

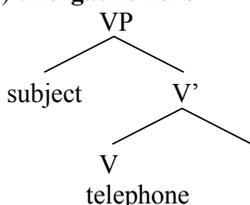
Unaccusativity in Mandarin Child Language

Kai-ying Lin and Kamil Ud Deen

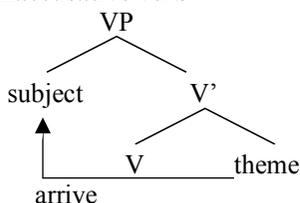
1. Introduction

Intransitive verbs are thought to consist of at least two kinds: unaccusative verbs and unergative verbs (Perlmutter, 1978). It is widely assumed that these two types of intransitive verbs have distinct syntactic representations, as shown here (Burzio 1986).

(1) unergative verb



(2) unaccusative verb



In this analysis, thematic role and the case assignment are separated. The sole argument of unaccusative verbs receives the theme role in the postverbal position, and raises to a preverbal position to receive the nominative case. On the other hand, the sole argument of unergative verbs receives case and the theta-role in the same preverbal position. Hence, unergative verbs have a sole argument which is base-generated in [Spec, VP], while the sole argument of unaccusative verbs is base-generated as the complement of the verb and raises to a higher pre-verbal position. The raising of the sole argument of unaccusatives is an instance of A-movement, in that the argument moves into a position reserved for arguments.

The above framework is quite widely accepted, though some issues remain. One of them is that not all intransitive verbs in the world's languages fit into this binary distinction, with some intransitive verbs showing properties in-between. And second, there is a good amount of variation from language to language as to which verbs fall into the unaccusative category and which verbs fall into the unergative category. These two factors were the motivation for Sorace (2000)'s Unaccusativity Hierarchy, which provides an insightful account of unaccusativity based on semantic properties of verbs.

First, it proposes a scale with core intransitive verbs on one end and core unergative verbs on the other. The verbs denoting change-of-location are considered the most likely to be unaccusatives while controlled non-motional process verbs are likely to be unergative verbs, with other categories filling in the

space between those two categories. Thus, these semantic properties provide an indication of the likelihood of a verb being unaccusative or unergative, forming a continuum-like scale.

(3) Unaccusativity continuum

Likely to be unaccusative verbs	change of location
	change of state
	continuation of existing states
	existence of state
	uncontrolled process
	controlled motional process
Likely to be unergative verbs	controlled non-motional process

Additionally, it tries to address the concern that intransitive verbs do not fall into a binary distinction of unaccusativity/unergativity, and provides place for verbs which cannot fit plausibly into such a binary system. Verbs which don't behave like core unergative or unaccusative verbs can be subcategorized as somewhere in the middle of the continuum without forcing them into any of two core types. The observed cross-linguistic variation of unaccusativity, therefore, is seen as an adjustable system that can be adapted to variations in different languages.

Unlike theoretical research, the acquisition of unaccusativity is relatively unexplored. Previous studies on child language suggest younger children have acquired the distinction of unergative verbs and unaccusative verbs with one famous exception. Babyonyshev et.al. (2001; see also Orfitelli 2012, Choe 2012 for related discussion on the acquisition of A-movement) claim that young Russian children (3;0-6;6) have difficulties in producing the genitive-of-negation in Russian in a sentence-completion task. The genitive-of-negation is restricted to underlying direct objects of unaccusative verbs and transitive verbs within the scope of negation, and children were unable to produce the genitive case which some unaccusatives require. This suggests that children are not able to apply A-movement of unaccusatives to move the sole argument to the preverbal position. They conclude that children initially treat all intransitive verbs as unergative, and later develop the ability of moving postverbal subjects preverbally-- a proposal that is consistent with previous theoretical proposals (e.g., the A-Chain Deficit Hypothesis, Borer & Wexler, 1987, 1992; The Universal Phase Requirement, Wexler, 2002; Snyder & Hyams' 2015 different, though related Universal Freezing Hypothesis). In this paper, we investigate these issues in Mandarin, specifically addressing the question of whether Mandarin speaking children exhibit knowledge of the distinction between unaccusative and unergative verbs, and whether this knowledge is mediated by Sorace's continuum.

2. Unaccusativity in Mandarin Chinese and child's acquisition

2.1. Unaccusativity in Mandarin

Mandarin does not morphologically mark the distinction between unaccusative and unergative verbs. However, these verbs can be distinguished using two well-known diagnostics: subject inversion (Huang 1991, Yang 1999, Xue 2007) and aspect particles (Pan 1996, Yu 1995), as shown in the following examples (modified from Wang et al 2019: 709). Unaccusative verbs can undergo inversion, whereby the post-verbal argument may either remain *in situ*, or invert to a preverbal position. Meanwhile, the sole argument of unergative verbs can only occur in the preverbal position. This is referred to as the Inversion Test: only unaccusative verbs permit postverbal subjects.

- (4) a. Unaccusative verb, preverbal subject
 yi-zhi xiao-gou diao le
 one.CL dog drop perf
 b. Unaccusative verb, postverbal subject
 diao le yi-zhi xiao-gou
 drop PERF one.CL dog
 'One dog dropped'
- (5) a. Unergative verb, preverbal subject
 yi-zhi da-xiang ku le
 one.CL elephant cry PERF
 b. * Unergative verb, postverbal subject
 *ku le yi-zhi da-xiang
 jump PERF one.CL elephant
 'One elephant cried'

The second diagnostic involves aspect marking. Unergative verbs can occur with a durative marker *-zhe* and a perfective marker *-le*, while unaccusatives can only occur with the perfective marker *-le*. (Laws & Yuan 2010, examples below modified from Pan 1996:412), referred to henceforth as the Aspectual Test.

- (6) a. * Unaccusative verb with durative aspect
 *Lisi si zhe
 Lisi die DUR
 'Lisi is dying'
 b. Unaccusative verb with perfective aspect
 Lisi si le
 Lisi die PERF
 'Lisi has died'

- (7) a. Unergative verb with durative aspect
 Lisi zai lu-shang zhan zhe
 Lisi at road-LOC stand DUR
 ‘Lisi is walking on the street.’
- b. Unergative verb with perfective aspect
 Lisi zai lu-shang zhan le
 Lisi at road-LOC stand PERF
 ‘Lisi has walked on the street.’

2.2. Child acquisition of Intransitivity in Mandarin

Previous studies on Mandarin child language acquisition of unaccusativity are rare. Liu & Ning (2009) conducted a two-choice sentence-picture matching task on Mandarin children aged 2;1 to 6;11. The results show younger children’s comprehension of sentences declines as the height of destinations of A-movement increases. The accuracy of comprehension of passives, which requires the theme to move to the outer VP, is generally lower than that of the subject of unaccusative verbs (movement of which is within inner VP). However, the number of verbs used in this experiment were few and it did not test unaccusative verbs directly: a *gei*-morpheme was added to the unaccusative verbs in this experiment.

Wang et al. (2019) conducted an eye-fixation task on Mandarin toddlers (aged 1;6 to 1;8) and found that children can distinguish between the intransitive verb types. Each intransitive sentence was uttered by a puppet of an animation and the gazing time to the puppet was measured. The results showed that children looked at puppets uttering ungrammatical unergatives with postverbal subjects longer, indicating that they distinguished between the two verb types. The limitations of this experiment are that only two verbs in each verb type were used and only children younger than 2 were tested.

Because of the paucity of previous studies, and the fact that very few verbs were used, in our experiment we include a larger number of unaccusative and unergative verbs. Moreover, more than one diagnostic and more than one experimental methodology were used.

3. Experiments

We conducted two experiments: Experiment 1- a Forced-choice task and Experiment 2- an Acceptability judgment task. Experiment 1 and 2 were conducted on different days to prevent the children from memorizing the content of the experiment.

3.1. Experiment 1: Forced-choice task

3.1.1. Participants and Materials

52 children aged 3;0 to 7;0 (mean=4;9) participated in the experiment, though 5 were excluded for failing to respond to the fillers correctly. The test items

consisted of 6 items with unergative verbs and 6 with unaccusative verbs. The experiment had three factors: verb type (VERB), pre/post-verbal subjects (SUBJECT) and perfective/durative marker (ASPECT). The unergative verbs used are ‘to run’ (*zou3*), ‘to jump’ (*tiao4*), ‘to fly’ (*fei1*), ‘to smile’ (*wei2-xiao4*), ‘to cry’ (*ku1*), ‘to be angry’ (*sheng1-qi4*), and the unaccusative verbs are ‘to flow’ (*liu2*), ‘to melt’ (*rong2*), ‘to drop’ (*diao4*), ‘to die’ (*si3*), ‘to disappear’ (*bu2-jian4*), ‘to come’ (*lai2*). Both types of verbs (UNACC/UNERG, VERB) were crossed with the two aspect conditions (DUR/PERF, ASPECT) and the two subject conditions (PRE/POST, SUBJECT), yielding a total of 48 critical items. A verb was paired with either ASPECT or SUBJECT conditions in a trial, yielding 24 trials in total. These test trials were divided into 2 versions and were pseudorandomized with fillers, which are transitive sentences and unrelated to the topic in this experiment. Each child only participated in one version of the experiment.

Before the formal trials, no test trials were conducted in the experiment. Each child and the experimenter sat on one side of a table while watching a computer screen. Two characters were introduced, a cat and a dog, and children were told that each would try to describe what happened in the animation to the best of their ability. The child was asked to decide which said it better. Each trial contained one animation and two sentences, one uttered by each of the cat and dog. The whole experiment lasted 10-15 minutes.

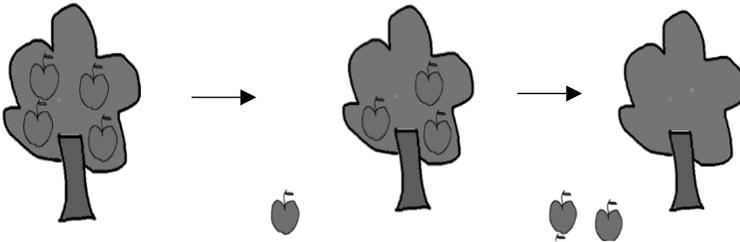


Figure 1. Example animation with an unaccusative verb *diao4* ‘drop’

cat				dog			
ji-ke	ping-guo	diao	zhe	ji-ke	ping-guo	diao	le
some.CL	apple	drop	DUR	some.CL	apple	drop	PERF
‘Some apples dropped’				‘Some apples dropped’			

Figure 2. Example of audio sentences *diao4* ‘drop’ (UNACC × ASPECT)

In this example, if children reliably choose the sentence uttered by the dog character (which correctly matches the unaccusative verb with perfective aspect), they must have been aware of the difference of two intransitive verbs under ASPECT conditions.

3.1.2. Result of experiment 1

In both ASPECT and SUBJECT conditions (VERB \times ASPECT, VERB \times SUBJECT) in Figure 2, unergative verbs and unaccusative verbs show significant statistical difference (chi-square=11.3377, $p < 0.001^{***}$ and chi-square=4.9351, $p\text{-value} = 0.002307 < 0.01^{**}$). For the unaccusative verbs in Figure 3a (indicated by the arrow), both choices were acceptable but children tended to select preverbal subjects rather than the postverbal ones. This might be because preverbal subjects are more frequently used in general and so there is a generalized preference for preverbal subjects. In light of this bias, the result from unaccusatives with postverbal subjects is not as meaningful as shown here: we cannot claim that children were not able to tell the difference of unaccusative verbs under the SUBJECT condition, though we return to this in the next experiment. Overall, children did show adult-like performance in each test. They were able to tell the difference between two intransitive verbs in both SUBJECT and ASPECT conditions and selected the correct option during the experiment.

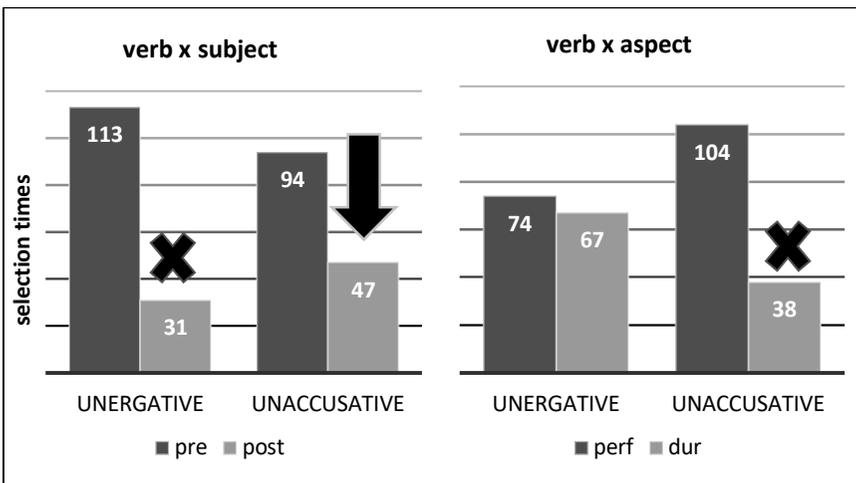


Figure 3a. result from Experiment 1 under subject condition and **Figure 3b.** aspect condition (cross shows ungrammatical options)

Figure 4a and 4b summarize the result of SUBJECT conditions and the ASPECT condition within age 3-5. Only ASPECT conditions showed a statistically significant difference (chi-square=6.244, $p\text{-value} = 0.01246 < 0.05^*$). (For reference, SUBJECT conditions reached chi-square=1.265, $p\text{-value} = 0.2607$).

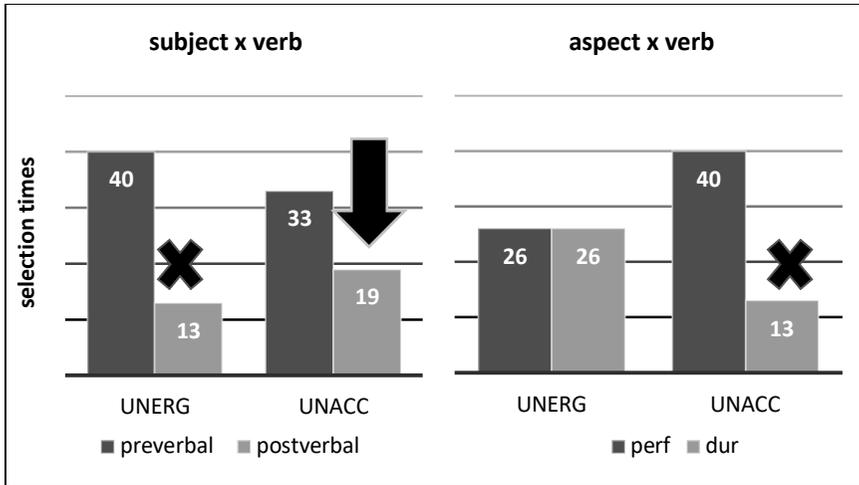


Figure 4a. result from the Experiment 1 under SUBJECT condition and **Figure 4b.** ASPECT condition in Group 1 (age 3-5, n=18)

This result suggests that children didn't master intransitivity in the SUBJECT condition within the ages of 3yrs-5yrs. Importantly, they correctly rejected UNERG X POST items and accepted UNERG X PRE items, but they weren't able to give balanced selections in the UNACC X SUBJECT condition. This might again be affected by the canonicity of the subject-position, as stated above in the overall age group, so more data in the second experiment are needed to confirm the delay of acquisition of unaccusative verbs.

3.2. Experiment 2: Acceptability judgement task

3.2.1. Participants and Materials

There were 66 children aged from 3;0 to 7;0 (mean=5.036) and each only participated in one version of experiment. The test items in Experiment 2 were identical to those in Experiment 1. 12 verbs (6 in each category) were included in the two SUBJECT and ASPECT conditions. The preverbal items under VERB X SUBJECT and perfective items under ASPECT X VERB were the same and we merged them into one PRE-PERF condition. Therefore, 12 verbs were crossed with 3 PRE-PERF, POST, DUR conditions, yielding 36 test items in total. Each trial consisted of one test sentence. The test items were divided into two lists and each contained 18 test items with 6 fillers, giving 24 test items (=trials) in each version.

Children heard one sentence and were asked to post a sticker on an array of smiley faces. Sad faces denoted the sentences were regarded as ungrammatical and happy faces as grammatical. If they couldn't decide, they selected the face in the middle. In the example below, the sad face is the correct response for this ungrammatical sentence.

ji3-ke1 ping2-guo3 diao4 zhe0
 some.CL apple drop DUR
 ‘Some apples dropped’



Figure 5. the options children select in Experiment 2

Children were trained on this protocol using unrelated sentences before the experiment began.

3.2.2. Results of Experiment 2

The result was standardized into z-scores. It is clear that children were able to give a low score to ungrammatical options (the one with red cross), and high scores to grammatical sentences (the others). The first point of note from these results is that the concern from experiment 1 regarding knowledge of argument position has been eliminated: postverbal subjects with unaccusative verbs (UNACC X POST) were correctly accepted. Moreover, both SUBJECT and ASPECT conditions reached statistical significance ($p=0.026552<0.05^*$ and $p=1.66e-0.5<0.001^{***}$). The result shows that children can discriminate between unaccusative and unergative verbs.

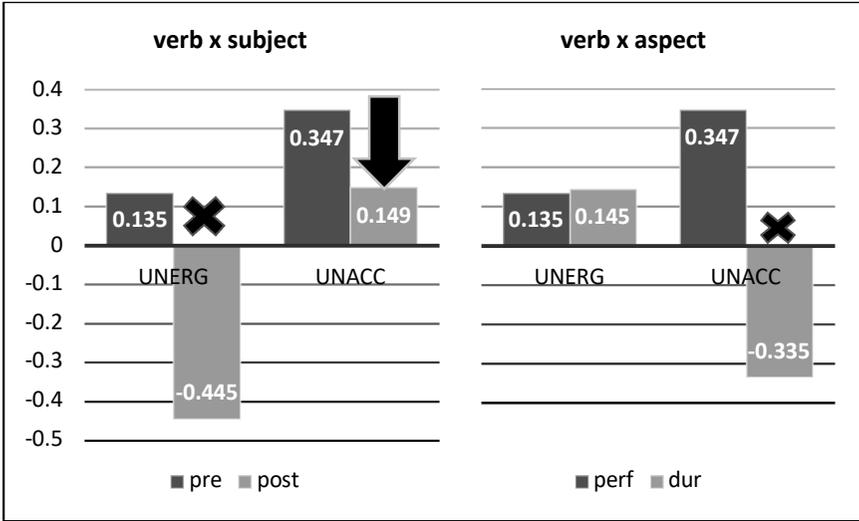


Figure 6a. result from Experiment 2 under SUBJECT condition and Figure 6b. ASPECT condition

When broken down by age group, we found that the 3-5-year-old children exhibited interaction between verbs and subject positions only approaching statistical significance ($p=0.0700$), while on the aspectual test revealed a statistically significant effect ($p=0.0034 < 0.01^{**}$).

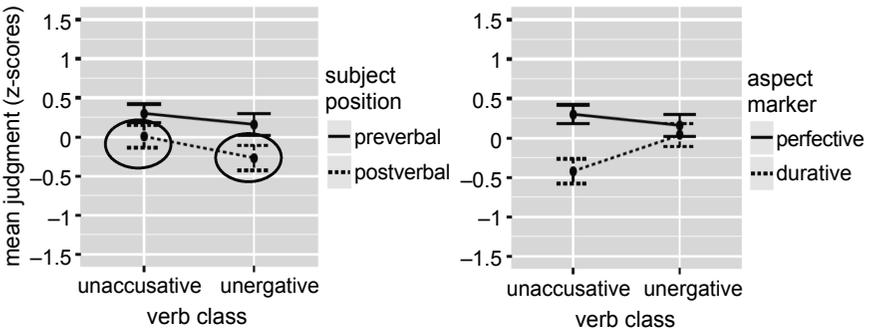


Figure 7a. z-scores in SUBJECT condition and Figure 7b. ASPECT condition in group 1 (age 3-5, n=17)

This result revealed that younger children aged 3-5 were unable to discriminate between the two intransitive verb types in the SUBJECT condition: their judgements between ungrammatical subject-position (UNERG X POST) and grammatical subject-position (the rest conditions under SUBJECT) were not significantly different.

4. Discussion

Our result can be briefly summarized as follows: The children across the full age range of 3yrs – 7yrs did exhibit knowledge of the difference in intransitive verb type within all the conditions. Within the 3-5 yr old age group, however, results are not as clean. Within the SUBJECT condition, children correctly rejected ungrammatical sentences in Experiment 1, but in Experiment 2 they were unable to accept grammatical UNACC X POST items and to reject the ungrammatical UNERG X POST items, suggesting a possible ignorance of unaccusativity. Second, in contrast to the SUBJECT conditions, younger children showed adult-like accuracy and judgements in the ASPECT conditions. In the following subsections, we will discuss the seemingly late acquisition of unaccusativity in the SUBJECT condition and what the ASPECT condition tells us.

4.1. Discussion of the SUBJECT condition

A straightforward interpretation of the SUBJECT condition suggests that younger children did not regard as grammatical postverbal subjects with unaccusative verbs (UNACC X POST). It suggests that younger children regard both types of intransitive verbs as unergative verbs at first and it is not until later in development that they realize the difference between these verb types.

The interpretation drawn from the above is that children can neither do A-movement nor make a distinction between verb types, which is not consistent with Wang et al. (2019), who demonstrated that children below age 3 were able to distinguish between two types of intransitive verbs using an eye-fixation task ('to come' and 'to drop' for unaccusative verbs; 'to smile' and 'to cry' for unergative verbs). One noticeable point is that only four verbs were included in that study, two in each group of intransitive verbs. This leads us to wonder whether the difference between Wang et al. (2019) and our results can be represented by the difference of verbs, which might implicate Sorace (2000)'s Unaccusativity Hierarchy.

In our experiment, unaccusative verbs are either change-of-location ('to come', 'to drop', 'to flow') or change-of-state ('to melt', 'to die', 'to disappear) in Sorace (2000)'s hierarchy, while unergative verbs fall onto the other side of continuum, as shown below.

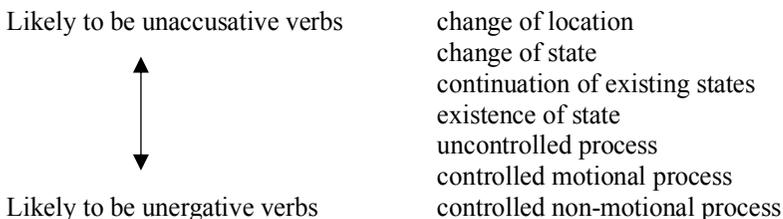


Figure 8. Unaccusativity continuum

The breakdown of our results by verb shows that core unaccusative verbs (change-of-location, ‘to come’, ‘to drop’, ‘to flow’, dotted lines) in the postverbal position receive expected high z-scores, as those conditions are grammatical. This is in a sharp contrast with non-core unaccusative verbs (change-of-state, ‘to melt’, ‘to die’, ‘to disappear’, solid lines): these grammatical sentences with unaccusative verbs received low z-scores as shown below.

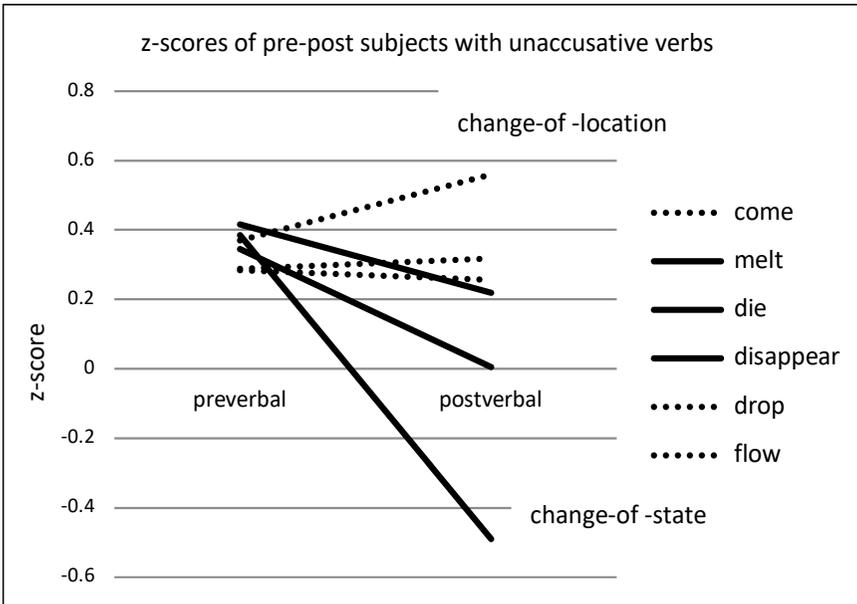


Figure 9. z-scores of PRE and POST X UNACC (without breakdown by ages)

We further broke down the result from the acceptability judgement task by age: it revealed that children aged 3-5yrs made a distinction between unergative verbs and core unaccusative verbs (change-of-location verbs) in the postverbal condition, with significant statistical difference ($p=0.008516 < 0.05^{**}$), while non-core unaccusative (change-of-state) verbs yielded no difference ($p=0.869333$). This is another piece of evidence that the verbs in Sorace's hierarchy play a role in the acquisition of unaccusativity.

In conclusion, children were already able to understand unaccusativity and allow postverbal subjects of core unaccusative verbs as early as age 3-5. However, the unaccusativity of some non-core unaccusative verbs were acquired in the later stages and this difference can be represented in the unaccusativity hierarchy, namely Sorace (2000)'s gradient scale.

5. Concluding remarks

In this paper, we showed that children exhibited broad adult-like knowledge of subject placement and aspectual restrictions of the two classes of intransitive verbs. In both our experiments, the results from younger children suggested that knowledge of the verb classes was not quite intact, leading to the possibility that some kind of structural deficit (such as challenges with A-movement, or Smuggling) might be at play. However, upon closer examination, we found that children were able to place subjects and select aspect correctly for the verbs that are at the ends of the Unaccusativity Hierarchy. We interpret this to mean that this Unaccusativity Hierarchy is in place from birth, and mediates the acquisition of intransitive verbs from the onset. In particular, children are able to identify verbs at the edges of the hierarchy by their semantics (change of location on one end, controlled non-motional process on the other, thanks to Jeff Lidz, personal communication, for this suggestion), and this bootstraps into the appropriate syntax. Verbs in the middle are acquired later because there is less certainty as to their cross-linguistic verb category membership: those verbs in the middle of the hierarchy may vary between unaccusative and unergative syntax, and as such must be learned on a language-by-language basis.

Our conclusion, therefore, is that Mandarin acquiring children are not challenged with any structural deficit such as A-movement or other restrictions on movement: the fact that children have acquired the verbs on the edges of the hierarchy is evidence of that fact. Rather, children are simply working their way through the hierarchy on a verb-by-verb basis. And the consequence of this for researchers in this area is to avoid selecting the core, prototypical unaccusative/unergative verbs, and to consider verbs across the hierarchy for inclusion in their experiments.

Reference

- Babyonyshev, M., R. Fein, J. Ganger, D. Pesetsky, and K. Wexler. 1998. The maturation of grammatical principles: evidence from Russian unaccusatives.ms., MIT.
- Babyonyshev, Maria, Jennifer Ganger, David Pesetsky, & Kenneth Wexler. 2001. The maturation of grammatical principles: Evidence from Russian unaccusatives, *Linguistic Inquiry* 32:1-44.
- Borer, Hagit, and Kenneth Wexler. 1987. The maturation of syntax. In *Parameter setting*, ed. Thomas Roeper and Edwin Williams, 23-172. Dordrecht: Reidel.
- Borer, Hagit, and Kenneth Wexler. 1992. Bi-unique relations and the maturation of grammatical principles. *Natural Language & Linguistic Theory* 10:147-189.
- Burzio, Luigi. 1986. *Italian Syntax: A Government-binding Approach (Vol. 1)*. Springer Science & Business Media.
- Choe, Jinsun (2012). Children Seem to Know Raising: Raising and intervention in child language. Unpublished doctoral dissertation, University of Hawaii.
- Huang, James. C.T. 1990. 'Two kinds of transitive verbs and intransitive verbs' [中文的兩種及物動詞和兩種不及物動詞]. In T.C. Tang et al. (eds.) *Proceedings of the 2nd World Congress of Chinese Language Studies*

- [第二屆世界華文教學研究會議論文集]. Taipei: World Chinese Language Association, 39-59.
- Laws, Jacqueline & Boping Yuan. 2010. Is the core-peripheral distinction for unaccusative verbs cross-linguistically consistent? Empirical evidence from Mandarin. *Chinese Language and Discourse* 1. 220–263.
- Liu, Haiyun and Chunyan Ning. 2009. Phase Impenetrability Condition and the Acquisition of Unaccusatives, Object-Raising Ba-Constructions and Passives in Mandarin-Speaking Children. *Proceedings of the 3rd Conference on Generative Approaches to Language Acquisition North America (GALANA 2008)*, ed. Jean Crawford et al., 148-152. Somerville, MA: Cascadilla Proceedings Project.
- Orfitelli, Robyn Marie. 2012. *Argument Intervention in the Acquisition of A-movement*. UCLA Dissertation.
- Pan, Haihua. 1996. Imperfective aspect *zhe*, agent deletion and locative inversion in Mandarin Chinese. *Natural Language and Linguistic Theory* 14 (2): 409-432.
- Perlmutter, David. 1978. Impersonal passives and the unaccusative hypothesis, in: *Proceedings of the 4th Annual Meeting of the Berkeley Linguistics Society*, 157-190.
- Snyder, William & Nina Hyams (2015). Minimality Effects in Children's Passives. In Elisa Di Domenico, Cornelia Hamann, and Simona Matteini (eds.) *Structures, Strategies and Beyond: Essays in Honour of Adriana Belletti* (Linguistik Aktuell/Linguistics Today, 223), 343-368. Amsterdam/Philadelphia: John Benjamins
- Sorace, Antonella. 2000. "Gradients in auxiliary selection with intransitive verbs". *Language* 76. 859–890.
- Wang, Ziqi, Xiaolu Yang, and Rushen Shi. 2019. Mandarin-Speaking Toddlers' Acquisition of Unaccusativity. *Proceedings of the 43rd Boston University Conference on Language Development*, ed. Megan M. Brown and Brady Dailey, 705-715. Somerville, MA: Cascadilla Press.
- Xue, C.M. 2007. *L2 Acquisition of Chinese Unaccusative Verbs by English-speaking Learners*. Beijing: Kexue Chubanshe.
- Yang Suying. 1999. Cóng fēibīnggé dòngcí xiàxiàng kàn yǔyì yǔ jùfǎ jiégòu zhī jiān de guānxì 从非宾格动词现象看语义与句法结构之间的关系 [On the relationship between syntax and semantics from the perspective of unaccusative verbs]”, *Dāngdài yǔánxué* [当代语言学]1, 30-62.

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