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# Intervention Effects in Mandarin-Speaking Children's Comprehension of Passives

**Minqi Liu, Victoria E. Mateu, and Nina Hyams**

## 1. Introduction

### 1.1. Intervention locality in child languages

In adult grammar, syntactic dependencies cannot be established between two elements X and Y if there is another element Z that structurally intervenes and has identical (relevant) features as X ((featural) Relativized Minimality, e.g., Rizzi 1990, 2004), as in (1a). How do children represent this locality constraint in their grammar?

The Intervention Hypothesis proposes that children are subject to a *stricter* version of featural Relativized Minimality (1b) such that even a partial overlap between the feature specifications of X and Z causes intervention difficulty in their comprehension (e.g., Hyams & Snyder 2005, Friedmann et al. 2009, Adani et al. 2010, Orfitelli 2012, Snyder & Hyams 2015, Mateu 2019, among others). According to this hypothesis, the degree of intervention difficulty in child languages is a function of the featural distinctness between X and Z.

(1) a. … $X_{[F]}$ … [ $\boxed{Z_{[F]}}$ … [ $Y_{[F]}$ …]] b. … $X_{[A][B]}$ … [$\boxed{Z_{[A]}}$ … [$Y_{[A][B]}$ …]]
Intervention difficulty

Previous studies in different languages have shown that the intervention difficulty is mitigated when particular features of X and Z mismatch; these features include *Number* (Italian, Adani et al. 2010, Belletti et al. 2012; Hebrew, Belletti et al. 2012; English, Adani et al. 2014; Spanish, Mateu 2022), *Gender* (Hebrew, Belletti et al. 2012), *Animacy* (Italian, Arosio et al. 2011; French, Durrleman et al. 2016, Bentea et al. 2016; English, Mateu & Hyams 2020, 2021), and *NP types* (e.g., Hebrew, Friedmann et al. 2009; English, Choe 2013).

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In this paper we explore intervention effects with experimental data from children's acquisition of short and long passives in Mandarin.[1] The unique morphosyntactic properties of Mandarin passives make it an interesting test domain.

### 1.2. Morphosyntactic properties of Mandarin passives

Firstly, Mandarin has two passive constructions that are minimally different in terms of structural intervention. *Long passives* are passives with an explicit external argument (EA) such as (2a), while *short passives* do not contain this argument (2b). There exists a vast array of literature on the distinctive syntactic derivations of these two constructions in Mandarin (see Ting 1998, Huang 1999, Her 2009, Huang et al. 2009, Zhang 2010, Bruening & Tran 2015, N. Liu & Huang 2016, Ngui 2020, Z. Chen & Li 2021, F. Chen 2021, among many others). Due to space limitations, we focus on two facts regarding the EA in Mandarin long vs. short passives.

(2) a. Mandarin long passives
*laoshu bei mao yao-le*
mouse BEI cat bite-PERF
'The mouse was bitten by the cat.'

b. Mandarin short passives
*laoshu bei yao-le*
mouse BEI bite-PERF
'The mouse was bitten.'

In Mandarin long passives, the EA can bind into the downstairs phrases. As shown in (3a), the EA can bind the anaphor *ta-ziji* 'himself', suggesting that the EA c-commands the locative object *ta-ziji de fangjian* 'his/her own room'. This is in sharp contrast with (3b), where the NP in the PP *gen Lisi* ('with Lisi') is in an adjunct phrase not c-commanding the anaphor. This binding fact is evidence that the EA in long passives c-commands the gap of the internal argument (IA), thus structurally intervenes in the dependency between the IA surface subject and its gap.

(3) a. Zhangsan$_i$ bei [Lisi$_j$ [guan $\_\__i$ zai **ta-ziji$_{i/j}$** de fangjian]]
Zhangsan BEI Lisi lock at 3SG-self GEN room
'Zhangsan is locked in his (✓Zhangsan's; ✓Lisi's) own room by Lisi.'

b. Zhangsan$_i$ [[gen Lisi$_j$] taolun **ta-ziji$_{i/*j}$** de xiangfa]
Zhangsan with Lisi discuss 3SG-self GEN idea
'Zhangsan discusses his (✓Zhangsan's; ✗Lisi's) own idea with Lisi.'
(Adapted from Huang et al. 2009)

[1] This study investigates Mandarin passives marked by *bei*, the most common passive construction in this language. Mandarin passives marked by other non-canonical markers such as *jiao, rang,* or *gei* are beyond the scope of this paper.

In Mandarin short passives, the EA is not syntactically projected (e.g., Huang 1999, Bruening & Tran 2015, Z. Chen & Li 2021, F. Chen 2021). One piece of evidence concerns depictive secondary predicates, which can only be licensed by a DP that is projected in the syntax. Depictives are ungrammatical in Mandarin short passives, as shown in (4), arguably because there is no EA projected. This contrasts with languages like English in which short passives contain a syntactically represented implicit EA, as shown in (5) (e.g., Roeper 1987, Collins 2005, 2017, Meltzer-Asscher 2012, see also Landau 2010; but c.f. Bruening 2013, Williams 2015, Bhatt & Pancheva 2017 a.o.).

(4) huaping bei (*qihuhu-de) da-sui le
vase BEI angry-ADV hit-break PERF
Intended: The vase was broken angrily.

(5) The game was played drunk/nude/sober/angry. (Roeper 1987: 297)

Based on the crucial difference that the EA in long passives c-commands the gap of the IA and hence is an intervener, while the EA in short passives is not projected, as illustrated in (6a) and (6b), the Intervention Hypothesis predicts that Mandarin long passives will be harder for children to comprehend than short passives due to the structural intervention by the EA.

(6) a. Mandarin long passives: *The mouse* $\text{BEI}_{\text{PASS}}$ [$_{\text{IP}}$ *the cat* [$_{\text{vP}}$ *bite*-PERF __ ]]
intervener
b. Mandarin short passives: *The mouse* $\text{BEI}_{\text{PASS}}$ [$_{\text{VP}}$ *bite*-PERF __ ]
(Adapted from Huang 1999)

Mandarin passives are a good test case for intervention for another reason: In Mandarin children cannot use an "adjectival strategy" to interpret short passives (Borer & Wexler 1987). This is a confounding issue that arises in languages like English in which short (verbal) passives and adjectival passives are homophonous.[2] For example, in the English sentence "*The door was closed"*, the past participle form *closed* is homophonous with the adjective "closed" (as in *"the closed door"*). In contrast to the verbal passive, an adjectival passive does not involve syntactic movement of the IA to the surface subject position, and hence English-speaking children do not need to establish the filler-gap dependency in short passives in order to perform well (Borer & Wexler 1987, 1992, Hirsch & Wexler 2006, among many others). They can assign an adjectival passive structure to the sentence. In long passives this adjectival interpretation is blocked

[2] The participles that are homophonous with an adjective primarily derive from actional verbs, although some studies pointed out that non-actional verbs may also form adjectives, such as in *a respected teacher, an admired doctor, a remembered poet,* etc. (e.g., Weinberg 1987, Hirsch & Wexler 2006).

by the *by*-phrase.[3] Mandarin does not have such homophony, as shown in (7b), and hence the adjectival strategy is not available to children.[4] If Mandarin short passives are easier for children than long passives, it can only be explained by the absence vs. presence of structural intervention.

(7) a. Mandarin short passives:
men bei guan-le
door BEI close-PERF
'The door was closed.'

b. Lack of adjective homophony:
#guan men
close door
Intended: 'the closed door'

Lastly, the lack of morphological agreement on the verb in Mandarin raises the question of what features might or might not be relevant for intervention in a morphologically poor language like Mandarin.

This study addresses the following questions: (i) Do Mandarin-speaking children perform better with short passives than long passives, arguably due to intervention? (ii) What features enter into the computation of intervention in child grammar? And (iii) Are these features language-specific or universal?

## 2. Predictions of the Intervention Hypothesis

### 2.1. Prediction on long vs. short passives in child Mandarin

In the first large-scale corpus study on Mandarin passives in child and child-directed speech, M. Liu (2022) found that Mandarin-speaking 2- to 6-year-olds ($N$ = 1,182) produced more long passives (61.2%) in their spontaneous speech than short passives, showing no significant difference from their input *($X^2(1) = 0.78, p = 0.38$)* in which long passives (58.5%) were also more frequent than the short ones. Nonetheless, as opposed to adults, most of children's long passives contained two arguments with multiple mismatched features (such as NP types and/or animacy). This finding was one of the factors that motivated our experimental study in which we carefully manipulate the features of the two arguments to examine the effect of (featural) intervention. *Despite* the relatively higher frequency of long passives in their input and spontaneous speech, the Intervention Hypothesis leads us to predict that long passives will be harder for children to comprehend than short passives.

### 2.2. Features relevant in Intervention and predictions for this study

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[3] With a *by*-phrase introducing the Agent of the event, the ambiguous form (e.g., *closed*) can only receive an eventive reading, not a stative one that corresponds to an adjective. As a result, the presence of the *by*-phrase blocks the adjective strategy.

[4] In some Romance languages, verbal passives use different auxiliaries than adjectival passives, nonetheless the participles are still identical in both verbal and adjectival passives. Children speaking those languages also use the adjectival strategy to interpret the intended verbal short passives, such as Catalan (Gavarró & Parramon, 2017), Spanish (Oliva & Wexler, 2018), and European Portuguese (Agostinho 2020).

It has been claimed that languages may vary in which features are relevant for intervention. For example, in a study on children's comprehension of Hebrew and Italian relative clauses (RCs), Belletti et al. (2012) found that a mismatch in the Number feature between the head noun of the object RC and the embedded subject, an intervener, improved children's performance on object RCs in both languages, but a mismatch in Gender only improved Hebrew- but not Italian-speaking children's interpretation of object RCs. They proposed that "only features functioning as attractors for syntactic movement will enter into the computation of intervention" and that Number "belongs to the phi-feature complex that determines movement to the subject position" in both languages whereas Gender does so in Hebrew but not Italian. However, this is not a settled issue. Some proponents of the Intervention Hypothesis assume a wider stance and argue that any morphosyntactic feature can be involved in the computation of intervention, even if it is not realized on the inflectional head, for example, Animacy (see Arosio et al 2011; Durrleman et al 2016; a.o.). Lastly, processing (e.g., memory)-based approaches such as Similarity-based Interference (e.g., Gordon et al. 2002; Lewis et al. 2006; a.o.) also appeal to a notion of intervention but differ from structural accounts in that they are linear and do not rely specifically on morphosyntactic features – the triggering similarities may be along any dimension, i.e., morphosyntactic, or purely semantic or phonological.

In this study, we investigated the potential effects of two features in Mandarin – Number and Shape. Number is canonically a phi-feature that has been found to modulate intervention in other child languages besides Italian and Hebrew (Belletti et al. 2012), including English (Adani et al. 2014), French (Durrleman et al. 2016), and Spanish (Mateu 2022). Shape, on the other hand, is an inherent lexical feature that has not been previously tested with regards to intervention effects. In Mandarin, both Number and Shape are encoded on *classifiers*, making it convenient for us to control for the minimal differences in our test sentences.

As shown in (8), in Mandarin, numerals do not directly combine with nouns; instead, a classifier ($Cl^0$) is obligatory because it bears the individualizing function (i.e., of picking out a single instance of the predication provided by the NP) that is required in counting (e.g., Chierchia 1998, Cheng & Sybesma 1999, 2012, Borer 2005). Here the classifier *-ge* in (8) is a general classifier, which is non-plural, non-shape-specific, and most frequent in Mandarin. $Cl^0$ is also the locus of grammatical number (Cheng & Sybesma 1999, 2012, see also Borer 2005). In Mandarin there is a plural classifier *-xie* which combines with the numeral *yi* 'one' to mark the DP as (indefinite) plural, as in (9) (Cheng & Sybesma 1999, 2012, Wu 2019; cf. Borer 2005).

(8) *yi*(**-ge**) pingguo*
one-CLF apple
'an apple'

(9) *yi**-xie** pingguo*
one-CLF apple
'some apples'

Additionally, there are specific classifiers in Mandarin that encode the inherent lexical properties of the noun, such as the shape or size of the denoted

entity. For instance, the shape-specific classifier in our experiment, *-tiao,* s(emantically)-selects for some entities that are thin and long, such as 'snake' and 'street' in (10a), but not entities of other shapes such as 'monkey' or 'car' in (10b).

(10) a. *yi-**tiao*** *she / jiedao*
one-CLF snake / street
'a snake/street'

b. *yi-**tiao*** **houzi / *qiche*
one-CLF monkey / car
Intended: 'a monkey/car'

So far, we have seen three classifiers in Mandarin: (i) the general classifier *-ge* in (8), which is the most frequent;[5] (ii) the plural classifier *-xie* in (9); and (iii) the shape-specific classifier *-tiao* in (10). All three of them occur early in child spontaneous speech, as shown by the utterances in (11) (CHILDES corpora, MacWhinney 1990). We therefore expect 3-year-olds, the youngest age we tested, to have knowledge of them. Nevertheless, as we will show in Section 3.2, we also verified this in a pre-test session in our experiment.

(11) a. *hai you yi-**ge** jiuhuche* (2;2)
still exist one-CLF ambulance
'There is still an ambulance.'

b. *yi-**xie** xiaoqiche* (2;9)
one-CLF car
'some cars'

c. *zhebian yi-**tiao** xian* (2;4)
here one-CLF line
'Here is a line.'

By manipulating these three classifiers in our experiment, we tested the effects of the match/mismatch of Number and Shape features on children's comprehension of long passives. We anticipated three possible outcomes depending on the nature of featural intervention in child grammar:

(12) Hypothesis I: All linguistic features, including morphosyntactic as well as semantic features, are relevant for intervention.

Prediction of Hypothesis I: The mismatch of either the Number or Shape feature will facilitate children's comprehension of long passives, compared to the all-matched trials, because both Number and Shape are morphologically realized on Mandarin classifiers.

(13) Hypothesis II: Only phi-feature candidates (e.g., Number) – but not lexically inherent features (e.g., Shape) – are relevant for intervention, even if they are not overtly realized on the inflectional head.

[5] The general classifier *-ge* is also the first classifier children acquire in Mandarin and it functions as a place-holder for $Cl^0$ before children produce other specific classifiers (e.g., Erbaugh 1986, Loke 1991, Hu 1993).

Prediction of Hypothesis II: We will observe an improvement in children's interpretation of long passives with a Number mismatch but not a Shape mismatch

(14) Hypothesis III: Only features triggering syntactic processes (i.e., movement or agreement) *and* realized on the inflectional head are represented in the computation of intervention locality.

Prediction of Hypothesis III: Neither Number nor Shape will show mismatch facilitation effects because neither of these two features is instantiated in the verb in Mandarin.

## 3. Experiment

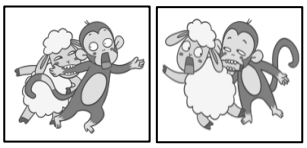
### 3.1. Design and materials

The experiment was a two-choice sentence-picture matching test with a 3 × 3 design, crossing three Sentence Types (Actives, Long Passives, and Short Passives) and three Featural Conditions (Match, Number Mismatch, and Shape Mismatch). In total, there were 54 trials, six per condition, varying among four actional verbs: *yao-zhu* 'bite', *zhua-dao* 'grab', *zhuang-dao* 'bump', and *ya-zhu* 'pin down'.[6]

In both Actives and Long Passives, there were two arguments in the sentences. The *Match* conditions contained two DPs with the general classifier *-ge,* such as (15a). In the *Number Mismatch* condition such as (15b), half of the trials had the first DP (Agent in Actives or Patient in Long Passives) marked with the plural classifier *-xie,* and the second (Patient in Actives or Agent in Long Passives) with the non-plural general classifier *-ge*, and the other half reversed the order of the two classifiers with *-xie* on the derived subject and *-ge* on the agent. The distribution of the two classifiers – the non-shape-specific *-ge* and the shape-specific *-tiao* – was also balanced in the *Shape Mismatch* conditions such as (15c).

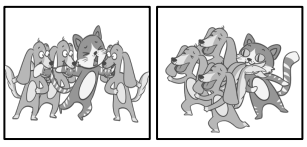
(15) a. Long Passive; Match

*[yi-**ge** xiaoyang] bei [yi-**ge** houzi] yaozhu-le*
one-CLF sheep BEI one-CLF monkey bite-PERF
'A sheep was bitten by a monkey.'



b. Long Passive; Number Mismatch

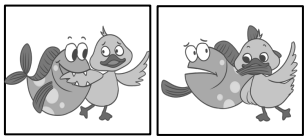
*[yi-**ge** xiaomao] bei [yi-**xie** xiaogou] yaozhu-le*
one-CLF cat BEI one-CLF dog bite-PERF
'A cat was bitten by some dogs.'



[6] We intended the test verbs to be as easy as possible for children, to eliminate any difficulty caused by the verb. Therefore, we used actional test verbs, which have been shown to be much easier for children in passives than non-actional verbs (e.g., Maratsos et al. 1985, Gordon & Chafetz 1990). For the same reason, we used Mandarin resultative verb compounds (RVCs) as opposed to bare verbs because our corpus study found that most (73.42%) of the main verbs in children's Mandarin passives were RVCs.

c. Long Passive; Shape Mismatch

*[yi-**ge** yazi] bei [yi-**tiao** xiaoyu] yaozhu-le*
one-CLF duck BEI one-CLF fish bite-PERF
'A duck was bitten by a fish.'

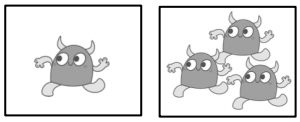


In Short Passives there was only one argument, the IA surface subject. Nonetheless, the "Match" or "Number/Shape Mismatch" between the agent and the patient of the event was depicted in the test pictures in the same way as the other two sentence types, controlling for potential extralinguistic factors such as complexity of the pictures. Given that children cannot use an adjectival strategy in Mandarin (Section 1.2), they must establish the dependency between the surface subject and its gap in order to understand the short passives. Therefore, if Mandarin-speaking children perform well with short passives, it means that neither this dependency itself (i.e., when it does not cross a structural intervener), nor the passive marker *bei*, causes difficulty in child Mandarin.

### 3.2. Procedure

Before the main test session, there was a training session to familiarize the child with the animals used in the test pictures and the two-choice sentence-picture matching task. There was also a pre-test session with novel nouns to make sure the child knew the three classifiers in our experiment, *-ge*, *-xie*, and *-tiao*. The children were told that they were to see some aliens with unfamiliar names and were instructed to choose the picture that matched the pre-recorded sentences. For example, the child heard the sentence (16) containing a novel noun *mila* and therefore needed to rely on their knowledge of the plural classifier *-xie* to choose the correct picture (the righthand picture).

(16) *yi-**xie** mila zai pao*
one-CLF mila PROG run
'Some milas are running.'



The 54 trials in the main session were arranged in a semi-random order so that the same sentence types or the same verbs were never adjacent. There was a break after the 27th trial, dividing the session into two equal halves. For each trial, the child was presented with two pictures on a computer screen while they heard a pre-recorded test sentence. These two pictures showed the same verb but with opposite theta-role assignments, as shown in (15) above. For half of the trials, the test sentence matched the picture on the left and for the other half, the picture on the right. The side of the correct choice was also semi-randomized across trials such that the correct choices were never on the same side for more than three consecutive trials.

Due to the COVID-19 pandemic, the experiment was conducted online via video-conference, with the child and their caretaker on the one end and the experimenter on the other end. The experimenter shared her screen on which the

materials were played in a PowerPoint slideshow. During the test, the children indicated their answers by pointing to the pictures of their choice, and their caretakers verbally reported which side of the screen the child chose. The test only proceeded when the previous trial was answered. If a child could not decide which picture to choose, the experimenter repeated or replayed the recorded sentence only once and encouraged them to try their best. The adult accompanying the child during the test was specifically told that the test results are anonymously stored and do not reflect any aspect of the child's cognitive capability and/or intelligence, and that they should always be truthful when reporting the child's responses. The child's choices (left vs. right) were then recorded in writing and later coded (correct vs. incorrect) by the experimenter.

### 3.3. Participants

Data were collected from 80 monolingual Mandarin-speaking children (aged 3;01-6;08, $M$ = 4;11) from the city of Changsha, Hunan Province, China, and its surrounding areas. None of the data were excluded as all children showed above-chance performance with the control trials (i.e., more than 13 correct out of the 18 Actives). None of the participants had a history of language or cognitive impairment.

### 3.4. Results

We used a mixed-effects logistic regression model with response as a binary dependent variable (correct vs. incorrect response) and Sentence Type (Actives, Long Passives, and Short Passives), Featural Condition (Match, Number Mismatch, and Shape Mismatch), and Age (in months) and their interactions as fixed effects. The models included random intercepts for participants and verb items. The significance of each fixed and random effect was tested with step-wise model comparisons using the *anova()* function in R.

We first analyzed the entire set of data. Age (in months) was not a significant predictor of children's correct responses *($\chi^2(7) = 8.526$, $p = .289$)*. There was a significant effect of Sentence Type *($\chi^2(6) = 188.86$, $p < .001$)*. As shown in Figure 1, Long Passives were significantly more difficult for children to comprehend than Short Passives *(z-value = -10.198, $p < .001$)* and Actives *(z-value = -7.243, $p < .001$)*, consistent with the prediction of the Intervention Hypothesis (Section 2.1).

To examine the effects of featural manipulations between the IA and the EA, we then looked at data from trials with both arguments (i.e., excluding Short Passives). Results showed that Featural Condition was not a significant predictor *($\chi^2(8) = 7.235$, $p = .516$)*. Children's performance did not improve when the two arguments mismatched in Number *(z-value = -1.236, $p = .216$)* or Shape features *(z-value = -0.951, $p = .341$)*. The interaction between Sentence Type and Featural Condition was also not significant *($\chi^2(2) = 3.395$, $p = .183$)*, suggesting that Featural manipulation did not make a difference in Long Passives compared to

Actives. Thus, our results are most compatible with Hypothesis III in (14), i.e., neither Number nor Shape show mismatch facilitation effects, presumably because neither of these two features triggers syntactic processes in Mandarin.

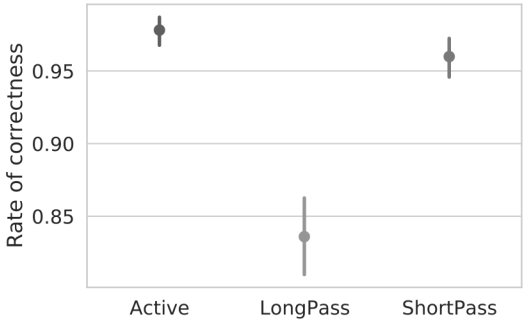



**Figure 1. Rates of children's correct comprehension of the three sentence types**

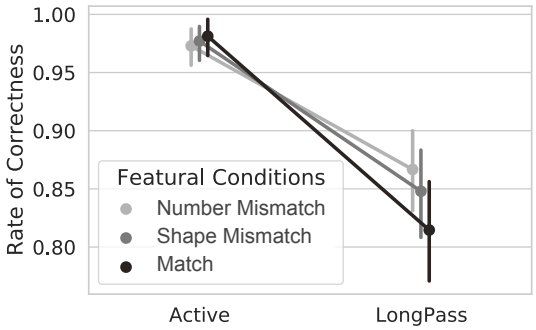



**Figure 2. Children's performance with Actives and Long Passives under three featural conditions**

## 4. Discussion

Consistent with the Intervention Hypothesis, Mandarin-speaking children's comprehension of long passives is significantly worse than their comprehension of short passives. Given that there is no adjectival strategy in Mandarin (Section 1.2), we propose that this asymmetry results from the intervention in long passives triggered by the EA, a structural intervener that is not projected in Mandarin short passives. Our experimental finding adds to the existing syntactic evidence that there is no implicit but structurally present EA in Mandarin short passives, consistent with analyses that posit structural differences between long and short passives (e.g., Ting 1998, Huang 1999, Huang et al. 2009, Bruening & Tran 2015, N. Liu & Huang 2016, Z. Chen & Li 2021, F. Chen 2021) and contrary to unifying analyses (e.g., Her 2009, Zhang 2010, Ngui 2020).

We further manipulated the different classifiers in the EA and the IA of the verb, in order to test the effects of Number and Shape features in child Mandarin passives. We found that a mismatch of neither these features improved children's performance with long passives, contra general cognitive processing accounts, such as Hypothesis I (12) and contra grammar-based accounts that do not specifically predict crosslinguistic differences, such as Hypothesis II (13).

These results suggest that not all features are equally relevant in the comprehension of a syntactic dependency. Even though Mandarin Number and Shape are encoded on classifiers, neither of them is relevant for the calculation of intervention in child Mandarin. Our results are thus most compatible with a language-specific grammatical account, such as Hypothesis III in (14) (in line with Belletti et al. 2012), that is, only the features triggering syntactic processes (i.e., movement and/or agreement) and encoded on the inflectional head in a particular language are represented in the computation of intervention in child grammar. Because in Mandarin, neither Number nor Shape is instantiated in the verb, neither plays a role in intervention – at least not to the same degree as has been observed in studies of other languages using similar methodologies, such as Number in English (Adani et al. 2014), Italian (Adani et al. 2010, Belletti et al. 2012), Spanish (Mateu 2022), French (Bentea & Durrleman 2017), or Hebrew (Belletti et al. 2012).

We further predict that for languages lacking verbal agreement of a morphosyntactic feature X, the mismatch of X between the intervening and moving elements will not facilitate children's comprehension of the intervention construction, e.g., Number/Person in Vietnamese (Thompson 1988), Korean (Sohn 2001), Japanese (Hinds 2003), Māori (Bauer 2003), etc.[7]

Lastly, our results are also most compatible with a grammatical approach to intervention effects in child languages, in the sense that there is a grammatical criterion (i.e., triggering certain syntactic processes) of what may count as a relevant feature for intervention – not all morphologically realized features count and mere morphophonological or semantic dissimilarity does not improve children's intervention difficulties (e.g., the classifier differences in our experiment). Thus, our results are most in line with accounts that view intervention as a grammar-specific rather than general cognitive phenomenon, and also with accounts that predict crosslinguistic variation based on the status of individual morphosyntactic features in each language.

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[7] One apparent counterexample to our prediction is Animacy, a morphosyntactic feature that has been shown to modulate children's intervention effects in languages with *no* verbal inflection for Animacy (e.g., Italian, Arosio et al. 2011; French, Durrleman et al. 2016, Bentea et al. 2016; English, Mateu & Hyams 2020, 2021). A confounding issue in these previous studies, though, is that the Animacy mismatched trials contained only animate agents/subjects and inanimate themes/objects, but not the other way around (cf. Mateu & Hyams 2020, 2021). Consequently, children's seemingly better performance with the Animacy mismatched trials, compared to the matched ones, might result from prototype effects, i.e., themes/objects are more prototypically inanimate than animate (e.g., Slobin 1981, Childers & Echols 2004).

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