

The Development of Binding Principles: New Findings

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Abstract: This paper reports on a pilot study (two experiments) that examined the knowledge of principles A and B of the Binding Theory in two Qatari- Arabic-speaking children using a truth-value judgment task and an act-out task. The results have suggested that Principle A exists in child's language as early as 4; 5 with adult-like accuracy. There was no difference between the full reflexives and the inherently reflexive verbs; the frequent and less frequent reflexives as well as the counterparts of the inherently reflexive verbs and the simple ones. Principle B, however, seems not to be operative in the language of the learners of this variety around the age of 4; 5 but used (at least in comprehension) at the age of 5; 7. Apart from finding that there is no difference between the transitive verbs that have inherently reflexive counterparts and those that do not (i.e. ambiguity) in terms of knowledge of principle A, the major new finding in this study concerns cliticized pronouns. While previous studies revealed that children learning languages with pronouns cliticized to verbs show no delay of Principle B, the results of this study contradict this hypothesis.

Keywords: binding principles, first language acquisition, Qatari Arabic.

Introduction

The present study is motivated by the inconclusive results concerning the development of principle B of the Binding Theory especially in relation to cliticized pronouns. The study also examines whether, in relation to Principle A, there is a difference between inherently/morphologically reflexive verbs and transitive verbs with reflexive proforms (Grodzinsky and Kave, 1993/1994). The potential difference between reflexive verbs that have inherently reflexive counterparts (that have the same meaning), and the verbs with self pronouns is also addressed.

The paper is divided into five sections. The first section presents a short review of the recent research findings related to children's knowledge of the principles of the Binding Theory (henceforth, BT) of Chomsky (1981). The second section provides a summary of how principles A and B work in Qatari Arabic (QA). In the third section, the research hypotheses proposed to study child QA are presented. The

methodology followed to test the hypotheses is outlined in the fourth section. The last section presents and discusses the results.

1. Review of the literature

1.1 Results related to Principle A

There is some agreement in the results found in different languages that children show little difficulty acquiring Principle A of the BT. Chien and Wexler (1990), for instance, found that English-speaking children as young as 5 years of age show knowledge of principle A of the BT. McKee (1992) also found that both Italian and English children aged between 3; 7 and 5; 0 behaved similarly; they both had above 90% accurate responses, despite the fact that Italian has clitic anaphors.

Grodzinsky and Kave (1993/1994) studied the knowledge of binding principles of Hebrew-speaking children between the age of 3;0 and 6;0. Hebrew, like Arabic, has reflexive proforms as well as inherently reflexive verbs (i.e. reflexivity is reflected in the morphology). The results revealed that children as young as 3; 0 know principle A in the cases of reflexive proforms and morphologically reflexive verbs.

Although they seem to master principle A relatively early, children have difficulty in interpreting sentences where the reflexive requires a referent outside the local domain; that is, when it behaves like a pronoun. Examples include the case of *sig* in Danish (Jakubowicz, 1994), or some ambiguous referents such as the case of *se* in Spanish (Solan, 1987), suggesting problems with principle B.

1.2 Results related to Principle B

The results concerning the development of Principle B are far from being homogenous. In his study of anaphors and pronouns in Italian, a language that has both clitic pronouns and anaphors, and English, McKee (1992) found that in the case of anaphors, there was no significant difference between Italian and English children.

The Development of Binding Principles: New Findings

In the case of pronouns however, Italian children performed much better with 90% accurate responses against 61% for the English children.

Different results were reached by Solan (1987) who found that in Spanish, a language with similar binding principles, children performed rather better with pronouns than with anaphors. Moreover, in a study on Serbo-Croatian children (between the ages of 4;0 and 6;0) (Goodluck, Saah, and Stojanovic, 1995) found more correct responses with sentences containing clitic pronouns and full-form pronouns than with sentences containing reflexives. The difference was, however, not statistically significant.

1.3 Conclusion

Most studies have found that children have problems with principle B rather than with principle A. This is explained by the fact that principle B is more complex as the pronoun has more than one possible referent (e.g. Stevenson, 1992: 79).

Children also display difficulties with reflexives that require a referent outside the local domain, as in the case of *sig* in Danish (Jakubowicz, 1994). Thus, the increase of accuracy in relation to principle B in languages where the pronoun is cliticized to the verb (e.g. Italian, McKee, 1992) is interpreted as a support of this explanation. That is, in the case of Italian, the clitic pronouns are in a more local domain than the full pronouns, thus limiting the number of possible referents and making their interpretation easier.

Solan relates the developmental delay of the pronoun *se* in Spanish to its various uses in the syntax. Other than being a reflexive, the clitic is a spurious dative marker as in (1) 'Juan se lo dio': 'John to him it gave' 'John gave it to him' and as an impersonal marker in (2) 'Aqui se habla espanol': 'Spanish is spoken here.' The pronominal clitics are however, unambiguous (Solan, 1987: 200).

Other researchers (e.g. Reinhart, 1993) propose that there are other (pragmatic) principles, in addition to the ones of binding, which allow adults to

decide whether or not there is co-reference in cases with more than one possible referent. This account is backed by the findings of Chien and Wexler (1990) and Philip and Coopmans (1996) who found that the accuracy of children's responses greatly increased when a quantifier *every* was added to the referent NP. Stevenson (1992: 88) cites Grimshaw and Rosen (1990), suggesting that while children violate Principle B, they might be following "a discourse-level constraint" which requires that pronouns have "linguistic antecedents".

On the whole, there is some agreement that the delay of principle B in the language of children is traced not to lack of knowledge of grammatical principles but to pragmatic (or other) factors. That is, knowledge of the principles governing discourse (Koster, 1994: 202).

2. Binding in Qatari Arabic

2.1 Reflexives: Principle A

Principle A of the BT stipulates that an anaphor must be bound in its governing category (Chomsky, 1981). The governing category (GC) of reflexives in Qatari Arabic (QA) is an IP. The GC of a reflexive in QA is the minimal domain containing the reflexive, its governor, and a proper antecedent (subject).

The notion of government that is followed here is the same as outlined in Haegeman (1991: 173). That is, A governs B if and only if:

- (i) A is a governor,
- (ii) A m-commands B,
- (iii) And no barriers intervene between A and B (maximal projections are barriers to government).

C-command (Haegeman (1991: 241):

A node A c-commands a node B if and only if

- (i) A does not dominate B;

The Development of Binding Principles: New Findings

- (ii) B does not dominate A;
- (iii) The first branching node dominating A also dominates B.

m-command (Haegeman 1991: 137):

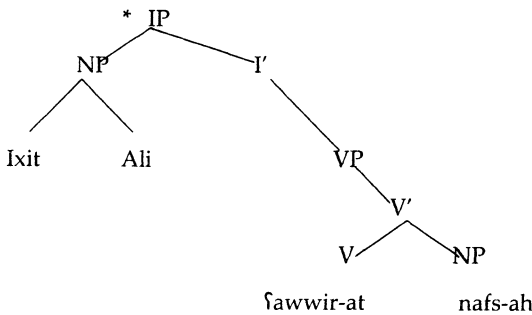
A node A m-commands a node B if and only if

- (i) A does not dominate B;
- (ii) B does not dominate A;
- (iii) The first maximal projection dominating A also dominates B.

In QA, the antecedent of the reflexive must c-command the reflexive. In (3), Ali cannot bind the reflexive because it does not c-command it.

- (3) a. *_{NP}[ixit Ali]_i ʃawwir-at nafs-ah_i.
 Sister Ali hurt-3sg.f self-his
 ‘*Ali_i’_si sister hurt himself’

b.



Besides, the antecedent of the reflexive needs to be the closest c-commanding subject to the reflexive (no cross over a c-commanding subject), and it needs to agree with the reflexive in person, number and gender features. If the closest c-commanding subject (potential antecedent) does not agree with reflexive in one of the above features, the sentence will be ruled out as shown in (4).

- (4) Alij ySaddig waSf Alia l-nafs-ahj.
Ali believes description Alia to-himself.
'Ali believes Alia's description of himself'

In QA, reflexivity is expressed either by reflexive proforms that have three variants: *nafs* 'self', *ruuH* 'spirit', and *'umr* 'life', or by a change in the verb morphology (5.b). Suffixes¹ expressing person, gender, and number must be added to the reflexive proform as in (5a) where the suffix agrees with the reflexive *nafs* in person, gender, and number:

- (5) a. Alij ṣaddal nafs-ahj.
Ali dressed up self-his
'Ali dressed himself up'
- b. Alij ti-ṣaddalj.
Ali self-dressed up.
'Ali dressed up'

2.2 Pronouns: Principle B

Principle B of the BT stipulates that a pronoun must be free in its governing category. Like in Modern Standard Arabic (MSA) (e.g. Fassi-Fehri, 1993), pronouns in QA are free in their governing category, which is the IP. The antecedent must precede the pronoun (in bold below). Yet, there are cases, both in MSA and QA and many other modern dialects, where in the surface structure the pronoun precedes the antecedent, as shown in (6). In those cases, the antecedent has, in fact, undergone a rightward

¹ These suffixes are in fact clitic pronouns.

The Development of Binding Principles: New Findings

movement as proposed by Fassi-Fehri (1993: 22), with the trace preceding the pronoun.

- (6) *tj rijaf il-beit-ah_i Ahmed_j*
went back to-house-his Ahmed
'Ahmed went back to his house.'

Like MSA, QA has both clitic pronouns like the ones in (6) and full pronouns that are often used in focus such as in (7). Full pronouns were not included because they are related to certain uses (mainly for focus) and would therefore be somewhat artificial in neutral contexts examined in the study.

- (7) *Shif-t-ah uhwa.*
saw -I-him he
'I saw him (not somebody else)'

Reflexives in QA (and MSA) are in complementary distribution with pronouns, a reflexive occurs where a pronoun is prohibited:

- (8) a. *Ahmed_i řawwar- ah_i* / nafs-ah_i.*
Ahmed pt.hurt.3sg.m- him* / self-his
'Ahmed hurt himself'
- b. *Ali_j řawwar- ah_i/*nafs-ah_i*
Ali pt.hurt3sg.m-him/*self-his
'Ali_j hurt him_i'

3. The study

3.1 Objectives

The main purpose of the study is to examine the development of principles A and B in QA-speaking children between the ages 4;0 and 6;0. The focus will be on whether a language specific development pattern exists.

3.2 Hypotheses

Principle A

Hypothesis 1: Reflexive verbs are learned later than reflexives with separate proforms.

This hypothesis was based on a preliminary observation that suggested that children knew only a few reflexive verbs. It was also motivated by the inconsistent results across languages. For example, in both Italian (verbs with cliticized reflexives) (McKee, 1992) and Hebrew (verb morphology) (Grodzinsky and Kave, 1993/1994), no difference was observed between the two types of verbs. In contrast, the French separate proform *lui même* was acquired later than the clitic pronoun *se*.

Hypothesis 2: The verbs that have morphologically reflexive counterparts elicit less accurate responses than the regular verbs that have no such counterparts.

An example of a verb that has a reflexive counterpart is *y-sabbiH/yi-t-sabbaH* 'to swim someone/ to swim'.

Hypothesis 3: The more frequent reflexive proform (*nafs*) will elicit more correct responses than the less frequent (*ruuH*). (*ʃumr*, the third possible reflexive, is excluded because it is very rarely used in the speech community that the children belong to.)

Principle B

Hypothesis 4: Unlike in languages with full pronouns (e.g. English: McKee et al, 1993; McKee, 1992; Chien and Wexler, 1990), there is no delay in Principle B in Arabic because the pronouns are cliticized to the verbs. This hypothesis is based on the results obtained for Italian (McKee, 1992).

The Development of Binding Principles: New Findings

4. Methodology

4.1 Subjects

The subjects were two Qatari children, a boy and a girl. The boy, referred to as child 1, is aged 4; 5 years, and the girl, referred to as child 2, is aged 5;7 years. The children were chosen because they fall within the range of age groups often recruited in previous studies.

4.2 Experiment 1

4.2.1 The truth-value judgment task

The truth-value judgment task consists of providing the child with a sentence and asking him/her to judge its grammaticality in a very subtle way. Two experimenters are involved in the task. The first experimenter uses toys to stage the situation and the second experimenter plays the role of the puppet that comments on the events. The child decides whether the sentence uttered by the puppet is correct or not and does so by either rewarding the puppet (giving it a cookie, for instance) or punishing it (giving it a rag). A typical example used in this technique is very similar to those proposed by McKee (1992). The first experimenter stages the scenario of a lion and a dog playing together. The dog (all of animals were given masculine names in order not to confuse the children) washes himself in the tub while the lion is just watching. The puppet comments on the event saying: "The dog washed himself." The sentence is grammatical and responding correctly, the child feeds the puppet a cookie. In a mismatch situation, the experimenter stages the event of the lion washing the dog. The puppet says: "The lion washed himself." The correct response of the child would be "no".

This method was chosen among the available research techniques because it has several advantages (see Gordon, 1996 for a description of the method). First, unlike the grammaticality judgment task, it does not require metalinguistic knowledge on the part of the children. It also does not require that they utter sentences or act out

sentences they hear. The notion of grammaticality in this task is coupled with truth, i.e. the correspondence between an utterance and a situation. In grammaticality judgment tasks, children are assumed to have some grammatical knowledge that they use to judge utterances (Gordon, 1996: 212). Moreover, the introduction of play and humor in the task is motivating for the children, and eliminates the yes-bias, a response often observed among children (e.g. Chien and Wexler 1990). Unlike pictures, which are static, the use of toys includes children in the task and keeps them attentive (Gordon, 1996: 218). The reward/punishment technique was preferred over the response to a yes/no question after the act out of the scenario because questions were feared to introduce ambiguity (219). Since no abstract verbs were used in this study, the act out task (see discussion of this task below) was used in experiment 2 to confirm the results of experiment 1.

4.2.2 Stimuli

All the verbs were chosen from the affectedness category used in the previous studies (e.g. Chien & Wexler 1990). To test the difference between verbs with infixed reflexives, their equivalents that need separate reflexive proforms, and the simple verbs that have no reflexive counterparts, five verbs for each type were chosen. The verbs were chosen among the ones very familiar to the children, that is, those often used in their discourse among themselves and with their parents. To avoid any kind of bias, caution was also taken that all the verbs were equally familiar and easily understood by the children. Their knowledge of the verbs was tested during the training session.

4.2.3 Procedure

Training sessions

Two training sessions consisted of familiarizing the children with the test: the type of verbs, scenarios, responses and the different questions. The training sessions also served as a try-out where the possible difficulties and biases may arise. One of the

The Development of Binding Principles: New Findings

biases the training wanted to examine, as recommended by Gordon (1996: 220), was whether children displayed a bias to either the reward or the punishment response. The task was clearly explained to the children and tried several times until it was clear that they understood it. The sentences used in the try out phase varied from the reflexives, pronominals, and other sentences. None of the sentences used in the test was used in the training sessions.

The first training session showed that the children knew almost all the verbs that were used in the actual study. There was a verb (*yit fadal* 'to dress oneself up') that they were not clear about and that was substituted by another one (*yitfaSSax* 'to undress oneself') that the children were familiar with. During this session, the children were highly motivated.

Test sessions

Every child was tested separately to avoid the influence of one on the other. The younger child needed four sessions to complete the test, while the older completed it in two sessions. Caution was taken to provide the children with exactly the same number of situations with a *yes* response (36 match situations, i.e. the description matches the situation) and those with a *no* response (36 mismatch situation). The same number of sentences was presented to the children. This allowed for a valid comparison between the conditions and the participants.

We tried to avoid the Clever Hans effect. Such clues as facial expressions, change of the tone, and gaze that would lead the child to provide a positive or negative answer were avoided both in the training sessions and during the conduct of the study. To avoid giving clues about the answers, Gordon (1996: 224) proposes that the experimenter should read the unacceptable sentences with a normal tone and in a fluent way and keep eye contact with the child while waiting for the response. McDaniel and Cairns (1996: 250), however, suggest that the experimenter should "look away immediately after presenting each item." In this study the first

suggestion was found more useful since it showed the children that the experimenter was interested in what they were about to say.

The session was stopped as soon as signs of boredom and/or distraction were observed in the child. McDaniel and Cairns (1996: 227) point out that children between 3;0 and 5;0 can “handle” approximately 20 items within a session including the training and the preamble (setting the situation of the sentence). In the present study, the younger child could do about 20 sentences (including fillers) in every session while the older child did 40 in every session. To check whether the children were attentive, a filler was introduced once in a while to avoid the bias of a particular interpretation (Goodluck, 1996: 158).

For each sentence the situation was repeated. The sentences were presented in no particular order, but when two actions could follow each other like washing and drying they were presented in their logical order. The change of the lexical items allowed us to ascertain that it was the structure that produced the effect it did rather than the lexical items chosen. Changing the lexical items also increases the interest of the children and lessens the carryover effect (Goodluck, 1996: 156).

4.2.4 Results and discussion

Principle A

Hypothesis 1: Reflexive verbs with verb morphology show in children’s grammatical knowledge later than reflexive verbs with separate proforms. This hypothesis was rejected on the basis of the findings displayed in Tables 1, 2 (*nafs*) 3 and 4 (*ruuH*) in comparison with Tables 5 and 6 displaying the responses with reflexive verbs. In fact, children’s responses in both sentences with reflexive verbs and those with anaphors (*nafs* and *ruuH*) are almost the same. The Tables also show that there is no difference between the match and the mismatch in all cases.

The Development of Binding Principles: New Findings

Table 1: Percentage of correct responses in sentences with *nafs* (Match condition).

Child 1	Child 2
90%	90%

Table 2: Percentage of correct responses in sentences with *nafs* (Mismatch condition).

Child 1	Child 2
100%	100%

Table 3: Percentage of correct responses in sentences with *ruuH* (Match condition).

Child 1	Child 2
90%	100%

Table 4: Percentage of correct responses in sentences with *ruuH* (Mismatch condition).

Child 1	Child 2
90%	90%

Table 5: Percentage of correct responses in sentences with morphologically reflexive verbs (Match condition).

Child 1	Child 2
100%	100%

Table 6: Percentage of correct responses in sentences with morphologically reflexive verbs (Mismatch condition).

Child 1	Child 2
100%	100%

Hypothesis 2: The verbs that have morphologically reflexive counterparts elicit less accurate responses than the simple ones. The prediction was based on the possible ambiguity of the verbs that have reflexive counterparts. This hypothesis was also rejected because the results (Table7 compared to Table 8) show that children perform almost exactly the same in both contexts with a correctness rate between 95% and 100%.

Table 7: Percentage of correct responses in sentences with verbs that have morphologically reflexive counterparts (Match and mismatch condition) (*ruuH* and *nafs* collapsed).

Child 1	Child 2
100%	95%

Table 8: Percentage of correct responses in sentences with simple verbs that have no morphologically reflexive counterparts (Match and Mismatch collapsed)+(*ruuH* and *nafs* collapsed).

Child 1	Child 2
95%	100%

Hypothesis 3: The more frequent reflexive proform (*nafs*) will elicit more correct responses than the less frequent (*ruuH*). This prediction was based on the assumption that what is more frequent is often better mastered. This prediction did not hold since children performed in both situations (Tables 1, 2 (*nafs*) and Tables 3 and 4 (*ruuH*) with a correctness rate between 90% and 95%. The younger child had 90% correct responses in the less frequent anaphor and 95% in the more frequent one. The older child had 95% correct answers in both situations.

The Development of Binding Principles: New Findings

Principle B

Hypothesis 4: Unlike in languages with full pronouns (e.g. English: McKee, Nicol and McDaniel, 1993; McKee, 1992; Chien and Wexler, 1990), there is no delay in Principle B in Arabic because the pronouns are cliticized to the verb. The hypothesis of the delay, based on the results on Italian (McKee, 1992) Spanish (Solan, 1987) and Serbo-Croatian (Goodluck et al, 1995), was rejected. The figures in Tables 9 and 10 show a significant difference between the performance of the younger child who had 40% correct responses and the older child who had 100% correct responses. It is noteworthy that most of his wrong responses were in the mismatch condition, which corroborates the previous results. A possible explanation of this may be that the task, and particularly the mismatch condition was a major cause of the child's errors. However, the mismatch had no effect on the responses with anaphors and reflexive verbs (i.e. in relation to principle B) (see results of experiment 2 discussed below).

Table 9: Percentage of correct responses in sentences with clitic pronouns (Match condition).

Child 1	Child 2
70%	100%

Table 10: Percentage of correct responses in sentences with clitic pronouns (Mismatch condition).

Child 1	Child 2
10%	100%

4.3 Experiment 2

4.3.1 The act out task

In this technique, the experimenter reads aloud a sentence and the child acts out his/her interpretation of it (see Goodluck, 1996 for a full description of this technique). This technique was chosen to confirm the results of the value judgment task because it allows children to act out their interpretation with no interference from the experimenter.

4.3.2 Procedure

In this task, which took place three weeks after the first experiment, the same children in the first experiment were presented with sentences and were asked to act them out. The same sentences that were used in experiment 1 were used in this experiment, except for the mismatch sentences, as the nature of the task does not allow testing these types of sentences. The task was explained to the children in training sessions immediately before the test.

4.3.3 Results

The results confirm the findings of experiment 1 for both children. In fact, while child 2 (the older one) got 100% of correct responses in all sentences. Child 1 got 100% of correct responses in the sentences with anaphors but only 40% of correct responses with sentences with pronouns. The figures are almost the same in both tasks, which also confirms the reliability of the experiments.

4.4 Discussion

The children showed no delay in Principle A, which exists as early as age 4; 5 (or probably earlier). The results also showed no effect of frequency, ambiguity (in relation to verbs that have reflexive counterparts in comparison with those that do not), or saliency (reflexive verbs in comparison with those that have separate anaphors which are presumably more salient).

The Development of Binding Principles: New Findings

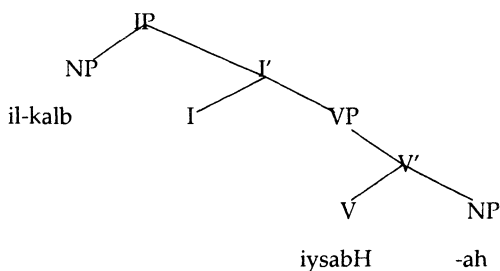
Principle B, however, seems to emerge later (after the age of 4; 5) but it is adult-like at the age of 5; 7. This result does not agree with the findings obtained by McKee (1992) in relation to clitic pronouns. An explanation for this could be that in Italian the position of these clitics is under INFL (before the verb) whereas in Arabic they are attached to the verb inside the VP, i.e. in the same position as the full pronouns.

(QA)

(12) il-kalb iy-sabH-ah.

The -dog 3sg.-wash-3sg. clitic pronoun (cl.p).

'The dog washes him'

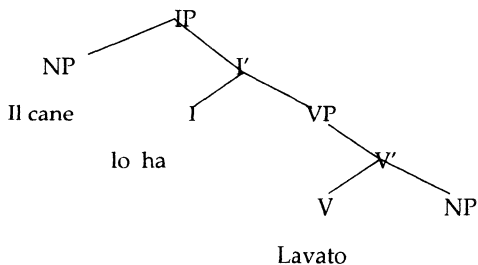


(Italian)

(13) Il cane lo ha lavato

The-dog 3sg. (cl.p) has washed

'The dog has washed him'



The postulated reason for the fact that clitic pronouns do not aid in principle B acquisition is mainly grammatical. Unlike in Italian, Spanish, and Serbo-Croatian, the clitic in Arabic, like full pronouns, occupies the position of the NP object inside the VP. This similarity indicates that like full pronouns, clitic pronouns in this variety are subject to non-syntactic factors that were suggested to constrain full pronouns.

The fact that the younger child did not show command of Principle B through performance does not necessarily mean that he lacks the knowledge of this principle. As indicated by researchers such as Stevenson (1992: 81) “performance data are not pure guides to underlying grammatical knowledge”. This prediction is based on his finding that adult performance in a test of knowledge of Principle C was worse than that of children. So, the younger child’s poor performance with pronouns does not necessarily mean he has no tacit knowledge of Principle B.

5. Limitations of the study

The results of this pilot study have to be examined with caution and are meant to be replicated in a more extensive study that will include a bigger sample of different ages.

6. Conclusion

By using two methods in assessing children’s knowledge of principles A and B of the BT, it was found that Qatari-Arabic speaking children, as young as 4; 5 years, show command of Principle A of the Binding Theory. As for principle B, only the older child (aged 5; 7) showed adult like performance; the younger child’s correct responses in relation to this principle did not exceed 40% in each experiment. In most of the cases the younger child treated pronouns as reflexives, though he chose non-local antecedents for pronouns much more than he did for reflexives. This distinction

The Development of Binding Principles: New Findings

may indicate that he knows that reflexives and pronouns must be treated differently, but he did not always apply this knowledge in performance.

The results of experiment 1 showed that children's performance was not affected by the match and mismatch conditions, as was reported to be the case in other studies (see Chein and Wexler 1990). The major new finding in this study is the fact that although pronouns in QA are cliticized to the verbs, they do not help children show knowledge of Principle B earlier as is the case in languages such as Italian, Spanish or Serbo-Croatian. We propose that the syntactic position that these clitics occupy may be the explanation of this discrepancy. In the Qatari variety clitic pronouns are treated like full pronouns, a fact indicating that they are constrained by the same pragmatic or processing constraints as the full pronouns.

Acknowledgements

We would like to thank Helen Goodluck as well as Magdalena Goledzinowska and an anonymous reviewer for their insightful remarks on earlier versions of the paper. Any error of fact or interpretation is, of course, our own responsibility.

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The Development of Binding Principles: New Findings

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