Early Steps to Scalar Implicature:
Children, Logic & Developmental Pragmatics

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1. Introduction

This paper replicates an experiment from Noveck (2001), in which he investigates the difference between adults' interpretation of scalar implicatures against that of children. A *scalar implicature* is an extension of Grice's *conversational implicature,* an account of how interlocutors in a conversation might arrive at an interpretation of an utterance that goes beyond the literal meaning of the words uttered. In the case of scalar implicatures, weak terms (e.g. *some, might*) often carry the implicit meaning of the negation of a stronger term (e.g. *not all*, *not must,* respectively), but not vice versa. That is to say, if a speaker could felicitously say *all*, it would be improper for her to use the weaker term *some*. On the other hand, a purely logical account of such terms leaves no room for such implicatures. Since the strong term entails the weak term (i.e. *some* means *at least one*), the weak term is compatible with the strong term. In other words, in logic, *some* does not suggest *not all*. Noveck's conclusions verify the psychological reality of Grice's prediction that pragmatic interpretation (viz. scalar implicatures) is determined only after the logical interpretation is incorporated. In our experiment, we follow Noveck (2001) to determine whether it is true that prior to developing the pragmatic sophistication of incorporating the scalar implictaure in the inferential process, children are indeed logical.

2. Methods

2.1 Participants

We interviewed six adults and four children. The adults ranged in age from 15 to 85. The four children were between the ages of eight to ten. Participants were friends and family and they all lived in Vancouver. Three of the children were native speakers of English and one, whose native language was Korean, spoke English as a second language. The adults were mixed native and non-native speakers. The experiments were each carried in person.

2.2 Materials

The experiment consisted of 29 quantified English sentences, which were translations from Noveck (2001)'s French original, modeled after Smith (1980). The sentences were quantified with either 'all' or 'some' and fell into one of the following six types.

(a) Patently true statement with ‘all’.
Example: All books have pages.

(b) Patently false statement with ‘all’ (absurd).
Example: All birds have telephones.

(c) Hyperbolic (over-generalized) statement with ‘all’.
Example: All dogs have spots.

(d) Patently true statement with ‘some’.
Example: Some flowers are yellow.

(e) Patently false statement with ‘some’ (absurd).
Example: Some fruits have computers.

(f) Under-informative statement with ‘some’.
Example: Some giraffes have long necks.

The sentences were distributed randomly, with an equal number (i.e. 5) representing each category (only category (b) occurred 4 times).

2.3 Procedure

Participants were informed that the researcher was going to read a series of statements, with which they could either agree or disagree. They were told that this was not a test and that either answer was acceptable. The researchers delivered all statements in the same tone, without emphasis on any particular word.

3. Results

The result of our experiment is summarized in Table 1.

Table 1

Rates of correct responses to the six types of sentences presented in the experiment.

Sentence Types	Correct Response	Age	
		Children aged 7 to 11	Adults
Utterances expressed with *All*			
Absurd (false)	**No**	100%	100%
Appropriate (true)	**Yes**	100%	97%
Inappropriate (false)	**No**	100%	100%
Utterances expressed with *Some*			
Absurd (false)	**No**	85%	97%
Appropriate (true)	**Yes**	100%	100%
Inappropriate (true though pragmatically infelicitous)	**Yes**	75%	27%

As in Noveck (2001), both groups evaluated the responses to the utterances expressed with 'all' equally. As expected, the major difference in the response from the two groups occurred in the utterance involving the existential quantifier 'some', where the truth conditions are logically true, but pragmatically infelicitous. In this category, a significantly larger percentage of the children accepted the statement as true, compatible with the strong term 'all', than adults, most of whom rejected the statement, understanding 'some' to mean 'not all'.

As the results show the majority of children answered consistently to the quantifiers 'some' and 'all'. One of the four child participants (who is a non-native speaker of English) answered in the negative to the inappropriate statements that began with 'some', showing that he was pragmatically aware.

Table 1 reveals that adults tend to disagree with the pragmatically infelicitous statements. Of the six adult participants, two answered 'no' to all of the five inappropriate statements expressed with 'some'. Three participants answered 'yes' to one of the statements. One participant answered 'yes' to all of the statements showing that he took a logical approach. He also agreed with one of the bizarre statements expressed with 'some'. The same participant also disagreed with one of the factually universal statements that begin with the 'all' quantifier (although both responses were rationally justified).

4. Discussion

Our experiment results match very closely Noveck (2001)'s findings, supporting the thesis that young participants within the age range of seven to ten interpret the weak

scalar quantifier, *Some* logically, that is to say compatible with the stronger term, *All.* Adults, on the other hand interpret the weak term pragmatically, incompatible with the strong term. Both the young and the adult participants rejected the patently false (absurd) statements (with minor idiosyncratic deviations e.g. Some books are good to eat—yes, the lifesaver book) and accepted the factually universal statements with the universal quantifier 'all'. Both groups also rejected the factually universal statements using the existential quantifier 'some'. The pattern, as suspected, hinges on the fact that the young participants use both quantifiers competently in verifying the truth conditions of a statement against their world knowledge, but diverge from adult responses only where the interpretation of 'some' involves the scalar implicature.

We did encounter two exceptions to this pattern, however, one in the case of a nine year old who appeared pragmatically sophisticated (i.e. adult-like), the other an adult (29 year old) who responded logically. In both cases, the participants were consistent in their approach. We do not believe that these exceptions provide counter-evidence to Noveck's claim for the following reasons. Our 'logical' adult participant is a conscientious student of philosophy. It is therefore evident that his logical training bore an effect on his responses. The explanation for our pragmatically sophisticated younger participant, on the other hand, is somewhat more tentative, but the fact that he is a non-native speaker of English is very suggestive. Furthermore, he included a justification for every one of his responses to the questions involving the weak term, stressing his disagreement by the fact that in those instances *all*, and not *some* must be used. It is critical to note, nevertheless, that he has clearly developed the cognitive aptitude for understanding scalar implicatures.

While Noveck's experiment provides sufficient evidence that adults and children interpret scalar implicatures differently, further research is necessary to determine when and how such scalar inferences are generated. In fact, we would like to propose that the weak term 'some' in under-informative statements could be ambiguous between a logical and a pragmatic reading. Consider the case of a retail setting where a consumer asks (1) of the cashier.

(1) Are some of those cereals on sale?

Suppose that *all* the cereals are in fact on sale. In such a circumstance, it is less likely that the cashier would respond to (1) in the negative, illustrated in (2).

(2) No (they all are).

A more natural response would be (3).

(3) Yes (actually they all are).

As (3) illustrates, a logical response to the query in (1) is a natural possibility, which can be disambiguated with the qualifier, *actually they all are.* (2), on the other hand, is grossly *illiteral*, that is, unforgiving of a logical reading. Further research is required to

investigate the influence of context on disambiguating either reading, and from a developmental perspective, the question whether children would demonstrate scalar sensitivity (i.e. pragmatic intuition) in some contexts also requires some attention. These experiments would involve restricting the domain of discourse to smaller and more specific sets of entities (e.g. narratives, pictures) than the general categories in Noveck (2001). The set up in Kim (2007) is of particular interest. In such an experiment, the participant would evaluate the truth or falsity of a statement according to a picture on a computer screen. The picture would consist of a large number of entities, all or some of which would share a certain property. Using an eye-tracker, the researcher could investigate whether an adult (or, in fact, children) would consider every individual in the picture before answering a statement quantified by ‘some’. Furthermore, the researcher could also determine whether different contextual set-ups impact the participants’ behaviour in evaluating quantified statements.

References

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