1. Introduction

Imagine you and your partner are in a housewares store, searching for a new kitchen clock. Luckily, the store offers a wide selection of clocks. You have spotted a nice round clock and now you want to draw your partner’s attention to it. The clock is quite big and hangs on a display above your head, among many other clocks in different sizes and shapes. In this situation, you will likely produce (1a) and not (1b) where the adjectives are in the opposite order.

(1) Look at …
   a.  the big round clock!  SIZE > SHAPE
   b.  #the round big clock!  SHAPE > SIZE

The difference between (1a) and (1b) has been argued to result from general ‘adjective ordering preferences’ (AOPs), here illustrated for SIZE and SHAPE. In languages with prenominal adjectives, including English and German, the order SIZE > SHAPE is usually preferred over the opposite order SHAPE > SIZE. Languages such as Italian with postnominal adjectives are claimed to show the exact mirror order (Cinque 2010).

AOPs are assumed to be present whenever the speaker uses two or more attributive adjectives; the opposite order is regarded as marked or strongly dispreferred. AOPs have been investigated for many languages since the 70s (Dixon 1977) and, in recent years, the interest in understanding AOPs has revived (e.g., Scontras et al. 2017, Trotzke & Wittenberg 2019, Kotowski & Härtl 2019). The current debate asks i.a. whether a flexible order is possible for some or in fact many combinations of adjectives (see the early discussion in Dixon 1977, Hetzron 1977). Take the adjective classes SHAPE and COLOR. In this case, the suggested
AOP is SHAPE > COLOR, as illustrated in (2a) (see Scott 2002, Cinque 2010). However, the preference does not seem very strong; (2b) with the reversed order is often accepted as well, which makes SHAPE and COLOR less clear cases of AOPs than SIZE and SHAPE (see example 1a/b). If preference for one over the other order for SHAPE and COLOR turned out to be not very strong or not existent at all, the general rigidity of AOP would be called into question.

(2) a. the square blue table SHAPE > COLOR
    b. ?the blue square table COLOR > SHAPE

Dating back to the 70s, acquisition studies have examined whether preschool children’s adjective use provides evidence for AOPs, and could thereby contribute to uncovering the nature of AOPs (Bever 1970, Scheffelin 1971, Martin & Molfeese 1972, Richards 1977). Due to contradicting results across studies and age groups, the findings have been inconclusive. Accordingly, the extent to which children are sensitive to AOPs and to possible differences in their strength, remains unclear. Employing the method of elicited production, the current study investigates the presence of AOPs in children and in adults, using SIZE, SHAPE, and COLOR adjectives.

The paper is structured as follows: Section 2 contains a descriptive analysis of AOPs and Section 3 summarizes the (non)restrictive use of adjectives. Previous acquisition research on prenominal adjectives and on AOPs is presented in Section 4. Section 5 describes the study design and the results. Section 6 offers a discussion of our findings and Section 7 concludes the paper.

2. Adjective ordering preferences

All AOPs are, in the first place, descriptive generalizations across a number of adjective classes (e.g., Dixon 1977, Sproat & Shih 1991, Scott 2002, Cinque 2010): adjective classes such as SHAPE, SIZE, and COLOR adhere to a particular order and specific adjective types within these classes are used in line with this ordering. One example of a particularly fine-grained notion-based hierarchy is the one given in (3), which has been proposed by Scott (2002, bold marking by us):

(3) […] > SUBJECTIVE COMMENT > EVIDENTIAL > SIZE > LENGTH > HEIGHT > SPEED > DEPTH > WIDTH > WEIGHT > TEMPERATURE > WETNESS > AGE > SHAPE > COLOR > NATIONALITY/ORIGIN > MATERIAL > COMPOUND ELEMENT > NP

Any concept of AOPs involves at least three dimensions. First, how are the adjective classes determined? They may be notion-based classes like SIZE, SHAPE, COLOR, or semantic classes like subsective and intersective (Truswell 2009), or classes based on a semantic function, e.g., qualifying and descriptive adjectives (Eichinger 1993). Second, what is the nature of the AOPs? Some proponents like Scott (2002) and Cinque (2010) assume that AOPs “…fall out as a direct consequence of UG” (Scott 2002: 97), while other researchers argue that the
AOPs result from more general cognitive ordering principles but not from grammar proper (Bouchard 2002). Finally, how rigid is the ordering? That is, can these restrictions not be violated, as often assumed in concert with the assumption that AOPs are universally available as part of grammar, or do they merely express preferences, as often assumed in non-grammar approaches that draw on principles in cognition or frequency (e.g., Scontras et al 2017, Hahn et al. 2018, Champollion 2006).

For ease of comparison with previous acquisition work, in the current study we use the notion-based classes SIZE, SHAPE, COLOR.¹ Our study sheds light on the third dimension, i.e. how rigid AOPs are for children and for adults. Based on our results, in Section 6 we offer some suggestions regarding the question of the nature of the AOPs. In line with the hierarchy in (3) and many similar AOPs (e.g., Sproat & Shih 1991, Cinque 2010), we assume as a starting point that SIZE and SHAPE show a clear order (see 1a vs. 1b), while SHAPE and COLOR may not (see 2a vs. 2b).

3. Restrictive and non-restrictive uses of adjectives

Depending on the context, adjectives can be used non-restrictively or restrictively. Imagine that in the housewares store you say to your partner Look at the round clock over there. In a context in which there is only one clock, the adjective round is used non-restrictively. In this case, the adjective does not disambiguate between potentially competing referents; it provides additional information regarding the already identified referent or is an inherent part of a concept as in black crow (Fabricius-Hansen 2009). In a context in which there are several clocks, only one of which is round, the adjective round in the utterance Look at the round clock over there has a restrictive function: it serves to disambiguate between competing referents and to single out the unique referent that is both a clock and round. Put differently, only in their restrictive use are adjectives part of the truth-conditional meaning (e.g., Morzycki 2016).

The semantic concept of restrictivity is closely connected to the pragmatic concept of informativity (Grice 1975). In the multiple referent context above (i.e., containing several clocks one of which is round) a DP with the restrictive adjective round is needed to single out the intended referent. The request Look at the clock with the unmodified DP would be under-informative; the adjective round makes the request informative and, hence, the utterance is referentially successful. Note that given the same context, the request Look at the wonderful big round clock is also referentially successful, because it would direct the listener’s attention to the intended clock. The two additional adjectives wonderful and big make the request, strictly speaking, over-informative, as they are not needed for identification of the referent; they are used non-restrictively.

¹ Note that the specific classes we used could also be derived via semantic classes or functions, resulting in the same ordering.
In the present study, we refer to informative and over-informative utterances as ‘referentially successful’ (cf. Pérez-Leroux et al. 2021). Our experimental set-up required use of two restrictive adjectives; hence, utterances like (4a) and (4b) are considered referentially successful when and only when they single out the one clock in the context that is big and round, with (4a) being informative and (4b) being over-informative. The utterances in (5a) and (5b) are not referentially successful, because they are under-informative.

(4) a. the big round clock
   b. the beautiful big round yellow clock

(5) a. the clock
   b. the round clock

4. Previous acquisition research on adjectives and ordering preferences

Prenominal adjectives are acquired very early. Around their second birthday, children use single adjectives as in red train productively (Weicker 2019, Clahsen et al. 1994, for German), and double prenominal adjectives such as (6) occur in children’s spontaneous speech between ages 2 and 3 (Bar-Sever 2019, for English; Grohe in prep., for German).

(6) großen roten Schnabel (Leo, 2:03, CHILDES)
   big     red    beak

While spontaneous speech analyses clearly show that children acquire the class of adjectives very early, they cannot tell us which meaning children assign to the adjectives they produce. To this end, elicited production studies and comprehension studies are needed. Prompting five-year-olds to use single prenominal adjectives in a restrictive context, Nadig and Sedivy (2002) as well as Davies and Katsos (2010) found that children supplied adjectives only some of the time. Davies and Katsos’ (2010) comprehension experiment indicated that the children were nevertheless sensitive to the context requirements of restrictive adjectives: when asked to rate informative, under-informative, and over-informative utterances on a three-point scale, informative utterances were rated significantly higher. Without prior training, production of double prenominal adjectives (referred to as AAN structures hereafter) has been found to be difficult in elicitation (Scheffelin 1971, Martin & Molfese 1972) as well as in narrative tasks, where AAN utterances were produced by only 25% of the five-year-olds (Eisenberg et al. 2008).

In languages like English and German adjectives typically appear in prenominal position, but they can also be part of relative clauses as in the clock that is round.

For an explanation of this early acquisition in terms of distributional learning, see Grohe et al. (2021).
In summary, children have more difficulty producing AAN utterances than single prenominal adjectives. Accordingly, AOPs are not detected easily in children and are not easy to investigate in acquisition. Only in cases of children using AAN structures, can we ask whether these structures adhere to any AOP. During the 1970s, several studies set out to examine AOPs in preschool children (Bever 1970, Scheffelin 1971, Martin & Molfese 1972, Richards 1977), with mixed results across ages and studies. For example, AOPs were found for only some of the adjective class combinations tested, and in some cases children’s preferred order differed from the adults’ (e.g., for CLEANLINESS and COLOR in Martin & Molfese 1972). Children also exhibited inconsistent patterns; in a study by Richards (1977), for instance, 3- and 6-year-olds, but not 4- and 5-year-olds, showed AOPs. Importantly, acquisition studies so far have not considered the question of whether some orderings of adjectives may differ in their rigidity.

5. Our study

The study is part of a PhD project on the acquisition of double prenominal adjectives (Grohe in prep.). Employing a novel elicited production task, in this study we addressed the following questions:

(Q1) a. Do children use nominal modification in contexts requiring two restrictive adjectives in a referentially successful way?
   b. If so, do they use AANs or other nominal modification structures?

(Q2) To what extent do preschool children show the same ordering patterns for SIZE-SHAPE and SHAPE-COLOR adjectives as adults?

Regarding (Q1) we expect children to inconsistently produce referentially successful responses and to use AAN structures along with other nominal modification structures such as relative clauses. As for (Q2) we predict a clear preference for SIZE > SHAPE in the adult group, in line with adjective ordering hierarchies (e.g., Scott 2002, Cinque 2010). This should be visible at the individual level as well as across the group. For SHAPE and COLOR adults may either show a preference for SHAPE > COLOR, in line with a rigid concept of adjective ordering hierarchies, or exhibit no preference, in line with descriptive analyses (Truswell 2009, see Section 2). In the latter case, both orders SHAPE > COLOR and COLOR > SHAPE would be present in the adult group, reflected by an equal distribution of each order at the group level and, importantly, as an indifferent pattern in each individual. A bimodal distribution within the group, in contrast, would suggest that the order allows for variation and that adults exhibit in fact two different ‘grammars’. Given the mixed findings from previous acquisition research, children’s behavior is difficult to predict. They may not show any evidence of ordering preferences yet in either condition, i.e. exhibit indifferent patterns at an individual level; they may show more rigid ordering preferences than the adults’ or children may show the same ordering patterns that we expect for the adults.
5.1. Participants

24 German-speaking monolingual adults and 24 children participated in the task (mean = 4.05 years, range = 3.06 – 5.10 years). All children showed typically developed language abilities, assessed with a standardized language test (LiSe-DaZ, Schulz & Tracy 2011).

5.2. Material

The elicited production task contained two conditions, SIZE-SHAPE and SHAPE-COLOR, with eight test items each. Six practice items, three in each condition served to familiarize participants with the procedure. Four filler items were added, in which only a noun was elicited. The eight target adjectives from the classes SIZE, SHAPE, COLOR (Table 1) are acquired by age 2 (Weicker 2019).

Table 1: Adjective material in the study

<table>
<thead>
<tr>
<th>Adjective class</th>
<th>Adjectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>groß (‘big’), klein (‘small’)</td>
</tr>
<tr>
<td>SHAPE</td>
<td>rund (‘round’), eckig (‘square’)</td>
</tr>
<tr>
<td>COLOR</td>
<td>blau (‘blue’), rot (‘red’), gelb (‘yellow’), grün (‘green’)</td>
</tr>
</tbody>
</table>

Sixteen different nouns were used as targets for the sixteen test items: (Tisch (‘table’), Vase (‘vase’), Uhr (‘clock’), Schüssel (‘bowl’), Teller (‘plate’), Knopf (‘button’), Lampe (‘lamp’), Sticker (‘sticker’), Torte (‘cake’), Lolli (‘lollipop’), Bonbon (‘candy’), Planschbecken (‘pool’), Kissen (‘pillow’), Fenster (‘window’), Mülleimer (‘trashbin’), Bild (‘picture’). Importantly, the target objects labeled by the nouns could come in both shapes round and square, in differing sizes and in the different colors. The experiment was run on a laptop via a PowerPoint slideshow. In each trial four objects were depicted on a page in a ‘magic book’ (Fig. 1 and 2). The target object, marked with stars, exhibited the two target adjective properties such as big and round. There were three distractors: two showed the same object as the target (e.g., a clock in Figure 1), each differing in one of the two adjective properties (e.g., the small round clock and the big square clock in contrast to the big round clock). These distractors ensured that both adjectives had to be used to label the target object in a referentially successful way. In addition, there was a ‘noun distractor’, which shared both adjective properties with the target object but with a different object. This distractor ensured that participants had to use the noun as well, i.e., an elliptical utterance such as die große runde (‘the big round (one)’) was not sufficient to identify the target object. The position of the target object and the distractors was pseudo-randomized across items.
In the condition SHAPE-COLOR (Figure 2) the display was arranged in the same way: the target object (e.g., the round green ball) was depicted together with two adjective distractors (e.g., the square green bowl and the round yellow bowl), which differed from the target in SHAPE or COLOR and a noun distractor (e.g., the round green balloon).

5.3. Procedure

Children were tested in a separate room at their daycare centers. The experimenter and the child looked at the picture book on a laptop. The experimenter introduced the children to a hand puppet, a little magician, to create a more natural context for the magic book task. Children were told that the magician needed their help to find out which of the objects in the book were ‘magic’ objects. To familiarize the children with the vocabulary, in each trial the experimenter first mentioned the nouns and adjectives, illustrated in (7a) for Figure 2. Then the hand puppet asked a question (7b), prompting the child to name the ‘magic’ target object. The target response for Figure 2, indicated by blinking stars, is given in (7c). If a child pointed to the object, she was asked to say which object was bewitched.

The order of target adjectives mentioned by the experimenter in the introduction to the test item (e.g., big and round, see (7a)) was balanced across trials to prevent a possible influence on the adjective order produced by participants.
a. Experimenter (pointing):
There are clocks and one ball. There are big things and one small thing. And there are round things and one square thing.
b. Hand puppet: Was ist verzaubert? (‘What is bewitched?’)
c. Child: die große runde Uhr (‘the big round clock’)

5.4. Results

The children produced a total number of 384 utterances. Addressing (Q1), only 37% of all child responses contained referentially successful nominal modification structures; 63% of the responses were under-informative or named an incorrect property. The number of referentially successful nominal modification responses increased significantly with age ($p < .05$, Generalized linear mixed-effects model with age as a continuous factor, see Table 2).

Table 2: Output of the Generalized linear mixed-effects model

| Fixed effects: | Estimate | Std. Error | Z value | Pr(>|z|) |
|----------------|----------|------------|---------|----------|
| (Intercept)    | -10.84297| 3.93103    | -2.758  | 0.00581 ** |
| AgeMonths      | 0.18188  | 0.07172    | 2.536   | 0.01121 * |

Table 3 summarizes the child response pattern. Most of the referentially successful responses were AANs (90/141 items); they were produced by 16 out of the 24 children. Notably, the second most frequent successful structure (36/141 items) were extensions such as die runde Schachtel, die grüne (‘the round box, the green one’): DPs with a single prenominal adjective, followed by an adjective phrase containing the second adjective. Relative clauses were rarely used (10/141 referentially successful responses). Over-informative AAAN-responses such as die große runde gelbe Uhr (‘the big round yellow clock’) were produced very rarely (5/141 items) as well.

Table 3: Structures produced by the children

<table>
<thead>
<tr>
<th>Referential success?</th>
<th>Structure</th>
<th>Example</th>
<th>N (total=384)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>(D)AAN</td>
<td>the blue square window</td>
<td>90 (23%)</td>
</tr>
<tr>
<td>Extension</td>
<td></td>
<td>the round box, the green (one)</td>
<td>36 (9%)</td>
</tr>
<tr>
<td>Relative clause</td>
<td>(D)AAAN</td>
<td>the square window that is blue</td>
<td>10 (3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the big blue round lollipop</td>
<td>5 (1%)</td>
</tr>
<tr>
<td>No</td>
<td>(D)N</td>
<td>window</td>
<td>64 (17%)</td>
</tr>
<tr>
<td>(D)A(N)</td>
<td></td>
<td>square, square window</td>
<td>138 (36%)</td>
</tr>
<tr>
<td>(D)AA</td>
<td></td>
<td>the square blue</td>
<td>5 (1%)</td>
</tr>
<tr>
<td>wrong A(s)</td>
<td></td>
<td>... round ...</td>
<td>26 (7%)</td>
</tr>
<tr>
<td>NR</td>
<td></td>
<td>I don’t know</td>
<td>10 (3%)</td>
</tr>
</tbody>
</table>
The adults performed at ceiling; only 3% (12/384) utterances were referentially not successful, using only one or a wrong adjective. Referentially successful AANs were produced 89% (343/384) of the time; the remaining 8% referentially successful responses (29/384 items) contained over-informative AANs (n=12), extensions (n=5), relative clauses (n=2), and self-corrections (n=10).

Addressing the AOPs (Q2), we compared for each condition the number of utterances that exhibited the order predicted by the hierarchy with the number of utterances in the unpredicted order (Figure 3). Turning first to the adults, 88% of their responses in the SIZE-SHAPE condition show the predicted order SIZE > SHAPE, compared to 12% in the unpredicted order SHAPE > SIZE. This preference differed significantly from chance ($p < .001$, Binomial test, two-sided). In the condition SHAPE-COLOR, 48% of the adult’s responses exhibit the predicted order SHAPE > COLOR, compared to 52% of utterances with the unpredicted order COLOR > SHAPE. This difference is not significantly different from chance ($p = .705$, Binomial test, two-sided).

![Figure 3: Adjective order produced by adults and children](image)

The child group showed a similar pattern as the adults: 71% of the children’s responses in the SIZE-SHAPE condition show the predicted order SIZE > SHAPE, compared to 29% in the unpredicted order SHAPE > SIZE. This preference differed significantly from chance ($p = .008$, Binomial test, two-sided). In the condition SHAPE-COLOR, 38% of the child utterances showed the predicted order SHAPE > COLOR, compared to 62% in the unpredicted order COLOR > SHAPE. This difference is not significantly different from chance ($p = .111$, Binomial test, two-sided). In summary, a significant ordering preference for SIZE > SHAPE was found for both the adult and the child group, while for SHAPE-COLOR no ordering preference was present for either group.

To determine whether the individual patterns are in line with the group results, in a next step we calculated for each participant whether she was
consistent in her responses. We classified a participant as a ‘consistent responder’ if more than 50% of her responses in a condition showed the same order. The distribution of consistent responders is summarized in Table 4 for adults and Table 5 for children.

### Table 4: Number of consistent adult responders

<table>
<thead>
<tr>
<th>Condition</th>
<th>Predicted order</th>
<th>Unpredicted order</th>
<th>No preference</th>
<th>No AAN response</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE-SHAPE</td>
<td>23 (96%)</td>
<td>1 (4%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SHAPE-COLOR</td>
<td>12 (50%)</td>
<td>11 (46%)</td>
<td>1 (4%)</td>
<td>0</td>
</tr>
</tbody>
</table>

### Table 5: Number of consistent child responders

<table>
<thead>
<tr>
<th>Condition</th>
<th>Predicted order</th>
<th>Unpredicted order</th>
<th>No preference</th>
<th>No AAN response</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE-SHAPE</td>
<td>9 (69%)</td>
<td>2 (15%)</td>
<td>2 (15%)</td>
<td>11</td>
</tr>
<tr>
<td>SHAPE-COLOR</td>
<td>3 (20%)</td>
<td>10 (67%)</td>
<td>2 (13%)</td>
<td>9</td>
</tr>
</tbody>
</table>

In the adult group, 23 out of 24 participants showed an individual preference for the predicted order SIZE > SHAPE, mirroring the group results. Regarding the order of SHAPE and COLOR, however, the adults showed a binomial distribution: 12/24 participants preferred the order SHAPE > COLOR, while 11/24 favored the order COLOR > SHAPE, and one adult produced an equal number of both orders. These individual results reveal the origin of the flexible order for SHAPE and COLOR found at the group level: the adults have clear individual preferences; only one person is truly undecided and shows optionality in her grammar.

Let us now turn to the individual analysis of the child responses. Importantly, only half of the children produced any AAN responses in either condition (see Table 5). Accordingly, consistent AOPs were analyzed for 13 and 15 children, respectively. As for SIZE and SHAPE, 9/13 AAN producers in this condition (69%) preferred the predicted order SIZE > SHAPE. Only 2 participants (15%) preferred the unpredicted order SHAPE > SIZE, and another 2 participants (15%) produced an equal number of both orders. In the SHAPE-COLOR condition, only 3/15 AAN producers in this condition preferred the order SHAPE > COLOR, whereas the COLOR > SHAPE was favored by 10/15 children. Another 2 children produced an equal number of both orders. This finding differs from the group results, where no significant preference was found for SHAPE-COLOR. Like the adults, the children have clear individual preferences; only 2 children show true optionality in their grammar. Notably, many children (67%) favor the unpredicted order COLOR > SHAPE.
6. Discussion

The aim of the present study was to shed light on the issue of rigidity and on the nature of adjective ordering preferences (AOP) by examining whether children show the same AOPs as adults. We asked, first, whether children produce nominal modification structures in contexts requiring multiple restrictive adjectives (Q1a). To this end, we developed a novel elicited production task, which carefully controlled the visual set-up such that two adjectives were needed to be referentially successful. Children aged 3 to 5 produced referentially successful nominal modification responses, with their frequency significantly increasing with age. Overall, however, only 37% of the responses were referentially successful. This result is in line with previous studies reporting that, although children may be sensitive to context requirements of restrictive adjectives, up to age 5 many of the children’s utterances lack the required adjectives (Nadig & Sedivy 2002, Davies & Katsos 2010). Furthermore, we examined whether children use AAN or other structures in order to achieve referential success (Q1b). AAN structures were produced 23% of the time and accounted for more than half of the successful responses (90/141), while relative clauses were rarely produced (10/141 successful responses). Notably, 25% of the responses (36/141) were ‘extensions’: a DP with a prenominal adjective followed by another adjective, which together referred to the magic object in an unambiguous way. The relatively high number of extensions may result from the child’s attempt to avoid double prenominal adjectives; alternatively, it may express the addition of an afterthought (Ziv 1994). Imagine the child producing the round box. As soon as she realizes that this DP does not suffice to single out the unique referent in the picture, she adds the green one to achieve referential success. Note that both explanations share the assumption that double prenominal modification is not easy for children. That adults produced some extensions as well (5/384) is in line with the latter explanation, but undoubtedly more research is needed to determine the exact nature of these extensions.

Addressing AOPs, we asked (Q2) whether preschool children show the same ordering behavior as adults for SIZE-SHAPE and SHAPE-COLOR adjective pairs. Based on previous theoretical accounts (e.g., Truswell 2009), we expected a clear AOP for the former, but not the later adjective pair. Adults showed the predicted preference for SIZE > SHAPE, both individually and at group level, while group and individual data for SHAPE-COLOR yielded a remarkably different picture. While there was no order preference at the group level, nearly all adults showed a clear individual preference, with a bimodal distribution of SHAPE > COLOR and SHAPE < COLOR. This unexpected result suggests that language in fact offers two options and that adults select one of them. Importantly, the children showed almost the same pattern as the adults: children preferred SIZE > SHAPE both as a group and in their individual response patterns. For SHAPE-COLOR there was no significant preference for a specific order at the group level, but most children had a clear individual preference, as the adults.

Which accounts can explain these patterns – rigidity for one adjective pair and optionality at the grammar level for another adjective pair – best? Let us first
look at the classic cartographic approach (e.g., Cinque 2010), which assumes that adjective ordering hierarchies are based on the underlying syntactic structure. Each notion-based adjective class is argued to be hosted by a dedicated functional projection, with the adjective order being determined by the order of these functional projections within the nominal spine. The clear preference for SIZE > SHAPE follows naturally from this approach, but it remains unclear how it would allow grammar to generate two options, COLOR > SHAPE and COLOR < SHAPE, between which speakers can choose. Moreover, the children in our study showed the same ordering patterns overall as the adults, which suggests that they are sensitive to differences in the strength of AOPs. Under a pure cartographic approach, we would expect the universal adjective order to be available via UG (e.g., Scott 2002) and we would expect children to start with this rigid universal order. However, this is not what we found.

In contrast to the cartographic approach, non-grammar accounts (e.g., Scontras et al. 2017, Hahn et al. 2018, Champollion 2006) allow for some flexibility. Cognitive approaches offer the possibility that adjective classes that appear close together in the hierarchy are more flexible in their order (Kotowski & Härtl 2019, Adam & Schecker 2011). More specifically, approaches that postulate subjectivity as a driving factor (Scontras et al. 2017) may allow a certain flexibility of orders. Furthermore, accounts that emphasize the role of frequency of adjective combinations may explain flexibility of AOPs as well. As a case in point, Dixon (1977: 25) found participants in his questionnaire study to be divided between both orders, when being presented with the “unusual” combination of new and slow. These non-grammar approaches differ from cartographic approaches also in their implications for what the child has to learn and where she can go wrong. While according to the latter, the ordering hierarchy is part of UG and does not have to be acquired, non-grammar approaches imply that acquisition of AOPs rests on consideration of concepts such as subjectivity and frequency. Comparing three hypotheses (ordering hierarchies, subjectivity and positional input frequency) in a probabilistic learning study of adjective orders in child corpora, Bar-Sever (2019) found that all three hypotheses were equally likely. Accordingly, it does not come as a surprise that some approaches explicitly postulate multifactorial explanations (Trotzke & Wittenberg 2019, Wulff 2003).

In summary, our adult and child data provide evidence against a pure cartographic approach as a driving factor in deriving AOPs. This conflicts with the conviction that AOPs fall out as a direct consequence of UG (Scott 2002, Cinque 2010) and cannot be violated. In our view, AOPs are more likely to result from general cognitive ordering principles than from grammar proper (see Bouchard 2002). Non-grammar approaches, involving cognitive, frequency, or multifactorial aspects are better suited to explain the non-rigidity of AOPs. We have to leave for further research how the remarkable property of AOPs we detected in our child and adult data (optionality at the grammar level in concert with consistent behavior in the individual speaker) could be modelled.
7. Conclusion

The present study addressed the rigidity and nature of adjective ordering preferences (AOPs), looking at children’s and adults’ response patterns for SIZE-SHAPE and SHAPE-COLOR adjectives. As expected, children had difficulty producing nominal modification structures such as the big round ball in the relevant contexts. Nevertheless, children showed the same ordering patterns as the adults: a clear preference for SIZE > SHAPE but not with SHAPE-COLOR. This pattern suggests that children at age 3 are clearly aware of the existence of AOPs and of differences in their strength. The latter finding provides clear evidence that AOPs are not rigid, which speaks against the assumption that AOPs are universally available as part of grammar and for non-grammar approaches, involving cognitive, frequency, or multifactorial aspects. Why children, like the adults, nevertheless had clear individual preferences for the order of SHAPE-COLOR, we leave for further research.

References


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