Information Structure and Ordering Preferences in Child and Adult Speech in English

Jidong Chen and Bhuvana Narasimhan

1. Introduction

When communicating with their interlocutors, speakers refer to entities that are “old” (mentioned in prior discourse) as well as entities that are “new” (introduced for the first time). In the course of language production, speakers must choose how to order “old” and “new” referents in their utterances; that is, speakers must linearize their thinking for the purpose of speaking (Levelt, 1989).

Typically, adults order previously mentioned old referent first, before they introduce referents that are new. The “old-before-new” (or “given-before-new”) ordering principle has been documented in a variety of construction types in languages (Bock & Irwin, 1980), in experimental studies of scrambling in languages such as Japanese (Ferreira & Yoshita, 2003), and in corpus-based studies of the dative alternation (Arnold, Losongco, Thomas, & Ginstrom, 2000).

This paper explores whether the preference for the “old-before-new” order is general and robust, as expected of a natural, universal principle (H. H. Clark & E. Clark, 1977), or whether it is malleable and influenced – or even constructed – by factors such as age, language, and culture.

2. Background

The ordering of constituents in utterances has been explained in terms of facilitation of comprehension and/or production (Arnold et al., 2000). In the speaker-oriented account, old referents are more activated than new referents because they have been encountered in a prior context, and are therefore more available for early mention (Branigan, McLean, & Reeve, 2003). In the addressee-oriented account, “old-before-new” is preferred because speakers assume that comprehension is easier for the hearer when a structure is already
available to which incoming information can be linked (H. H. Clark & Haviland, 1977). But other research suggests that the “old-before-new” preference is reduced or reversed depending on construction type (Clifton & Frazier, 2004), cognitive load (Narasimhan, Duffield, & Kim, 2015; Slevc, 2011), and age (Narasimhan & Dimroth, 2007). Clifton and Frazier (2004) find that processing is facilitated when the postverbal arguments in double-object constructions follow the definite-indefinite (“old-before-new”) order versus the indefinite-definite (“new-before-old”) order. Yet an old-before-new facilitation is not found for NP-PP constructions if the definite postverbal noun phrase is followed by a prepositional phrase containing an indefinite noun phrase.

Slevc (2011) finds that speakers’ “old-before-new” preference in the production of dative constructions is attenuated when under a verbal processing load; a similar effect is found in conjunct noun phrases (Narasimhan, Duffield, & Kim, 2016). Children acquiring German exhibit a “new-before-old” preference when ordering noun phrases within conjuncts (e.g., an apple and a spoon) in contrast to the “old-before-new” preference for the same construction type in adult speakers of German (Narasimhan & Dimroth 2008; Narasimhan, Duffield, & Kim 2016). Similar to the children acquiring German, bilingual Spanish-English children have also been found to show a “new-before-old” preference in conjunct noun phrases in Spanish (Ceja Tel Toro, Chen, & Narasimhan, 2016).

3. The study

In the present study, we further explore the nature of age effects on ordering preferences by asking: how do monolingual English-speaking children order “old” and “new” referents in conjunct noun phrases? Conjunct noun phrases (e.g., an apple and a spoon) were chosen, as they are simple to produce and allow for information status to be manipulated in noun phrases that do not otherwise differ in topicality or semantic or grammatical role.

If “new-before-old” is a language-independent cognitive strategy, children acquiring English will prefer this order just as children acquiring German do. But if ordering preference is influenced by word order patterns in the input language, children acquiring English are less likely to order referents based on information status compared to children acquiring German or Spanish, as prior research suggests that word order is more rigid in English versus German (Callies, 2009) or Spanish (Brown & Rivas, 2011).

The specific research questions we are examining are:

1. How are “old” and “new” referents ordered in conjunct noun phrases in the speech of English-learning children?
2. Is the “new-before-old” order a deep-rooted cognitive or communicative preference found in children acquiring different languages?
3. Or is the “new-before-old” preference modulated by language-specific word order flexibility of the target language?
3.1. Methodology

We conducted an elicited production of conjunct noun phrases to explore the research questions above. The elicitation stimuli and procedure were adapted from the original study of the German-learning children in Narasimhan & Dimroth (2007). Our participants were 15 English monolingual children (9 girls, 6 boys; mean age 4;4, age range 3;10 to 5;1), and 12 adults (6 females, 6 males; mean age 28, 21 to 54 years). The stimuli were 23 pairs of common objects and 3 single objects (part of the fillers) presented in slides on a laptop, including 12 target pairs of English nouns for 24 inanimate objects (see Table 1), e.g. “apple” and “spoon” that were matched on the number of syllables and frequency of use based on child-caregiver corpora (age range 1;4 – 4;0) in the CHILDES database (MacWhinney 2000), 4 warm-up items, and 14 filler items. The target and filler stimuli were randomized and counterbalanced into four different orders.

<table>
<thead>
<tr>
<th>Table 1. Labels for target object pairs used as stimuli</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object label 1</strong></td>
</tr>
<tr>
<td>1 book</td>
</tr>
<tr>
<td>2 clock</td>
</tr>
<tr>
<td>3 flower</td>
</tr>
<tr>
<td>4 cup</td>
</tr>
<tr>
<td>5 key</td>
</tr>
<tr>
<td>6 hat</td>
</tr>
<tr>
<td>7 cookie</td>
</tr>
<tr>
<td>8 tree</td>
</tr>
<tr>
<td>9 ball</td>
</tr>
<tr>
<td>10 car</td>
</tr>
<tr>
<td>11 apple</td>
</tr>
<tr>
<td>12 glass</td>
</tr>
</tbody>
</table>

Each participant was tested individually in a quiet room. They were first shown an object (e.g. a spoon) on a slide. The experimenter asked: “What is on the screen”? and repeated the participant’s object description (in order to make the referent sufficiently “old”). The participant was then shown two objects on a slide: the old referent plus a new object (e.g. a spoon and an apple). They were asked again: “What do you see on the screen?” and their response was recorded. Figure 1 illustrates the experimental setup and the procedure. With the child participants, this procedure was slightly adapted in a child-friendly manner to keep them engaged. The experimenter introduced a stuffed animal at the beginning of the task, a Teddy Bear, who could not see the slide and wanted to know what the child had seen on the screen. Each child was first invited to make friends with Teddy by patting it. Then she or he (henceforth “she”) was asked if would like to help Teddy learn what she had seen. All the children agreed.
The total number of target responses was 324, including 180 responses from the children (12 target trials × 15 children) and 144 from the adults (12 target trials × 12 adults). All the participants responded to every trial and thus there were no missing responses. Each response to the target pair of objects was coded for the ordering of the referents: (1) n/o: new referent before old; (2) o/n: old referent before new; (3) n: new referent only; or (4) o: old referent only.

### 3.2. Results

Figure 2 shows the mean proportions of “new-old” vs. “old-new” responses in the child and the adult responses. The adults were highly consistent in their preference for the “old-before-new” word order: 84% “old-before-new” responses in contrast to 16% “new-before-old” responses. All the adults also produced the “old-before-new” order in more than 67% of their responses. The number of “old-before-new” responses ranged between 8-12 and the number of “new-before-old” responses range between 0-4 out of a total of 12 test trials (see Figure 3).
Figure 2. Mean proportions of the “new-old” vs. “old-new” responses in child and adult speech

Figure 3. Number of “old-new” and “new-old” responses in adults
In contrast, the children showed a stronger preference for the “new-before-old” order (59% of responses) versus the “old-before-new” word order: (41% of responses) (as shown in Figure 2). They also exhibited much greater variation in their responses, ranging between 1-10 “old-before-new” responses out of a total of 12 trials (see Figure 4). Two children, AD and CO, also produced rather frequently the “new-only” responses (7 out of the 12 trials for AD and 2 for CO) and the “old-only” response was very infrequent (only 1 for CO), as shown in Figure 4. Only 2 out of 15 children preferred the “old-before-new” order in more than 50% of their responses, whereas 10 children preferred the “new-before-old” order in more than 50% of their responses and 3 children were at chance level (50%).

We conducted a mixed-effect logistic regression analysis, with age as the predictor variable and order of mention (“old-before-new” vs. “new-before-old”) as the outcome variable. We found a significant effect of age: children were less likely to use the “old-before-new” word order than adults (see Table 2). Whereas the adults’ preference for the “old-before-new” word order preference was significantly higher than chance ($\beta=1.98$, $Z=4.31$, $p<.0001$), children did not prefer the “new-before-old” order at levels significantly higher than chance ($\beta=-0.39$, $Z=-1.90$, $p=0.057$).
4. Discussion and conclusion

Our study provides further evidence for the robust “old-before-new” preference found in prior research. Monolingual English-speaking adults prefer the “old-before-new” word order, consistent with the “old-before-new” preference documented in adult speakers of German using a similar task and the same conjunct phrase construction (Narasimhan & Dimroth, 2007; Narasimhan et al., 2015).

But the “old-before-new” pattern is not a global preference; it is modulated by age. Similar to children acquiring German (Narasimhan & Dimroth 2007) and Spanish (Ceja Del Toro, Chen, & Narasimhan 2016), the four-year-olds in our study fail to exhibit the “old-before-new” preference found in adult speakers of English. The developmental differences might arise from cognitive factors, such as the salience of novel entities for children vs. adults; or from communicative factors, such as sensitivity to the informational needs of the addressee.

However, the “new-before-old” preference does not appear to be a universal early cognitive or communicative tendency influencing children’s production in all languages. Unlike children acquiring German or Spanish, English-speaking four-year-olds do not prefer the “new-before-old” order at rates significantly higher than chance. One might be tempted to trace the differences in preference for the “new-before-old” order between children learning German and children learning English to methodological reasons. The experimental procedure in the German study (Narasimhan & Dimroth 2007) involved toy replicas of real objects, children were asked to help a second experimenter, who could not see the objects in a transparent container, to find the matching picture that showed the old and the new objects. Thus the children participated in a more engaging communicative interaction as compared to the procedure in the current study, in which children simply described 2D pictures of objects on the computer screen to the experimenter (or Teddy Bear). This methodological difference may have contributed to the less frequent production of the “new-before-old” word order in children acquiring English. Note that in the mixed-effect logistic regression analysis, we found that even though children did not prefer the “new-before-old” order at levels significantly higher than chance, the \( p \) value is close to significance level (\( p = 0.057 \)). Also in the German study, the German-learning children’s mean proportion of “new-before-old” ranged between 62%-65% of the responses (Narasimhan & Dimroth, 2008). In the current study we found a mean proportion of 59% of the “new-before-old” responses. It is possible that

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Std. error</th>
<th>Z value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(intercept)</td>
<td>1.7756</td>
<td>0.2974</td>
<td>5.970</td>
</tr>
<tr>
<td>Age: Child</td>
<td>-2.1734</td>
<td>0.3752</td>
<td>-5.793</td>
</tr>
</tbody>
</table>
given a larger sample size of children we may see a significant preference for the “new-before-old” word order.

However, differences in procedure and sample size may not be the only factors influencing the reduced “new-before-old” order in children acquiring English. A significant preference for the “new-before-old” order (a mean proportion of 81% of the responses mentioned the new referent first) was found in the study with the Spanish-English bilingual children (Ceja Del Toro, Chen, & Narasimhan 2016), in which the procedure was identical to the one used in the present study and the sample size was even smaller (13 children versus 15 children in the present study). We therefore postulate that the absence of a significant preference for the “new-before-old” order in English-speaking children is influenced by the degree of word order flexibility of the target language. English has a more rigid word order compared to languages such as German (Callies, 2009) and Spanish (Brown & Rivas, 2011). Children acquiring any language are likely to find novel referents more prominent than old referents. But only children exposed to the flexible use of word order are tempted to employ word order to express asymmetries in discourse-pragmatic prominence. That may lead to a stronger reliance on word order in German and Spanish child speech than in English child speech.

Further crosslinguistic and developmental research is required to explore the range of variation in information structure-driven word order patterns. An investigation of ordering patterns in caregiver input to children, as well as additional manipulations exploring the role of factors such as ease of processing and sensitivity to addressees’ informational needs in influencing word order is also required. Further studies are also needed to investigate how information structure is encoded using a variety of linguistic devices including word order, intonation, discourse particles, construction type, case-marking, and referential form, among others.

References


Proceedings of the 42nd annual Boston University Conference on Language Development

edited by Anne B. Bertolini and Maxwell J. Kaplan

Cascadilla Press Somerville, MA 2018

Copyright information

Proceedings of the 42nd annual Boston University Conference on Language Development © 2018 Cascadilla Press. All rights reserved

Copyright notices are located at the bottom of the first page of each paper. Reprints for course packs can be authorized by Cascadilla Press.

ISSN 1080-692X
ISBN 978-1-57473-186-6 (2 volume set, library binding)

Ordering information

To order a copy of the proceedings or to place a standing order, contact:

Cascadilla Press, P.O. Box 440355, Somerville, MA 02144, USA
phone: 1-617-776-2370, sales@cascadilla.com, www.cascadilla.com