Children's Insensitivity to Information from the Target of Agreement: The Case of Xhosa

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1. Introduction

In English, the manifestation of a once-rich agreement system is agreement on verbs indicating a singular 3rd person subject in what is loosely called the present tense (Sauerland, 2002):

(1) He goes to the store.

(2) They go to the store.

Young children speaking standard English reliably produce agreement (3rd person 's' on verbs) at about age three and a half years (Brown, 1973). However, Johnson, de Villiers & Seymour (2005) asked: when can children retrieve subject number from the verb ending alone? They created a set of stimuli to test this by concealing whether the noun itself was singular or plural, by carefully recording the stimuli and using a verb that begins with an /s/ cluster:

(3) The elephants spill the paint.

(4) The elephant spills the paint.

The result was surprising: children were not able to correctly identify whether the subject was singular or plural until age five or six years. On the face of it, this is a violation of the usual assumption that comprehension should precede production. Why would comprehension lag by one to two years? The first target was the procedure: perhaps it was an artifact of a picture-choice task? One possibility that they explored was that young children could make one of two inferences differing from that of the examiners:

A) They could think that the single duck is 'representative' of the proposition "The ducks swim on the pond", hence point wrongly to the singular picture when they hear a plural,

OR

B) They could think that one of the two ducks is a good example of "The duck swims on the pond", and point wrongly to the plural picture when they hear a singular.

That is, young children might not do a Gricean implicature of the sort that adults would use to choose the best alternative of the two pictures for the sentence given.

There are two counterarguments to that position. First, when children were shown pictures of the same sort that they had to describe themselves, they did provide the best description. That is, the children on that task did not point to a single one of the pair and describe it, nor did they take the single character as representative and use the plural. The result also shows that children had command over 3rd person /s/ even in an experimental, elicited production situation: the precocious production

results reported in the literature are not an artifact of spontaneous speech and conservatism of production, that is, only saying what they can. Children at this age can easily contrast agreement for plural and singular 3rd person subjects. It must be mentioned that we have not tested three year olds yet. It also remains a possibility that the constraints on production are different than the constraints on comprehension (Hendriks & Spenader, 2006).

More significantly, when pronouns are used instead in the comprehension test, children at age 4 years are just as good as 5 year olds, on e.g. the contrast in 5) and 6):

(5) They swim on the pond.

(6) It swims on the pond.

Sensitivity indices were over .75 for both ages, and there was no age difference. Hence, the argument about the comprehension result being an artifact of picture choice seems untenable.

Why is number agreement on the verb easy in production but not accessible in comprehension? Bobaljik (2008) makes the proposal that agreement is a late operation, part of the post-syntactic morphological component, which creates the prediction that:

(7) 'Agreement features on the target of agreement do not contribute to interpretation'.

The implication is that the target of number agreement is inert, devoid of semantic information in its own right.

Data from English, with its very weak agreement system, are inadequate for a genuine test of this idea. English agreement is almost always fully redundant with the number marking on the noun, hence children could ignore the verb marking as a cue. It would be sensible to argue that when "more depends" on the number on the verb, children would do better. The case to consider is that of pro-drop languages, where if the subject were dropped, much more would depend on the number agreement on the verb for its identification.

Perez-Leroux (2006) repeated the experiment of Johnson and de Villiers (2005) using as subjects children who spoke Dominican Spanish, a pro-drop language. Here, the agreement morphology on the verb was the only cue to detecting which picture to choose (the same choice of singular or plural subjects). The three, four and five-year-old Spanish speakers were no better than the English-speaking preschoolers, that is, they failed to reach significant discrimination on the basis of the verb agreement morphology. The verb agreement morphology was not used as a clue to the number of the subject even though in Spanish the subject must frequently be absent because of pro-drop. At least for children, it seems that verb agreement is not more salient as a marker of notional number even when its 'cue validity' is increased by pro-drop.

Finally, Höhle and Brandt (2008) compared picture-choice with an eyetracking measure in German as a more sensitive measure of preference, with number agreement on the end of the verb as the only clue to subject number. Children's eyegaze showed some sensitivity to the number agreement, but their picture choice was at chance at three and four years.

In this study we tested Xhosa-speaking children to see if children in a very rich agreement language would utilize the morphemes on the verb as markers of subject number. However, the data serve a secondary purpose, namely, to potentially adjudicate between, or at least add to arguments around, rival accounts of the verb morphemes in Xhosa, One of the Nguni group of Bantu languages, Xhosa is primarily agglutinative, with morphology accumulating on the verb stem. There are nine positions on the verb into which a grammatical morpheme might slot, and they include markers that agree with both subject and object noun class (Du Plessis, 1997). The subject noun can be dropped (pro-drop), leaving only the subject marker on the verb appropriate to the class of the absent subject noun. There are fifteen noun classes, each marked by an initial morpheme as a noun prefix. The basic sentence form is thus:

(8) Oomama *ba*-thetha efonini.
     2a mother 2a-SM talk loc-phone
     "The mothers talk on the phone".

Number is not associated with a single morpheme but instead the form changes by noun class. There are 15 noun classes, 8 singular and 7 plural. In the following examples, the change from singular to plural is different for each noun class, unlike languages such as English, which has only tiny irregularity in plural formation (man/men, child/children, foot/feet).

(9) Class 1: um-ntu   Class 2: aba-ntu
             person   people
     Class 1a: u-sisi   Class 2a: oo-sisi
             sister   sisters
     Class 7: isi-lumko   Class 8: iz-ilumko
             genius   geniuses
     Class 9: in-to   Class 10: izin-to
             thing   things

In subject and object verb marking on the verb, once again it is not a straightforward copy of an agreeing prefix, rather the plural form of the marker varies with class:

(10)   Oo-sisi   ba-hlala   phezu   kwesofa.
        2a-sisters   2a-SM–sit   on top   sofa
        "The sisters   sit   on the sofa".

(11)   Izi-nja   zi-hlala   phezu   kwesofa.
        10-dogs   10-SM-sit   on top   sofa
        "The dogs   sit   on   the sofa".

The classic work on the nature of subject-verb markers in Bantu languages is by Bresnan and Mchombo (1987) on Chichewa. They assumed that a syntactic agreement marker must have an overt controller in the same sentence. In contrast, a pronominal marker cannot occur with an overt local controller or it would violate Principle A. Chichewa subject agreement was considered pronominal in type when an overt subject is absent (pro-drop), and as agreement when an overt subject is present. Object agreement obligatorily occurs when the object is dropped or displaced beyond the phrase, and so the OM was classified as pronominal in form.

Baker (2001) offers an alternative: In Chichewa the overt subject must be moved outside the clause (before or after) when there is subject agreement. In such an analysis, the subject marker occupies the subject position, namely Spec-AgrS, and behaves more like a clitic pronoun. Baker argued that the subject in Chichewa is displaced outside the phrase by the presence of SM, i.e. SM occupies the subject position (Van der Spuy, 1993). In that way, there would no longer be a Principle A violation with an overt subject, since it is displaced.

In other accounts of Bantu verb markers, several other considerations come into play. One argument concerns whether subject wh-questions be asked directly. If subjects are forced into topic position as Baker proposes, then wh-questions would have to be indirect, as topics cannot be questioned. The result is oblique questions using passives or clefts (Deen, 2006). A second argument concerns the behavior of the morpheme when there are several auxiliaries. In Zulu, for example, SM appears on each auxiliary, which would be unlikely behavior for pronouns (Buell, 2004). In Xhosa, these tests do not decide the question of the status of SM as either agreement or pronominal clitic.

In this study we tested whether SM for children speaking Xhosa patterns like subject agreement or like pronouns. If it behaves like subject agreement, then children might show poor sensitivity to subject number carried only by SM. If it behaves like pronouns, then children might show good sensitivity to subject number carried only by SM.

In the novel aspect of the study, we also tested Object agreement using a similar design, to see if number agreement could be carried by the morphemes attached to the verb. Most theorists of Bantu consider these object morphemes to be pronominal clitics, though Buell (2004) argues that they have

properties that qualify them as object agreement morphemes. In particular, when the morpheme co-occurs with a lexical object, the lexical object is displaced out of the clause. The question of how children retrieve number from object agreement has not been tested previously.

2. Methods
2.1. Design

The study was designed as an experiment to test whether children can retrieve number information about the subject and the object from the verb morphology alone. This was done using 8 sets of pictures for the subject marking test and 8 sets for the object marking test. The pictures were selected based on frequency of use of verbs associated with them amongst children aged between 4 and 6 as well as cultural appropriateness. The pictures represent the most common variety of singular-plural agreement pairs in Xhosa.

2.1.1. Subject Agreement Test

The subject agreement test consists of 8 sets of pictures representing singular and plural agreement marking and 8 sentences. The pictures and sentences were not on the same sheet. Of the 8 sets, two were accompanied by sentences that contain a lexical subject. The six critical examples contained only the SM as an indicator of subject number, three singular and three plural.

2.1.2. Object Agreement Test

The object agreement test also consists of 8 pictures representing the singular and plural object agreement marking and 8 sentences. As with the subject agreement marking, two sets were accompanied by sentences that contained a lexical object. The six critical examples contained only OM as a clue to object number, three singular and three plural.

2.2. Participants

The participants involved in this study were 38 Xhosa speaking children attending daycare/ preschool in the townships near Cape Town. The children were randomly selected by the teachers with the aim to produce the same number of girls and boys per age group. The younger participants were 12 four -year- old children. The number was divided equally amongst boys and girls in this age group. The second group consisted of 26 five-year-old children. Of the 26, fifteen were boys and 11 were girls. The researchers were native speakers of Xhosa who themselves have children in the same age group. The children were tested individually in their schools by these native speakers of Xhosa.

2.3. Procedure

The tests were carried out in three different daycare centers in the townships around Cape Town. For each of the sessions, the researchers met with the students together with their teachers to ensure that the children felt comfortable talking to them. Each participant was then taken to a separate room where they sat with the researcher. Each interview lasted for about 4 minutes.

The children were first asked a few simple questions relating to their personal information such as name, surname, age and whether they had siblings or not. This was followed by an explanation of the task. The participants were asked to listen to a sentence and then choose the picture that corresponded to the sentence that they heard. Before the actual test, in order to increase the children's attention to the task and to ensure that they understand the instructions to point to only one picture, they were given warm-up examples that just required picture identification. For example, given a choice of a picture of a baby and a bicycle, they would be asked:

(12)   Khawundibonise ubhabha
         "Please show me the baby".

In the test itself, the children usually spontaneously repeated the sentences without any problems, and retained the morphemes in question in their pronunciation. They received positive feedback regardless of their choices.

In the subject agreement test, for example, one picture showed one rabbit sniffing at flowers, versus a second picture where two rabbits are sniffing at flowers. After indicating the rabbits and the flowers to bring them into the discourse, the child was told to "point to the picture where":

(13)   U-nukisa amablomu
         SM-sniff flowers
         "It sniffs at the flowers".

The task was very similar for Object agreement. Each child saw for instance two pictures, one in which a woman is watering a single flower, and one in which she is watering three flowers. After saying about the pair of pictures:

(14)   Jonga…Oo-mama, …ama-blomu
         See   2a-women,   6-flowers
         "See… Women, flowers".

the child is asked to 'show the picture where':

(15)   Umama   u-ya-wa –nkcenkceshel-a
         1a-Woman   1a-SM-TNS- 6-OM waters - M
         "The woman waters them".

The alternative question would be:

(16)   Umama   u-ya-li-nkcenkceshel-a
         1a-Woman   1a-SM-TNS- 5-OM waters – M
         "The woman waters it".

The responses were recorded on a score sheet containing the child's name and age. The responses were scored based on two measures. First accuracy was noted, namely the number correct. Then more importantly, the children's sensitivity was coded, namely, whether the child picked the singular picture only when the singular sentence was presented. This latter index takes into account any bias, such as children always preferring the singular or plural picture. Sensitivity is the number of singular pictures chosen when singulars were presented divided by the total number of times a singular is presented, and likewise for the plural. Chance performance is therefore a sensitivity of .5.

3. Results

Consider first the data from children's sensitivity to the subject morpheme on the verb. The average sensitivity hovered around chance, as shown in Figure 1. Although there was a significant change in sensitivity to the singular forms between ages four and five, the level of performance at each age was no greater than .5 by a single sample t-test. This was the case for both singular and plural forms.

Figure 2 shows the level of performance on the morphemes carrying object information. Neither singular nor plural sensitivity was greater than chance for either age group, nor was there a difference by age in performance on either index. It is not the case that some children could do the task and other children could not. The data were distributed as one would expect by chance.
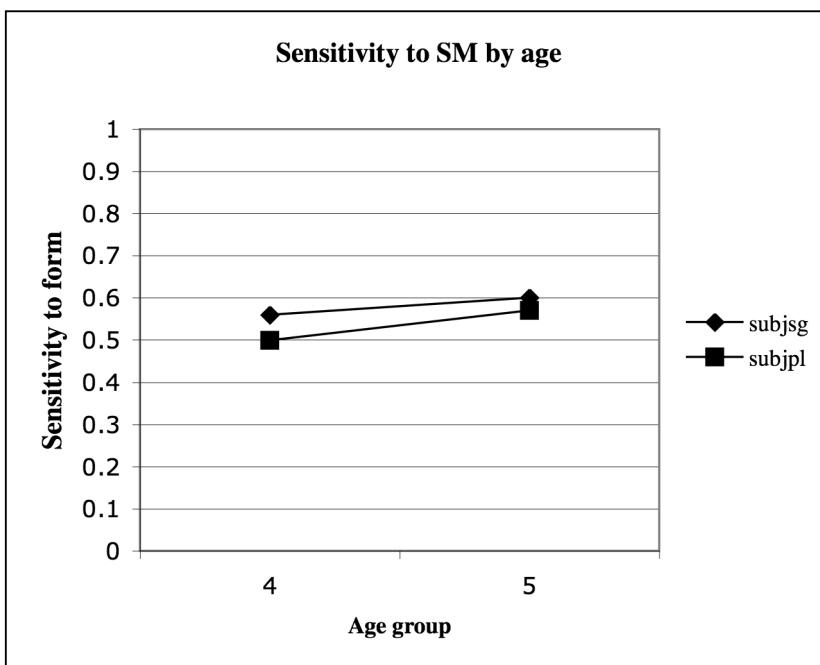
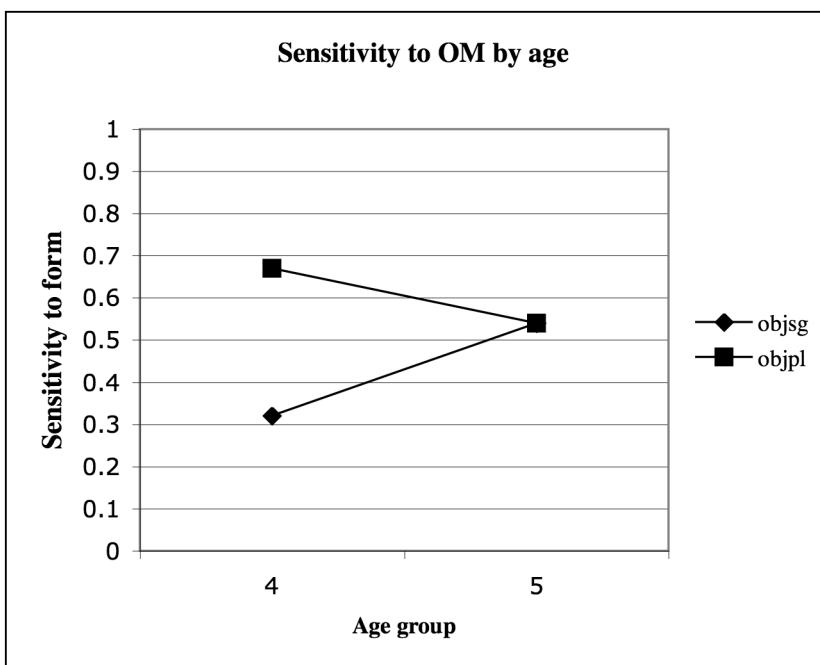**Figure 1. Sensitivity to singular and plural subject marking by age.**

Figure 2. Sensitivity to singular and plural object marking by age.

4. Discussion

It is difficult in any case to compare the level of performance across languages, and it would be inappropriate to do so here given the huge differences in the populations studied as well as the language differences. However, the Xhosa-speaking children's data do resemble the data from English-speaking children in that they show no sensitivity to the morphemes on the verb that carry number agreement with the subject.

If the general hypothesis is that the target of agreement is inert, or devoid of semantic information in its own right, then these data could contribute to the debate about the status of the morphemes as agreement morphemes rather than clitic pronouns in Xhosa. Furthermore, the object morphemes behave the same way, lending credence to the view that they also behave as agreement morphemes.

There are many remaining questions to be investigated. For example, at what age and under what conditions can Xhosa-speakers use the verb morphemes information for this purpose? Does that ability require metalinguistic awareness, or Gricean implicatures?

Second, could the morphemes carry noun class information even if they do not carry number? The question raised is whether it is only number information that is "bleached", or unavailable, but perhaps grammatical gender (noun class) would be available. The analogy would be to e.g. pronouns in English:

(17)   It fell.
versus
         She fell.

However, perhaps that again is a *pronoun* property, potentially not available from the target of agreement. Xhosa is a rich language in which this could be investigated. The situations can be arranged so that the only clue to the subject would be carried by the agreement on the verb, and the potential subjects in the discourse situation could be from different classes. An act-out methodology would work well for this design: would children enact the sentence with the right subject?

Third, what if the child's own production system were engaged in the process of the decision? We have begun work in this direction to see if running the sentences in the experiment through the child's production system will improve sensitivity in a cloze-type task e.g. in English:

(18)   "The ducks swim in the….. ?"

In the picture choice, the ducks (plural) are swimming in a pond, and the duck (singular) is swimming in a bathtub, and the child must decide how to complete the sentence. If this task proves easier, it will answer questions about the point at which the information in agreement is preserved or lost. We infer from spontaneous speech data that Xhosa-speaking children do produce the right number agreement on verbs from an early age, perhaps even precociously compared to English speaking children (de Villiers & Gxilishe, 2009). The comprehension-production gap seems to be again reversed from the usual direction, and we are in pursuit of the right explanation.

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