1.3-4.0	3-4
Kyle	1, 7-3, 0	1.2-3.6	3-4
Korean			
Tongju	1, 9-3, 3	1.4-3.7	3-4
Jene	1, 7-2, 5	1.0-2.9	3-4
French			
Ronan	1, 11-2, 2	1.3-1.9	1-3
Anne	1, 11-2, 1	1.9-2.3	1-3
Alexis	2, 5-2, 7	2.3-2.7	1-3
Marguerite	2, 5-2, 7	2.3-3.3	1-3

Note. Duration of a session was 60 to 90 minutes.

<sup>a</sup> MLU (Mean length of utterance) was measured following Brown (1973) and Dromi & Berman's (1982) methodology.

Although the two Korean children lived in an English-speaking country, they lived in a quasi-monolingual Korean environment. The Korean families in Buffalo with very young children consisted mostly of graduate students and formed a rather closed community: They did not mingle with American families. (This is typical of Koreans in the United States for both student and immigrant communities.) The two Korean families in this study came to the United States because of the father's pursuit of graduate study in an American university, and both planned to return to Korea on completion of graduate studies. For both children, the major caregivers spoke only Korean at home. The children did not go to school during the study period, and all of their playmates were Korean children who lived in the neighborhood. As one can imagine in these circumstances, the children's contact with English speakers was quite minimal, and therefore Korean was their primary language. Of the two Korean children, one (Tongju) was the only child in her family, and her mother, who did not speak English, was always with her. The other child, Jene, was taken care of by his grandmother during the day and by his mother in the evening. His grandmother did not speak English at all. However, Jene's two sisters, particularly the oldest, who was going to an English-speaking school, were bilingual (English and Korean). The two sisters often talked to each other, but not to Jene, in English. However, Jene picked up some English words from his sisters. My observation of Jene's development stopped when he started using English words in Korean sentences.

The Korean- and English-speaking children were observed for more than a year. However, for French children this was not possible because the research period in France was restricted to 3 months. For this reason, 4 French children were selected who varied in their developmental stages in terms of MLU (mean length of utterance), and each child was observed for 3 months.

#### Procedure

During each observational session, yes-no questions were asked sporadically as appropriate contexts arose. For example, as the child and the investigator were looking at a picture of a monkey the investigator asked "Is this a bird?" or "Isn't this a bird?" The questions were mostly on the identification of names of objects and on the child's desire or intention. The sessions were either audio-(30%) or video-taped (70%).

The linguistic forms used in each language were as follows: In English, all possible types of constructions were randomly and spontaneously used: The subject and the copula (*be*) or auxiliary could be either inverted (e.g., "Is it a bird?") or noninverted (e.g., "It's a bird?"), and the negative marker *not* could either be contracted or auxiliary (e.g., *isn't*) or uncontracted (e.g., *is not*). In French, the colloquial form of the question, namely, noninverted question construction with the negative marker *pas*, was used (e.g., "C'est *pas* un oiseau?" ("It's not a bird?")). In Korean, whose basic word order is subject-object-verb, the negative marker *an* occurred before the copula *i* (like *sayka an-iya?*, this bird Neg-Copula?, "Isn't this a bird?"). However, the negative marker occurred either before or after other verbs (e.g., *kwaca an-meke?*, cookie Neg-eat?, "Don't you eat cookies?"; or *kwaca mekci ana?*, cookie eat Neg?, "Don't you eat cookies?"). All of these forms are possible in the colloquial style in each language.

#### Analysis

All the question-answer pairs (both affirmative and negative questions) were grouped by the type of question (TA, FA, TN, and FN) and the answer form. Three coders, one native speaker for each language, verified the author's transcription of all the QA pairs. There was an average of 98% agreement between the author and the verifier. QA pairs for which the coder did not agree with the author's transcription were excluded from the analysis.

Children's answer forms were of two types, as follows: (a) a minimal form (i.e., an affirmer or negator with or without a phrase or a clause following it), and (b) a phrase or a sentence without a minimal form preceding it (e.g., "a frog"). The latter type of answer will be called *elaborate response* (ER).<sup>1</sup> For affirmative questions, answers could be categorized by the answer form (i.e., affirmer, negator, or ER). On the other hand, for negative questions, the answers were categorized by the type of strategy<sup>2</sup> (P/N or A/D) used. To determine the strategy used by the child for each negative question it was necessary to take into account what the child meant by the minimal form. For example, suppose that, to the question "Don't you want to take a nap?", the child simply says "No." This could be interpreted as either P/N or A/D strategy, depending on the child's intention. If the child's underlying meaning is "(No,) I don't want to take a nap," the child has used the P/N strategy. On the other hand, if the child's meaning is "(No, it is not true that I don't want to take a nap) I DO want to take a nap," the child has used the A/D strategy. Thus, only when one identifies the child's intention can one arrive at the correct interpretation of the strategy used for the particular question. In our study, to identify the child's underlying meaning, the following types of verbal and nonverbal behavior were taken as evidence of the children's underlying intent. Ambiguous answers (1% of all answers) were not considered in the analysis.

1. The child used one strategy *consistently* for a given proposition, and the answer to the corresponding affirmative questions revealed the child's intention.

Note: The child's utterances are on the right side. The context, given in parentheses, and the investigator's (S) speech are noted on the left side. Slash (/) refers to the end of an utterance unit when the child (P or K) produces more than one utterance unit at a time.

- Patrick (2 years 5 months) (1)
- (P is playing with a puzzle game.  
S is coming from the kitchen.)
- S: Do you want to have a snack? No
- (P is still playing)
- S: You're not hungry? Yes
- S: Are you hungry? No
- S: Aren't you hungry? Yes

In this context, Patrick communicated the fact that he was not hungry by using the A/D strategy consistently to the investigator's negative questions.

2. Sometimes the child gave a full sentence followed by a minimal answer. In Example 2, Patrick revealed his use of the A/D strategy (rather than the P/N strategy of adult English) by specifically saying "I can't do that."

- Patrick (2 years 6 months) (2)
- (P tries to open a plastic bag tied with a tie-string)
- S: How do you open it?
- (P can't untie the string) Can't/  
I can't do that
- S: Can't you do that? Yeah
- S: You cannot do that? Yes/  
I can't do that

3. The child's nonverbal behavior clearly showed his/her intent.

- Kyle (2 years 3 months) (3)
- (S is reading a book. K begins to shout, indicating that he is not interested in reading.)
- S: You don't want to read? Yeah

Except for Stage I (see Results and Discussion section), QA pairs of negative questions could be categorized into one of the three strategies.

The frequency of use of a given strategy was counted for TN and FN questions, and each session characterized by the child's predominant answering strategy for each type of negative question. A given session was considered to be the onset of a new stage: (a) when a change of the predominant strategy occurred in either TN or FN questions (i.e., the response pattern changed), or (b) when a new answering strategy appeared in the child's production (this was the case at Stage IV in Korean where the appearance of the contrapositive term was identified as a new stage). This analysis led to the identification of four distinct stages in English and Korean. Each stage showed some stability in the sense that the response pattern characteristic of a given stage continued for at least two consecutive sessions. Note also that, once a new response pattern (i.e., new stage) emerged, children did not retreat to previous response patterns. Thus, the data suggest that children were not trying different strategies in a random fashion but rather were guided by systematic changes in processing yes-no questions.

Although several syntactic constructions were used for English and Korean questions, we have not differentiated them in our analysis because there were no noticeable differentiations in the children's response patterns across the different types of questions during the developmental period we have investigated.

## Results and Discussion

### Stage I: Acquisition of the Turn-Taking Function of Yes-No Questions

The response patterns at Stage I were similar to those reported by Steffensen (1977). The children used either a minimal form (affirmer or negator) or a part of the predicate in the question as the answer to a question. Both types of answers were interactionally appropriate in that they fulfilled the conversational (i.e., turn-taking) requirement of answering a question. However, the children did not seem to respond to the semantic content of the question. First, they tended to use one minimal form (either affirmer or negator) exclusively for both true and false questions. An example in Patrick's speech is shown in Example 4. At 1 year 1 month, Patrick could point to a number of objects and pictures and name them correctly. However, when he was asked TA questions about the names, he responded with the negator *no*.

- Patrick (1 year 11 months) (4)
- (Patrick can say "frog" with correct reference)  
(S is pointing to a picture of a frog)
- S: Is this a frog? No
- S: Yes it is. This is a frog. Frog

<sup>1</sup> I would like to thank David Zubin for suggesting this term.

<sup>2</sup> In this article, the terms *system*, *strategy*, and *response pattern* are used in the following sense: *System* refers to the particular way of answering yes-no questions that is adopted and conventionalized by the adult speakers of a particular language. *Strategy* refers to the way adopted by the child to answer each question during the period when the adult system is still being acquired. I have used the term *strategy* to refer to children's answering patterns from Stages I through III, and have used the term *system* for Stage IV where children seem to have acquired the adult system. Children may use several strategies for a given type of question and the degree of frequency of each strategy may change from one stage to another. *Response pattern* refers to the overall distribution of different strategies used for a type of question at a given stage.

S: This is a frog?

No

When using a minimal form, Patrick (English) and Ronan (French) used the negator only. Kyle (English) started by using the negator mostly, and then switched to predominant use of the affirmer at 1 year 11 months, one month before the onset of Stage II. Overall, the English- and French-speaking children used the negator at the early phase of Stage I. On the other hand, the two Korean children mostly used the affirmer. Thus, whereas there was a cross-linguistic similarity in terms of understanding the turn-taking function of yes-no questions, there was a difference in the type of minimal form used. Choi (1986) suggested that Korean children produce the affirmer early because of the high frequency and multifunctionality of the form *ing* in the caregiver's input.<sup>3</sup>

The second type of answer, namely, copying a part of the predicate is illustrated in Example 5, in which Patrick copies the predicate *bee* from the question. Similar to the use of minimal forms at this stage, the copying strategy also showed non-distinction between true and false questions.

Patrick (1 year 11 months) (5)  
(S is pointing to a monkey)  
S: Is this a bee? Bee

As can be seen later, this copying strategy develops into the elaborate response (ER) strategy of Stage II.

In summary, at Stage I, although children produced the appropriate answer forms, they did not acquire their semantic functions; in other words, children, at this stage, have yet to acquire the truth function of both yes-no questions and the positive and negative values of minimal answer forms.

### Stage II: Understanding of the Truth Function of Yes-No Questions

From Stage II, the children began to understand the truth function of yes-no questions and showed a consistent relationship between answer form and question type. However, they acquired the adult system in stages. Tables 3 and 4 summarize the data from Stage II through Stage IV, showing the development of the answering systems to affirmative questions (Table 3) and negative questions (Table 4).

For each type of question, several response forms were used by the children: For affirmative questions, the answer could be affirmer (Aff), negator (Neg), or elaborate response (ER). ERs consisted of the correct predicate or sentence, as in Example 6. As mentioned above, the ER strategy seems to be developed from the copying strategy at Stage I.

Tongju (2 years 2 months) (6)  
(S is pointing to a chicken.)  
S: i-ke mengmeng-i-ya?  
this bowwow-be-Q?  
"Is this a bowwow?" Kokkiyo  
"Cock-o-doodle-doo"

For negative questions, the children used the P/N, the A/D, or the ER strategy.

At Stage II, the children answered affirmative questions correctly more than 80% of the time by using either a minimal

form or ER (Table 3). Thus, the children interpreted questions not only as a request for response, but also as a request for verification of the truth of the proposition. The high percentage of correct usage of the affirmer and negator at Stage II suggests that the children have begun to acquire the relation between affirmer and positive value and between negator and negative value. However, what makes this stage different from the next stage (Stage III) is that the children used the ER strategy extensively (especially Patrick and the two Korean children). This suggests that the abstract meaning of the minimal forms, particularly the affirmer, was not yet firmly established and that the children often used the concrete lexical items to give the correct answer. It is also possible that ER strategy, that is, use of concrete lexical items, comes from the labeling routine that constitutes an important part of interaction between the caregiver and child at an early stage.

For negative questions, the children also used minimal forms or ERs (cf. Stage II in Table 4). The Korean children used the ER strategy more extensively than the English-speaking children. When the children used minimal forms, however, they responded to the core proposition, thus apparently using the P/N strategy. This pattern was shown by both English- and Korean-speaking children. Though it may therefore appear that the English-speaking children are already acquiring the adult system of their language (i.e., the P/N system) at Stage II, this does not seem to be the case. First of all, unlike the adults, English-speaking children relied heavily on the ER strategy. Second, the use of the P/N strategy turns out to be unstable, because they switch to a different strategy at Stage III. In Korean, children's response pattern at Stage II, namely, their use of the P/N strategy, does not reflect the adult system of their target language. All of these results suggest that children in both language groups have not yet assimilated the adult system but are guided, at least partly, by some common cognitive constraints. In particular, the frequent use of the P/N strategy at Stage II does not seem to derive from the systematic processing of the core proposition in the question (i.e., systematic disregard of the negative marker in the question) but rather from the lack of ability to process the negative marker.

### Stage III: Emergence of the A/D Strategy for TN Questions

The major characteristic of the next developmental stage is as follows: For affirmative questions, affirmer and negator were

<sup>3</sup> In Korean, *ing* is a multi-functional word used frequently in informal colloquial conversation. In addition to its function as affirmer, it expresses that the speaker understood the preceding utterance by the other party, similar to the English expression "oh, I see." When it is used at the end of a sentence with a rising intonation, the speaker is seeking agreement from the listener, similar to the English expression, "right?" When *ing* is used with a rising intonation by itself (i.e., without a preceding clause by the same speaker), it means that the speaker did not understand what was just said by the other party, similar to "what?" in English. All of these functions are frequently used in the familiar form of the spoken Korean. The high frequency of the form with multiple discourse functions may have enhanced the early use of the affirmer *ing* (Choi, 1986).

Table 3  
*Percentages of Minimal Forms and Elaborate Responses from Stage II through Stage IV: Longitudinal Study*

Stage	Age (years, months)	TA				FA			
		Aff	Neg	ER	N	Aff	Neg	ER	N
English: Kyle									
II	2, 0-2, 2	95 <sup>a</sup>	(3) <sup>b</sup>	2	63	(16)	75	8	22
III	2, 3-2, 5	97	(3)	—	120	(8)	85	7	79
IV	2, 6-3, 0	100	—	—	41	—	93	7	93
English: Patrick									
II	2, 3	—	(9)	91	35	—	83	17	19
III	2, 4-2, 5	100	—	—	38	(3)	81	16	32
IV	2, 6-3, 2	100	—	—	65	—	96	4	83
Korean: Tongju									
II	2, 0-2, 3	26	—	74	46	—	42	42 + (16)	11
III	2, 4-2, 6	87	—	13	53	—	81	19	65
IV	2, 7-3, 3	100	—	—	67	—	95	5	40
Korean: Jene									
II	2, 1-2, 2	36	—	64	31	(13)	62	18 + (7)	19
III	2, 3-2, 6	100	—	—	27	(8)	71	21	20
French: Anne									
IV	1, 11-2, 1	96	—	4	107	—	96	4	28
French: Alexis									
IV	2, 5-2, 7	96	(2)	2	57	—	97	3	34
French: Marguerite									
IV	2, 5-2, 7	98	(1)	1	114	—	100	—	45

Note. TA = true affirmative; FA = false affirmative; Aff = affirmer; Neg = negator; ER = elaborate responses; N = Number of questions of the given type.

<sup>a</sup> Underlined percentages were the most frequent answer forms.

<sup>b</sup> Percentages in parentheses were wrong answers.

appropriately used more than 70% of the time (cf. Table 3). Compared with Stage II, the minimal forms were used much more often than ERs. This suggests that the relations between affirmer and positive value and between negator and negative value are well established at Stage III. For negative questions, a new pattern was observed: the predominant use in all children of the A/D strategy for TN questions (cf. Table 4). The A/D strategy for TN questions is illustrated in Example 7, in which Kyle persistently responded to the exact form of the investigator's question as the latter kept switching between affirmative and negative questions.

- Kyle (2 years 4 months) (7)
- (S thinks that Kyle has wet his diaper.)
- S: Do you want to change? No
- S: Don't you want to change? Yes
- S: Do you want to change? No
- S: You don't want to change? Yes

This example illustrates how English-speaking children at this stage use the A/D strategy, paying attention to the form of the

question in deciding how to answer, even though this strategy is not the most frequent in adult language. This shows that, unlike Stage II, children are now able to process negation in the question semantically and answer accordingly.

In contrast, the response pattern for FN questions at Stage III did not differ much from that of the preceding stage: The children continued to use mainly the P/N strategy or ER strategy for FN questions. For example, when the adult asked "Isn't it a cup?", referring to a cup, children tended to say "Yes" or "A cup." In other words, at Stage III, although the children responded to the negative meaning for TN questions, they did not do so for FN questions. This resulted in predominant use of the affirmer for both types of negative questions. Note that this extensive use of the affirmer was restricted to negative questions, because they correctly produced the negator to FA questions.

The language-specific phenomenon observed in Stage II continued through Stage III for FN questions: Whereas the English-speaking children used the P/N strategy predominantly (e.g., Example 8), the two Korean children used the ER strategy predominantly (e.g., Example 9).

Table 4  
*Percentages of Different Answering Strategies for Negative Questions from Stage II through Stage IV: Longitudinal Study*

Stage II through Stage IV: Longitudinal Study										
Stage	Age (years, months)	TN				FN				
		P/N	A/D	ER	N	P/N	A/D	ER	N	
English: Kyle										
II	2, 0-2, 2	44 <sup>a</sup>	28	28	12	60	—	40	10	
III	2, 3-2, 5	16	74	10	50	44	22	44	9	
IV	2, 6-3, 0	86	—	14	36	84	—	16	19	
English: Patrick										
II	2, 3	60	—	40	15	43	—	57	13	
III	2, 4-2, 5	20	77	3	35	70	—	30	10	
IV	2, 6-3, 2	71	23	6	110	73	8	19	37	
Korean: Tongju										
Stage	Age (years, months)	TN				FN				
		P/N	A/D	ER	N	P/N	A/D	ER	"mace"	N
II	2, 0-2, 3	40	—	60	20	33	—	67	—	9
III	2, 4-2, 6	—	82	18	17	38	12	50	—	8
IV	2, 7-3, 3	—	100	—	50	—	13	52	35	37
Korean: Jene										
II	2, 1-2, 2	42	—	58	14	37	—	63	—	12
III	2, 3-2, 5	—	78	22	28	17	—	83	—	17
French: Anne										
Stage	Age (years, months)	TN				FN				
		P/N	A/D	ER	N	P/N	A/D	ER	"si"	N
IVa	1, 11-2, 1	100	—	—	40	40	27	33	—	15
French: Marguerite & Alexis										
IVb	2, 5-2, 7	100	—	—	69	—	—	—	100	27

Note. TN = true negative; FN = false negative. P/N and A/D are the positive/negative and agreement/disagreement strategies, respectively. ER = elaborate responses. N = Number of questions for a given type.

\* Underlined percentages were the most frequent answering strategies.

Patrick (2 years 4 months)

(In reference to a car)

S: Isn't this a car?

Yes

Tongju (2 years 5 months)

(In reference to a picture of a lion)

S: ike saca aniya?

this lion Neg?

"Is it not a lion?"

saca

lion

"lion"

(8)

(9)

certain new language-specific phenomena emerged at Stage IV. They were as follows:

1. English-speaking children acquired the P/N system for both types of negative questions: They used the P/N strategy correctly more than 70% of the time for both TN and FN questions.

2. In Korean, Tongju used the A/D system for TN questions 100% of the time but used a variety of answers to FN questions: the affirmer *ing*, the negator *ani*, ERs, or the contrapositive *mace*. Jene, who was studied until 2 years 5 months of age, did not show Stage IV. That is, he failed to show exclusive use of the A/D system for TN questions during the study, nor did he use the contrapositive form to FN questions.

3. Three of the four French children studied, Anne, Marguerite, and Alexis, were at Stage IV according to this analysis. Anne seemed to be at an earlier stage of acquisition, in which

#### Stage IV: Acquisition of the Language-Specific System

At Stage IV, the children's response patterns to the two types of negative questions were much more similar to the language-specific adult system than at previous stages. In other words, the children were adopting the adult system, and as a result,



she has acquired the adult P/N system for TN questions but used a variety of answers to FN questions (Stage IVa). In contrast to this, Marguerite and Alexis, who were 4 months older than Anne, had acquired *si* to answer FN questions (Stage IVb) and used it appropriately 100% of the time.

### *Summary of the Longitudinal Study*

This longitudinal study suggests that children acquire their language-specific answering system by going through four stages. The similarities across the languages are summarized in Table 5. At Stage I, children learn the interactional function of the QA system. At Stage II, children acquire the truth function of yes-no questions and begin to use minimal forms and consistently processing the core proposition only. This is not considered as P/N strategy because the data do not show evidence of children's systematic processing of the core proposition. At Stage III, children can respond to negative questions by using the A/D strategy. At Stage IV, children assimilate the adult system.

Cross-linguistic differences were also observed: At Stage I, the English- and French-speaking children showed a tendency to use the negator, whereas the Korean children mostly used the affirmer. At Stage II, the English-speaking children tended to use the P/N strategy for both types of negative questions, but the Korean children tended to use the ER strategy. The tendency by the Korean children to use the ER strategy for FN questions continued through Stage IV.

Although the results of the longitudinal study give us insight into how children develop the answering system, it has several weaknesses that prevent one from making generalizations. The sample size was relatively small and varied for each type of question from one stage to another, and different syntactic constructions were used for negative questions in English and Korean. Furthermore, the French longitudinal study did not show Stages II and III. Therefore, to see the extent to which these findings are general within and across languages, I conducted a cross-sectional study by using an elicitation procedure.

### **Study 2: Cross-Sectional Elicitation Study**

The cross-sectional study was designed to elicit children's response patterns to yes-no questions with a more controlled procedure than in the longitudinal study. In this study, the question was restricted to identification of the name of a picture

(e.g., "Is it a bird?"). Therefore, the main verb was always the copula (*be* in English, *être* in French, and *i* in Korean). Also, in English, the syntactic construction was restricted to an inverted question with a contraction (e.g., "Is[n't] this a bird?"). In French and Korean, the only possible grammatical question construction with a copula as the main verb was used, as already described in Study 1.

Stage I was not investigated in Study 2 because I was mostly interested in children's response patterns after they acquire the truth functions of the yes-no questions.

### *Method*

#### *Subjects*

For the cross-sectional elicitation study, data were obtained from 36 children ranging in age between 1 year 9 months and 3 years 0 months, twelve in each language group. The English- and Korean-speaking children were recorded from the Buffalo, New York and San Diego, California, areas in the United States, and the French-speaking children were from a suburb of Paris, France. All Korean-speaking children were raised by monolingual Korean homes and spoke only Korean at the time of the experiment.

#### *Design and Procedure*

Each session contained two kinds of interactions between the investigator and the child: spontaneous play and an elicitation game. The purpose of the spontaneous play was for the child to get familiar and comfortable with the investigator, and also to use the data later for measuring the child's MLU (mean length of utterance). The spontaneous play lasted about 15 min.

For the elicitation study, a picture-matching game was presented that consisted of a board (1' x 1') with nine colorful pictures on it and nine individual cards identical to the pictures. Two sets of materials were used. One set contained pictures of objects: truck, chair, airplane, teddy bear, tricycle, crayon, telephone, boat, and trumpet. The other set contained pictures of animals: lion, zebra, camel, elephant, seal (with a ball on its nose), monkey, alligator, kangaroo, and giraffe. Before the elicitation, the investigator made sure that the child knew the names of the objects and the animals.

The elicitation procedure was conducted as follows: The child and the investigator sat next to each other. The child had one picture board at a time in front of him or her. The investigator had nine picture cards and asked one of the four types of questions (e.g., TA, FA, TN, or FN), showing one card at a time to the child. When the child answered, the investigator gave the card to the child who then matched the card with

Table 5  
*Summary of Developmental Stages of Question-Answering*

Stage I	Stage II	Stage III	Stage IV
Interactional competence			
	Truth-functional competence		
		Grammatical competence	
			Assimilation to language-specific system

the same picture on the board. The investigator asked eight questions of each of the four question types in random order by shuffling at each session 8 sets of 4 cards (i.e., 32 cards) on which one of the four question types was indicated. Each child was asked 8 questions for each question type, for a total of 32 questions per child. Sessions with English- and Korean-speaking children were audio-recorded, whereas those with French children were video-recorded.

### Analysis

The procedure used for coding the QA pairs was the same as in the longitudinal study: All answers to affirmative questions were categorized into affirmer, negator, or ER. Answers to negative questions were categorized in terms of strategy (P/N, A/D, or ER). For each negative question, the answering strategy was identified on the basis of the correct name of the picture. All transcriptions were initially done by the author and were later verified by a native speaker in each language.

### Results

For each child, the response patterns for the four types of questions were charted, and the predominant strategy used for each type of question was identified. In this study, the data on negative questions are reported, because they offer insight into the development of answering strategies in children's learning different systems. Corresponding to the answering patterns of the stages found in the longitudinal study, the children's answering patterns were grouped into Stages II, III, and IV. Table 6

shows the ages, MLUs, and answering patterns of the three developmental stages in each language.

The cross-sectional data show that, in all three languages, children's answering patterns conformed to one of the three patterns found in our longitudinal study: (a) predominant use of either the P/N or ER strategy for both types of negative questions (corresponding to Stage II), (b) predominant use of the A/D strategy for TN questions but not FN questions (corresponding to Stage III), and (c) assimilation to the language-specific system (corresponding to Stage IV). Furthermore, the correspondence between the three stages and their respective MLU ranges suggests that the stages are developmental, as was found in the longitudinal study. That is, in the cross-sectional data, the less the MLU, the earlier the stage the children tended to be in.

Our cross-sectional data on French children make a particular contribution to the study because Stages II and III were not observed in the longitudinal study. (Of the four children, one was at Stage I, and the other three were already at Stage IV.) Response patterns of the French children in the cross-sectional study conformed to one of the three patterns found in English- and Korean-speaking children of the longitudinal study. This strongly suggests that French children develop strategies similar to those found in English- and Korean-speaking children at Stages II and III before acquiring their language-specific system. In particular, French-speaking children between MLU 1.9

Table 6  
*Percentages of Different Answering Strategies for Negative Questions from Stage II Through Stage IV: Cross-Sectional Study*

Stage	Age (years, months)	N	MLU (in sec)	TN			FN			
				P/N	A/D	ER	P/N	A/D	ER	
English										
II	1, 9-2, 3	3	1.5-1.9	48*	24	28	29	—	71	
III	2, 2-2, 3	4	2.0-2.5	30	70	—	55	—	45	
IV	2, 2-3, 0	5	2.7-3.0	76	6	18	82	6	12	
Stage	Age (years, months)	N	MLU (in sec)	TN			FN			“mace”
				P/N	A/D	ER	P/N	A/D	ER	
Korean										
II	1, 11-2, 5	5	1.2-2.0	23	6	71	32	3	65	—
III	2, 3-2, 5	4	2.2-3.4	7	67	26	45	—	55	—
IV	2, 7-3, 0	3	3.0-4.4	—	80	20	4	13	58	25
Stage	Age (years, months)	N	MLU (in sec)	TN			FN			“si”
				P/N	A/D	ER	P/N	A/D	ER	
French										
II	2, 3-2, 4	3	1.6-1.7	70	—	30	40	—	60	—
III	1, 9-2, 5	3	1.9-2.2	40	52	8	42	36	12	—
IVa	2, 6-2, 7	3	2.0-2.5	77	8	15	20	22	44	14
IVb	2, 10-3, 0	3	2.5-3.5	93	—	7	—	—	—	100

Note. N = Number of subjects in each stage. MLU = mean length of utterance. P/N and A/D are positive/negative and agreement/disagreement strategies, respectively. ER = elaborate responses.

<sup>a</sup> Underlined percentages were the most frequent answering strategies.

and 2.2 (ages from 1 year 9 months to 2 years 5 months) also showed predominant use of the A/D strategy for TN questions.

The results also indicate that Korean children are relatively late both in age and in MLU in acquiring the A/D system fully: None of the Korean children showed the use of the A/D strategy for both TN and FN questions. This is consistent with the longitudinal data: Tongju did not use the full A/D system until the end of the study (at 3 years 3 months). The cross-sectional data, like the longitudinal data, show that Korean children rely on the ER strategy more than English- or French-speaking children throughout development. Thus, extensive use of the ER strategy seems to be characteristic of Korean children.

### General Discussion

In this section, I first discuss the cross-linguistic similarities and differences shown in both studies, and then the results on differences between TN and FN questions.

#### *Cross-Linguistic Similarities: Underlying Cognitive Development*

This study identified several common developmental stages in the acquisition of the answering system to yes-no questions. In agreement with previous studies (Garvey 1984; Steffensen, 1977), the longitudinal data showed that children acquire the interactional function of yes-no questions (Stage I) before the truth-functional meaning (Stage II). This is not surprising because, from the pre-linguistic period, children engage in turn-taking interactions with their caregivers (Shatz, 1983) and, therefore, this aspect of the question-answering interaction should be salient to them from early on.

Both the longitudinal and cross-sectional data show that children acquire the affirmative question-answering system before the negative question-answering system. Furthermore, these data suggest that, at Stage II, children treat negative questions similarly to affirmative questions, processing only the content words (i.e., the core proposition). At Stage III, children show their ability to process the negative meaning in TN questions by responding to the surface form of the question (i.e., the A/D strategy). The relatively late acquisition of the answering system to negative questions is most likely due to the fact that, universally, negation is conceptually more complex than affirmation. Givón (1982) argued that events are viewed by speakers as something that occurs from nothing and are therefore linguistically encoded as positive. In contrast, a negative statement is used in the opposite situation, namely, when nothing happened although an event was supposed to have occurred. Consequently, in discourse, affirmative statements are more frequent than negative ones. From the child's perspective, this means that affirmative sentences are more often heard and produced than negative sentences. As Wason (1959) points out, because children are so used to describing the world positively, it is easier for them to respond to positive information than to negative information.

For children to be able to process negative questions—either systematically to disregard the negation in the question (the P/N system) or to incorporate it (the A/D system)—they must understand the pragmatic information underlying the ques-

tion, that is, the positive supposition of the questioner. Our data suggest that this understanding occurs at Stage IV when children's answering forms relate to the underlying positive supposition: (a) At Stage IV, English-speaking children respond to the core proposition, that is, the positive belief of the questioner; (b) French children use *si* to respond to the positive supposition; and (c) Korean-speaking children sometimes use the contra-positive form (*mace*, "you're right").

#### *Cross-Linguistic Differences: Effect of Language-Specific Input*

Our cross-linguistic comparisons show differences between English- and French-speaking children on the one hand and Korean children on the other in terms of the frequency of use of a particular answer form. In particular, from Stage II through Stage IV, Korean children used the ER strategy much more extensively than English- or French-speaking children. This was especially evident in answers to FN questions. Such a result may reflect the response pattern of Korean adult speakers. That is, although it is widely assumed that Korean uses the A/D system, it may be that the ER strategy is used frequently for FN questions by adult speakers in their colloquial speech. If this is true, this phenomenon may be related to the fact the Korean system relates to the surface form of the question. As mentioned earlier, negative questions in Korean are used only when the questioner has some doubts about the proposition and therefore the degree of belief on the affirmative proposition by the questioner may be weaker in Korean than in English. This may lead the Korean answerer to provide the correct predicate that explicitly presents the correct proposition. Further empirical studies on adult QA patterns and the contexts in which they use negative questions are needed to test this hypothesis.

#### *Differences Between TN and FN Questions Within the A/D System*

The results show three related findings. First, children across languages used the A/D strategy to TN questions at Stage III, which occurred typically between 2 years 0 months and 2 years 6 months. That this phenomenon occurred in English- and French-speaking children is particularly interesting because the basic system of these two languages is the P/N system. Second, different response patterns were observed for TN and FN questions. At Stage III, children developed the A/D strategy for TN questions but not for FN questions. Third, whereas this asymmetry of response pattern continued through Stage IV for French- and Korean children, English-speaking children acquired the adult P/N system for both types of negative questions equally well at Stage IV. That is, English-speaking children used the P/N strategy for *both* TN and FN questions more than 70% of the time. Thus, for English-speaking children, the difference in the response patterns to TN and FN questions found at Stage III disappeared once the P/N system was acquired at Stage IV. On the other hand, for French- and Korean-speaking children, the asymmetry continued, with the Korean-speaking children not applying the straightforward A/D system to FN questions. These phenomena can be summarized as follows: whereas children readily applied the A/D strategy to TN questions, they did

not do so to FN questions. The following discussion focuses on explaining this result.

### *Pragmatic and Input Factors*

Pragmatic factors such as cooperative principles in conversation and input frequency may play a role in this phenomenon. Several studies show that before 2 years of age children understand an adult's goal in conversation and help the adult achieve it (Rheingold, 1982). Particularly, children become cooperative in question-answering interactions from early on (Bloom, Rocissano & Hood, 1976; see Shatz, 1983, for review). Pellegrini, Broday, and Stoneman (1987) also suggested that children as young as 2 years old observe Grice's (1975) cooperative principles, particularly in question-answering. In the QA situation, children suppose that the adult's question is relevant to the situation and also that the proposition conveys truth. Thus, at Stage III, it seems that children try to make sense of the proposition in the adult's question by matching the proposition with the situation. For example, when the adult says "Isn't this a cup?", pointing to a plate (i.e., a TN question), the child (who can now process the negation in the predicate) assumes that the adult of course knows that it is *not* a cup. Therefore, the child may treat the negative question either as confirmation of the belief that "it is not a cup" or as a test of his or her knowledge. In both cases, rather than denying the negative meaning in the question, the child would affirm it so as to agree with the adult's knowledge. This strategy results in the use of the A/D strategy.

However, for FN questions, children used the P/N strategy. That is, when the adult asked "Isn't it a cup?", referring to a cup, children tended to say "Yes" (or "A cup"). For the cooperative principle to work here, the child must systematically disregard the negative morpheme in FN questions and consider the core proposition to make it a true statement. However, there are no independent data or literature to suggest that children systematically process negation for TN questions but disregard it for FN questions.

Alternatively, it is possible that children have failed to develop a particular strategy for FN questions because of infrequent input from caregivers. That is, children may be rarely asked FN questions and therefore may not have developed any particular strategy. Thus, when asked a FN question, they respond to the core proposition, as they did in the previous stage. To investigate this hypothesis, a systematic longitudinal study of interactions between caregiver and child is necessary. In this longitudinal study, this cannot be done because the major interactant with the child was the investigator. However, a preliminary examination is possible, since, during a few sessions in the course of the longitudinal study, the caregivers (all mothers) interacted substantially with the child. As shown in Table 7, this occurred at Stage IV for the English-speaking and two of the French-speaking children. On the other hand, in Korean, data on input frequency are available for all stages for Tongju whose caregiver was an active participant in all sessions. Table 7 shows that in Korean and in French, TN questions were asked much more often than FN questions. However, in English, both TN and FN questions were asked much less than affirmative questions.<sup>4</sup> These limited data support the suggestion that children

Table 7  
*Frequency of the Four Types of Questions in the Caregiver's Speech to the Child*

Language/child	Stage	TA	FA	TN	FN
English					
Kyle	IV	12	7	1	0
Patrick	IV	28	8	2	2
Korean					
Tongju	I	23	6	5	0
	II	18	8	2	0
	III	43	8	5	0
	IV	131	14	16	0
French					
Anne	IVa	27	10	6	1
Marguerite	IVb	12	4	4	0

*Note.* Numbers indicate the number of times the caregiver asked each type of question. Kyle and Patrick's caregivers participated in the recording only at Stage IV. TA = true affirmative; FA = false affirmative; TN = true negative; FN = false negative.

have not developed a strategy for FN questions because they are scarce in the input.

However, although input frequency might explain the results of Stage III, the results of Stage IV cannot be explained in this manner. That is, input frequency cannot explain (a) why English-speaking children at Stage IV acquired the P/N system for both TN and FN questions equally well, (b) why French-speaking children used the contrapositive term for FN questions 100% correctly (at Stage IVb), and (c) why Korean children, in contrast, did not use the A/D strategy for FN questions. This leads one to consider some cognitive factors related to the processing of negation.

### *Cognitive Factors*

A number of child language researchers (Brown, 1973; Clark & Clark, 1977; Johnston & Slobin, 1979; Shatz, 1983) have argued for a correlation between the degree of linguistic and cognitive complexity and the order of acquisition. For example, Johnston and Slobin (1979) suggested that the particular order of acquisition of different locative terms (e.g., *in*, *on*) is guided by the degree of cognitive complexity attributed to different locative terms. In addition, Shatz (1983) suggested that children's ability to use conversational rules may be affected by information processing demands. Applying this framework to the present study, the late acquisition of the contrapositive term in French children and the A/D system for FN questions in Korean children may be due to language-specific answering systems that impose cognitive difficulties in processing FN as opposed to TN questions.

According to Clark, deciding on the truth or falsity of a statement or question in relation to the situation presented in a picture requires a series of mental operations. The mental oper-

<sup>4</sup> It is possible that, because of the rhetorical function of FN questions in English, English-speaking adults actually produce FN questions more often than TN questions. More empirical data are needed to investigate this issue.

ations consist of the following four steps (adapted from Clark, 1974):<sup>5</sup>

- Step 1: Represent sentence, e.g., [this ball]
- Step 2: Represent situation in the same format as the sentence, e.g., [Neg (this ball)] or [this Neg ball]
- Step 3: Compare the two representations for synonymy
- Step 4: Produce an appropriate answer.

In this model, the initial index (i.e., the response form) is always set on affirmative and changes to negative when there is a mismatch between the two representations that are being compared. Each step requires some cognitive processing; whenever one has to incorporate negation, or change the index from affirmer to negator, an additional mental operation is required.

The processing involved in the two types of affirmative questions should be the same across languages because the affirmer is used for TA questions, and the negator is used for FA questions in all languages. For negative questions, however, the mental operations needed to arrive at the right answer must differ across the three languages, because minimal forms are used differently. According to the above model, in English, the representation of the question (Step 1) must be the core proposition, that is, the proposition without negation. In other words, "Isn't this a ball?" is represented as [this ball]. If the question is TN, the core proposition, [this ball], does not match the situation (cf. Table 1). Therefore, the answerer has to change the index from affirmer to negator (Step 3). On the other hand, for FN questions, the core proposition and situation match; therefore, the answerer gives the affirmer as the answer without changing the index. Thus, in the P/N system, only TN questions require extra mental processing. Of course, in answering negative questions, English-speaking children must understand the pragmatic function of negation in the question, namely, the positive supposition underlying the question.

In the A/D system, the answerer responds to the surface form of the question. This suggests that, in Korean, negation must be incorporated in the representation of the question at Step 1. For example, "Isn't this a ball?" is represented as [this Neg ball]. According to Clark and Clark (1977), such incorporation of negation requires extra cognitive processing. In addition, for FN questions, the answerer must change the index from affirmer to negator, because the proposition [this Neg ball] and the situation [this ball] do not match. In contrast, the change of index is not needed for TN questions.<sup>6</sup> Thus, Korean children, acquiring the A/D system, must do two additional mental operations for FN questions: First, they must incorporate the negative meaning into the predicate, and second, they must negate the statement with the negator *ani*. In this study, it is proposed that this cognitive load imposed by the language-specific system may have led the Korean children to use strategies other than the A/D strategy for FN questions (e.g., ERs or contra-positive term).

French children must also incorporate the negative meaning into the proposition for FN questions. However, *si* is different from *ani* in that it is a positive marker (i.e., a marker that agrees with the core proposition) and, furthermore, the function of *si* is specific to FN questions and therefore efficient in communication because it removes any possibility of ambiguity. Thus,

acquisition of *si* is enhanced. This is also shown in the use of the contrapositive term *mace* in Korean children at Stage IV. In contrast with Korean and French, English-speaking children acquiring the P/N system do not have to incorporate the negative meaning into the predicate to answer negative questions. This may account for the relative ease of acquisition of the P/N system in English for both types of questions.

The processing models proposed in this study for yes-no questions suggest that, overall, the P/N system is easier than the A/D system. This may account for the observations made by other researchers in older children that the English system is somewhat easier to acquire than the Japanese or Korean system: Japanese bilingual children tended to use the English system even when speaking Japanese, but the reverse pattern was not observed, that is, they did not use the Japanese system when speaking English (Akiyama, 1979).

These data suggest that cognitive processing mechanisms underlying the P/N and A/D systems are different, which supports Akiyama's (Akiyama & Guillory, 1983) language-specificity hypothesis. If the QA system is the basis for sentence verification (Akiyama & Guillory, 1983), we would expect that there would also be differences in processing the two types of negative statements in sentence verification tasks (Akiyama, 1984). However, in Kim's (1986) study, TN statements were more difficult than FN statements for both Korean- and English-speaking children, which suggests similar cognitive processing in the two language groups. To understand more clearly the relations between question-answering and sentence verification tasks, further longitudinal and cross-sectional studies on the development of the two tasks are needed. In addition, pragmatic as well as cognitive and language-specific factors need to be investigated because they may differ significantly in the two types of tasks.

The present cross-linguistic data show that negation is universally more difficult to process than affirmation irrespective of the language-specific QA system. The data also show that, at a similar period in development, children in all three languages begin to process negation in the question, and show the ability to understand the presupposition underlying negative questions. On the other hand, the language-specific QA system influenced the degree of cognitive complexity, which resulted in differences in rate of acquisition of the adult system at Stage IV. Language-specific input also affected the development of specific response forms, for example, early use of the affirmer, and extensive use of ER by Korean children. In summary, the

<sup>5</sup> The processing steps for the sentence verification model have been modified so that they correspond to the question-answering situation.

<sup>6</sup> Note that several children (Tongju, Kyle, and Marguerite) in the longitudinal study showed an interesting behavior of using negation to convey a specific assertion. For example, seeing a picture of a rabbit with only one tooth, Tongju's mother asked her, "How many teeth do you see?" Tongju (2 years 10 months, Stage IV in this analysis) replied, "(I) don't see several teeth," meaning "The rabbit has only one tooth." This suggests that for Tongju, *not having several teeth* is equivalent to *having one tooth*. Thus, specific negative information refers to specific affirmative information. Thus, Tongju's speech suggests that she can compare a negative proposition with a corresponding affirmative proposition and match them as equivalent.

study suggests that the acquisition of the QA system, which starts at around 2 years of age, involves interactions between cognitive development, understanding of pragmatic aspects of question-answering, and language-specific input.

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