

Naturalistic and experimental data in language acquisition: The case of epistemic terms

Serge Doitchinov

SFB 441 – University of Tübingen, Germany

serge@uni-tuebingen.de

1 Introduction

Available data on the acquisition of epistemic terms expressing uncertainty show an interesting case of conflicting data.

On the one hand, longitudinal studies show that children begin to use modal terms like *think*, *may/might* or *maybe* from 3;6 on (cf. Stephany 1986 for a review). However, they remain very rare until 6;0. It is commonly assumed that the onset of the acquisition of epistemic meanings is correlated with the development of a representational Theory of Mind (ToM) (cf. Bartsch & Wellmann 1995). If children are unable to make a sharp distinction between the real world and mental worlds, or to recognize that there is no one-to-one mapping between them, they probably cannot use and understand epistemic terms. Developmental studies show that the ToM is progressively acquired during the fourth and fifth year of life (cf. Wellmann 1990).

On the other hand, many experimental studies have shown that epistemic terms expressing uncertainty are not reliably understood by children under 8;0 and that children under 8;0 tend to not distinguish between epistemic terms expressing certainty and uncertainty (cf. Green 1979; Abedutto & Rosenberg 1985; Bassano et al. 1992; Noveck 2001).

Two hypotheses can be formulated to explain this late understanding of epistemic terms of uncertainty.

First, children may have difficulties recognizing when a given situation is ambiguous, i.e. children under 8;0 may be unable to deal with the concept of uncertainty. Indeed, experimental studies by Piaget & Inhelder (1975), Green (1979), Pierraut-Le Bonniec (1980) and Byrnes & Overton (1986) support this claim. However, experimental studies by Sommerville et al. (1979) and in particular by Sophian & Sommerville (1988) challenge this traditional Piagetan view: both studies

provide evidence that 6-year olds are able to recognize when they do not have enough information to choose between several possibilities.

In a recent study, Noveck (2001) suggests that children's failure to understand epistemic terms is not due to their cognitive inability to deal with uncertainty but rather to their inability to compute scalar implicatures. Noveck's (2001) truth-value judgment task suggests that 7-year-olds equally attribute certainty and uncertainty to the modal *might*. That is exactly what one expects, if the scalar implicature is not taken into account. In a second task, children at this age judged a sentence like *some elephants have trunks* to be correct, while adults reject such sentences because of the implicature. However, studies using other designs provide some evidence that 6-year-olds are able to compute such implicatures (cf. Chierchia et al. 1998).

2 Experiment

The aim of the present study is to test experimentally which cognitive or linguistic factors may be responsible for the late understanding of epistemic terms.

2.1 Method

86 children (22 6-year-olds, 33 7-year-olds and 31 8-year-olds) had to solve three tasks. The three tasks were designed to assess their ability (a) to understand the German epistemic modals *können* 'may/might' and *vielleicht* 'maybe/perhaps', (b) to compute scalar implicatures with the German quantifier *einige* 'some', and (c) to reliably deal with the concept of uncertainty. All three tasks were carried out as picture selection tasks.

2.2 Results

Table 1 shows the percentage of the children who were successful in solving the different tasks.

Table 1: Percentage of successful children in the three tasks

Age	Mod. Task [‡]	Impl. Task	Uncertainty Task
6	5.6	94.4	11.1
7	41.1	96.6	51.7
8	63	100	74.1

[‡] The results for *können* and *vielleicht* are pooled together because they are absolutely identical.

As can be seen in table 1, all groups performed very well in the implicature task. The table also indicates an important developmental trend in the two other tasks.

More important for the goal of the present study, however, are the calculated correlations between the different tasks, as shown in table 2:

Table 2: Correlations between the different tasks (Task X Task)

Age	Mod. X Impl.	Mod. X Uncert.
6	0.06	-0.09
7	0.16	0.53*
8	-	0.68**
All	0.14	0.62***

* $p < .05$; ** $p < .01$; *** $p < .000$

No correlation was found between the Modal Task and the Implicature Task. By contrast, the results of the Modal Task and the Certainty Task are significantly correlated, except for the 6-year-olds. This is due to the fact that nearly all 6-year-olds were not successful in either of the two tasks. However, their results do not contradict the overall trend.

3 Discussion

These results strongly support the claim that children under 8 are not able to reliably understand epistemic modals. They also provide strong evidence that this inability is not due to the fact that children under 8 are not able to compute scalar implicatures but that children at this age have difficulties to detect epistemic uncertainty.

The present study contradicts the results of Noveck (2001). How can this be explained? It is possible that Noveck's experimental design may have influenced the results negatively. In the picture selection tasks of the present study, the children had to choose between the semantic and the pragmatic interpretation of the input sentences. Accordingly, they were presented two different contexts (a pragmatic and a semantic one) to interpret the sentences.

In Noveck's truth-value-judgment task, the pragmatic context was systematically cancelled and the children had to reject the input sentence. Given the fact that, in his experiment, the pragmatic context was systematically cancelled, and therefore only a semantic interpretation of the input sentences made sense, the children may have concluded that the input sentence was incorrect (as expected by Noveck). But they also may have assumed that the goal of the study was to test their ability to understand the logical property of *might* and *some* and not their ability to compute scalar implicatures (i.e. their ability to understand the pragmatic meaning of the input sentences). Following this second strategy, they just accepted the input sentences as semantically correct.

By contrast, this second strategy is less probable in a picture selection task, because this setting leads the children to show their preferred reading of the input sentences.

The present study also provides strong evidence that the inability of children under 8;0 to fully master epistemic terms is due their inability to understand uncertainty. However, one should be careful with this conclusion: The level and the type of information needed to make a correct inference of possibility or necessity may vary considerably from experiment to experiment. As Sophian & Sommerville (1988) noticed, the more pragmatic the context is, the easier it is for children to consider two possibilities at a time.

This study also demonstrates why different types of data are needed for a full understanding of the course of acquisition of epistemic terms: on the one hand, naturalistic data cannot provide any reliable evidence whether it is the computation of scalar implicatures or the full understanding of the concept of uncertainty which is responsible for the late acquisition of epistemic terms. This issue can only be tackled by experimental tasks. On the other hand, experimental studies that are designed to assess children's ability to understand epistemic terms do not provide contexts that are realistic enough: their settings require too much meta-cognitive and meta-linguistic abilities from the tested children. They can therefore only show from which age on the use of epistemic terms is fully mastered. Since the context provided in experimental designs are relatively far from childrens daily-life experience, children may have been limited in their competence to deal with the type of given information that build the premises in inferences in experimental studies. It may therefore be that experimental designs systemtically underestimate childrens' ability.

By contrast, longitudinal data provide very naturalistic contexts. They therefore give an important insight into the earliest stage of the acquisition of epistemic terms, which experimental data cannot provide. However, the use of naturalistic data for the analysis of the aquisition of epistemic terms is also problematic because epistemic terms – above all epistemic modal verbs – are quite rare in adult language in general and in child language in particular. This rarity makes impossible any experimentally well supported strong claims about the course of the acquisition of epistemic terms.

References

- Abbeduto, L. & S. Rosenberg (1985). Children's knowledge of the presupposition of *know* and others cognitive verbs. *Journal of Child Language*, 12: 621-641.
- Bartsch, K. & H. Wellmann (1995). *Children Talk about the Mind*. New York, Oxford University Press.

- Bassano, D., M. Hickmann & C. Champaud (1992). Epistemic modality in French children's discourse "to be sure" or "not to be sure"? *Journal of Child Language* 19: 389-413.
- Bonniec, G. P.-L. (1980). *The Development of Modal Reasoning: Genesis of Necessity and Possibility Notion*. New York, Academic Press.
- Byrnes, J. & W. Overton (1986): Reasoning about certainty and uncertainty in concrete, causal and propositional contexts. *Developmental Psychology* 6: 793-799.
- Chierchia, G., S. Crain, M. Guasti & R. Thornton (1998). *Some and Or*: A study on the emergence of logical form. In: A. Greehill et al. (eds.), *Proceeding of the 22th BUCLD*, vol.1, pp. 97-108. Cascadilla Press.
- Green, M.G. (1979). The developmental relation between cognitive stage and the comprehension of speaker's uncertainty. *Child Development* 50: 666-674.
- Noveck, I.A. (2001). When children are more logical than adults: experimental investigations of scalar implicature. *Cognition* 78 : 165-188.
- Sommerville, S.C. et al. (1979). Two levels of inferential behaviour in young children. *Child Development* 50: 119-131.
- Sophian, C. & S.C. Sommerville (1988). Early development in logical reasoning: considering two possibilities. *Cognitive Development* 3: 183-222.
- Stephany U. (1986). Modality. In: P. Fletcher & H. Garman (eds.), *Language Acquisition*, pp. 180-200, Cambridge, Cambridge University Press.
- Wellmann, H.M. (1990). *The Child's Theory of Mind*. Cambridge, MA: MIT Press.