Acquisition of event passives and state passives by Mandarin-speaking children

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HIGHLIGHTS

• We examine the acquisition of event and state passives by Mandarin-speaking children.
• Adults and 6-year-olds could distinguish event passives from state passives.
• 4 and 5-year-olds tend to analyze event passives as the corresponding state passives.

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ABSTRACT

The present study aims to investigate how children comprehend event passives and state passives in Mandarin and whether they can distinguish these two types of passives or not. Chinese action verbs were classified into three types: achievement, destructive, and creative. Each verb type was involved in a picture identification task using two kinds of passives, event and state passives. Sixty children grouped according to age (4, 5 and 6-year-olds) as well as twenty adults completed the tasks. Results showed that adults and 6-year-olds could distinguish event passives from state passives, while younger subjects were liable to treat event passives as state passives. Young Mandarin-speaking children (4 and 5-year-olds) tend to analyze event passives as equivalent to the corresponding state passives, whose structures are similar to adjectival constructions.

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1. Introduction

Studies of children’s acquisition of passives in recent decades have produced some important findings. Passive structures start to occur around the age of two and children cannot fully grasp passives before age three (Hirsch and Wexler, 2004; Li, 1995) and until nine, children could master both syntactic and thematic dimensions of this structure (Messenger et al., 2012). Children are likely to interpret short passives as adjectival passives (Borer and Wexler, 1987), and long passives are more difficult for children to acquire than short passives (Horgan, 1978; Chang, 1986; Liu and Ning, 2009). Compared with psychological passives, children perform better in understanding passives with action verbs (Maratos et al., 1985; Sudhalter and Braine, 1985; XU and Yang, 2008). All the evidence indicates that children, until at least three years old, have great difficulty comprehending and producing passive sentences.

To explain children’s delay in passive acquisition, there are mainly four possible accounts, the syntactic account which claims that children do not have the relevant grammar to interpret passives in their early years (Borer and Wexler, 1987, 1992); the frequency account, which argues that children lack the relevant experience with passive construction (Brooks and Tomasello, 1999; Demuth, 1989); the cue-based account, which argues that children are not given strong and unambiguous cues to the passive construction (Bates and MacWhinney, 1985, 1989); and the incremental processing account, which proposes that the interpretation of passives is difficult when it requires children to revise an earlier commitment to a role assignment (Trueswell and Gleitman, 2004; Huang et al., 2013). Among these four accounts, the syntactic account is a generative approach which regards children’s ability to acquire passive constructions as an essentially innate one (Borer and Wexler, 1987, 1992), attributing their early poor performance to task demands (Crain and Fodor, 1993) or their processing
deficiency in the by-phrase (Fox and Grodzinsky, 1998). The A-chain Deficit Hypothesis (ACDH) proposed by Borer and Wexler (1987) specifies the reason for the relative delay in children's passive acquisition in terms of syntactic movement. A passive sentence is derived by moving an object to a subject position. Since the moved element arrives at an argument position, this process is called A-movement, which creates an A-chain. ACDH claims that children cannot interpret and apply the argument movement correctly before five years old, failing to form A-chains, so they have difficulty in acquiring passive structures.

The study by Israel et al. (2000) further provided empirical evidence that children at early ages tend to regard actional short passives as homophonous adjectival passives, which lacks the relevant A-movement. They conducted a naturalistic data analysis of seven children from the CHILDES database (mostly from around 2; 0 to 4; 6). Their research showed that all children manifested the same developmental sequence, first acquiring adjectival state passives (e.g. it's broken; 2; 6), then equivocal passives (e.g. that's gonna be broken too; 2; 7) and finally event passives (e.g. a monarch butterfly was killed by a bird; 3; 7).

Children's preference for adjectival passives over verbal passives can be illustrated by a typical ambiguous short passive in English, such as sentence (1), which has two interpretations. The first reading is a verbal passive: [The door] was closed, which means that someone came along and closed the door (an event of 'door closing'). The second reading is an adjectival passive: The door was [AD] closed, implying the door was not open (in a closed state). In the first reading, a syntactic movement is involved in the verbal passive, which may cause difficulties for young children. In the second reading, it is an adjectival passive without movement, so children may find it easier to acquire.

(1) The door was closed.

In sum, many researchers agree that English-speaking children first acquire adjectival state passives and then verbal event passives. The present study seeks to check whether the acquisition of passives by Mandarin-speaking children is consistent with the syntactic account on passive acquisition, such as ACDH. And the data collected from the controlled experiments will be helpful to enrich the current acquisition theories.

1.1. Long passives and short passives in Mandarin Chinese

To better understand adjectival passives in Mandarin Chinese, we first briefly describe the syntactic structure of Chinese passives. The typical passive structure in Mandarin Chinese is NP1 (patient) + bei NP2 (agent) + V + Complement + LE (Zhu, 1982; Lv, 1984). In terms of whether agents appear or not, Chinese passives can be divided into long passives and short passives (Li, 1980, 1986, 1993; Lu, 2004). For example, sentence (2) contains a verb ti ‘kick’, representing an active voice, (3) and (4) are corresponding passive sentences. Sentence (3) is a long passive, in which Xiao lanfeng is the patient of the verb ti ‘kick’, and Xiao hongfeng stands for the agent who did the action. Sentence (4) is the short passive without an explicit agent. Both these two passives have an overt passive marker bei.

(2) Xiao lanfeng ti le xiaohongfeng. (active)
   Blue Bee kicked ASP Red Bee
   ‘Blue Bee kicked Red Bee.’
(3) Xiao lanfeng bei Xiao hongfeng ti le. (long passive)
   Blue Bee BEI Red Bee kick ASP
   ‘Blue Bee was kicked by Red Bee.’
(4) Xiao lanfeng BEI ti le. (short passive)

Blue Bee BEI kick ASP
   ‘Blue Bee was kicked.’

1.2. Syntactic movement of passives in Mandarin Chinese

According to Huang (1999), Chinese long passives involve null operator movement, which are similar to English tough constructions, such as John is easy to please (Hicks, 2009). The detailed analysis is given in (5a), in which BEI selects a clause and the patient argument in the embedded clause is a null operator, which undergoes A'-movement and is bound by the matrix subject under the process of predication. With regard to short passives, Huang proposed that they are not agent-deleted versions of long passives, but structures parallel to English get-passives. As presented in (5b), BEI selects a VP, while a PRO, which originally follows the aspect marker le, undergoes A-movement to [Spec, VP], and then it gets controlled by the base-generated subject.

(5) a. Xiao lanfengi [VP BEI [ip OP, [ip Xiao hongfeng ti le ti ]]] (A'-movement)
   Blue Bee BEI Red Bee kick ASP
   ‘Blue Bee was kicked by Red Bee.’
 b. Xiao lanfengi [BEI [VP PRO, [ti le ti ]]] (A-movement)
   Blue Bee BEI kick ASP
   ‘Blue Bee was kicked.’

From the above analysis, both Mandarin long passives and short passives involve syntactic movement: null operator derivation in long passives is attached to A'-chains, while PRO derivation in short passives belongs to A-movement.

1.3. Event passives and state passives in Mandarin Chinese

In this study, we employed short passives instead of long passives for the following reason. In English, only short passives with action verbs have two readings, i.e., both verbal and adjectival interpretations. In Mandarin Chinese, a short passive construction bearing no agent also has verbal and adjectival interpretations, which is similar to an English short passive.

Short passives in Mandarin Chinese can be further divided into event passives and state passives, and there are some distinctions between them. First, event passives describe actions which are in principle irreversible, so the adverbal rengran ‘still’ cannot modify the verb. State passives, by contrast, focus states brought about by the actions, which can be transitory, thus they can combine with the adverbial rengran ‘still’ (Kratzer, 2000). Second, state passives usually express obvious outcomes. For native Mandarin Chinese speakers, (7) is compatible with the state that ‘Blue Bee has been kicked and it has become broken’, but (6) just emphasizes ‘the situation of being kicked’. Third, the slot in the Chinese expression chuyu … zhuangtai ‘under which state’ can only be filled by an adjectival, so this expression can be employed to test whether beiti be ‘kicked’ or beitihuai le ‘be kicked broken’ can be adjectival or not. For native Mandarin Chinese speakers, only ‘the state of being kicked broken’ can be acceptable, but ‘the state of being kicked’ is hard to accept. Thus, the event passive sentence (6) with the verb ti, is more likely to be a verbal passive and there are A-chains in its deep structure, while the state passive sentence (7) with the verb phrase tihuai ‘kick and become broken’, can be considered an adjectival passive without A-chains in Mandarin-Chinese.

Based on the above analyses, we claim that event passives are verbal passives with syntactic movement, which syntactic structures can be analyzed as follows:
(6) Xiao lanfeng [BEI [AP PRO. [ti le t:j]]]

On the contrary, state passives are adjectival passives without syntactic movement, which syntactic structures can be analyzed as follows:

(7) Xiao lanfeng [BEI [AP ti huai le]].

In sum, for Mandarin short passives, state passives and event passives are not homophonous in forms, state passives are adjectival passives with the form of NP+BEI+V+Complement+LE, while event passives are verbal passives with the form of NP+BEI+V+LE. In contrast, for English short passives, adjectival (state) passives and verbal (event) passives can be homophonous in form.

1.4. Aims of the present study

According to ACDH hypothesis, verbal (event) passives with syntactic movement will be more difficult for young children to understand than adjectival (state) passives which are without movement, leading to the prediction that Mandarin-speaking children should understand state passives better than event passives. This study is a further exploration of adjectival (state) passives in this field. Firstly, this paper extended the research scope to Mandarin event and state passives in order to provide more evidence for the universality of passive development sequence. English is one kind of language which is marked by a wealth of morphological changes, while Chinese is marked by few morphological changes. By comparing two kinds of passive structures in different languages, people can have a better knowledge of passive sentence structure in different types of languages. For passive sentences in English, there always exist argument movements in long passives or short ones. While in Chinese, only short passive sentences involve argument movement. By studying the acquisition of event and state passives by Mandarin-speaking children, we can enrich our knowledge about passive structures in different languages. Secondly, the influence of verb types were also taken into consideration so that to provide a more comprehensive study of event and state passives by Mandarin-speaking children. The aims of the present study are to investigate the development of children’s comprehension of event and state passives in Mandarin, and whether, and at what age, they can distinguish these two types of passives.

2. Method

The present study adopted a controlled experiment to investigate Mandarin-speaking children’s comprehension of active sentences, event and state passive sentences.

2.1. Subjects

Participants were children whose ages ranged from 4 to 6 years old. They were selected in the present study for two main reasons. First, previous studies indicate that before age four to five, English children produce and comprehend actional passives better than nonactional passives, consistent with the assumption that early grammar only allows the formation of adjectival passives (Borer & Wexler). Second, Israel et al. (2000) demonstrated the advantages of adjectival passives in early language acquisition by conducting a naturalistic data analysis of seven children from 2; 0 to 4; 6. In all, 60 Mandarin-speaking children were recruited from the kindergarten at Hunan University (a public school located in Changsha city in the southern part of China). All the subjects lived in a family setting and were normally developing. They were divided into three groups based on age: twenty 4-year-olds (M = 4; 3), twenty 5-year-olds (M = 5; 10), and twenty 6-year-olds (M = 6; 7). In addition, 20 college students with an average age of 22 years also participated as the adult control group.

2.2. Materials

In Mandarin Chinese, verbs of accomplishment (containing two subtypes, creative and destructive) and achievement are most widely used to form passive sentences (Huang et al., 2007), thus, they were used for the stimuli in this study. Three types of verbs were involved. Achievement verbs encode the resultative state caused by the actions of agent and the action has already been completed (such as dasui ‘smash’); destructive verbs encode negative influence caused by some external forces and the action itself may or may not be completed (such as zao ‘build’); creative verbs focus on causing something to happen or exist and the action may be completed or not (such as chai ‘dismantle’); verbs of accomplishment cause a significant change, verbs of achievement focus on the state of the subject, and verbs of change focus on the subject changing its state. All the verbs encoded in the present experiment were expected to be understood by young children. In total, there were 72 sentence groups (24 × 3). Each group comprised three sentences, one active sentence, one event passive and one state passive. In total, there were 96 pictures for each subject.

Picture identification tasks were used to test comprehension. For each sentence group, there were four pictures which denoted respectively correct agent eventive reading, correct agent stative reading, incorrect agent eventive reading, and incorrect agent stative reading (hereafter referred to as CAE, CAS, IAE, and IAS respectively). The images in the pictures consisted of two colored cartoon bees that were familiar and attractive to the children. Taking the age of subjects into consideration, the experiments selected only those verbs that could be expected to be understood by young children. In total, there were 96 pictures for each subject the comprehension test (24 × 4). For instance, in Fig. 1, among four pictures, two pictures focused on the eventive meanings, in which one showed Red Bee kicking Blue Bee with its leg (A), and the other depicted the reverse situation (B). The other two represented the stative meanings, in which one depicted Red Bee having been kicked into bits and broken (C), and the other depicted the reverse situation (D). The four pictures for each serial were arranged at random.

2.3. Procedures

Two experimenters were involved in the research. The lead experimenter first presented pictures and then asked subjects some corresponding questions. The second experimenter (score-keeper) recorded responses by the subjects. The test was audio and video recorded to enable checking of data after the experiment. Subjects from different age groups were tested individually. All participants saw all the same items and there were no between-subject conditions except for age. Children completed the comprehension tasks one by one with the guidance of two experimenters. The order of presentation was the active sentence first, followed by the two passives, which were randomly ordered. Before the main test, there was one practice trial for children. It involved the same procedure and similar content that the main test included. The practice trial was conducted to make sure the subjects could recognize all the picture figures, and could cooperate with the experimenter to respond to all the questions. If subjects could select pictures correctly in the practice trial, and provide justifications for their choices, they were invited to participate in the main test session.

In the main test, every subject was presented with four pictures
each time. At the beginning of the test session, the experimenter instructed the subject, “Hello, xx (the name of the subject)! Now, let us look at some pictures. I will tell you something about bees. They are two robots. The one in blue is called Blue Bee, and the other in red is called Red Bee. Look at these bees carefully, and you need to choose one from the four pictures based on my question.”

Children were told that they could choose the same picture for more than once. In the case of counting the accuracy rates on actives and passives, subjects were awarded one point as long as they chose the correct agent and patient for one sentence item. That is, both CAE and CAS were regarded as right answers for one sentence item. The experimenters only recorded subjects' tendency for CAE (correct agent eventive reading) and CAS (correct agent stative reading) in event or state conditions.

If a subject could not give the right answer in the active test, the subject was awarded zero points and the experimenter would explain the verb meaning to him or her, making sure the subject could understand the meaning of the test sentence. In order to further analyze the passive data, we eliminated the subjects who seemed to have problems in active sentence comprehension. Our criterion was based on the consideration that children, particularly younger children might make up to five errors in active sentence judgment when they lost interest in the task or their attention was distracted. This procedure controlled for the validity of active sentence tests, and at the same time guaranteed that the tests of the corresponding passives would not be influenced.

3. Results

Statistical analyses were conducted using SPSS 13.0. We first compared children's and adults' understanding of active and passive sentences (Table 1). For any active or passive sentence uttered by the experimenter, the subject's picture choice was counted as correct as long as he or she selected the right agent and patient in the task. For active sentences, 4-year-old children had an accuracy of 79%; the accuracy of 5-year-olds and 6-year-olds exceeded 95%, and the correct responses of the adult group reached 100%. The great majority of the children correctly comprehended active sentences, confirming that the verbs chosen for the test sentences were comprehensible for children, thus it was feasible to make use of these verbs to construct corresponding passive sentences. The test of active sentences was also a preparation for conducting the next step for passive structures. For the passive sentences, the overall percentage of correct choices for four year olds was around 76. The two older groups of children had an overall score for passive comprehension almost at ceiling of about 96% and 97% respectively, while the adult group score overall almost 99.6%.

It is clear that only the youngest group of children produced an appreciable number of incorrect responses, and there was no overall difference in correct responses to active and passive trial types for any of the subject groups. This may be due to children's carelessness in judgments when they lost interest in the tests or their attention was distracted from the tasks. 7 child participants who made more than five errors in 24 sentences were regarded as scoring below criterion on active sentence comprehension and their data were excluded from further analysis.

Table 2 shows the percentages of all the subjects'
comprehension of event and state passives. Our data displayed the proportion of CAE (correct agent eventive reading) or CAS (correct agent stative reading) by 53 subjects (60–7). It indicated that under event passives, 4-year-olds only chose about 34.3% of CAE among their limited choices, and their choices of CAS reached 46.8%. The 5-year-old group did a little better, with over half of CAE (54.2%), and they interpreted event passives with more eventive readings than stative readings (41.9%). For the subjects at the age of six, the proportion of CAE in their answers reached 65.2%, though it was still far behind that of the adult group, who scored 90% of CAE. It was clear that the older the subjects were, the more CAE and the fewer CAS they chose for event passives. When it came to state passive conditions, the results of all the four groups coincided with each other, showing their shared preference for CAS. Even the youngest group chose about 62.8% of CAS for the corresponding state passives. The rate of CAS rose to 86.3% for 5-year-olds, and that for both 6-year-olds and adults surpassed 90%.

By means of Mann–Whitney U Test, we explored the between-group effects before exploring within group effects. Results showed that, under event passive conditions, there was a significant difference and effect size between 4-year-olds and 6-year-olds in making CAS responses (U = 112.0, p = .01, \( \eta^2 = .13 \)), which means that compared with 6-year-olds, children of 4 years old were more inclined to choose stative readings. However, such a tendency was not shown between 4-year-olds and 5-year-olds, as well as between 5-year-olds and 6-year-olds. When it came to state passive conditions, multiple comparisons showed that there were significant differences and effect size between 4-year-olds and 5-year-olds (U = 56.0, p = .00, \( \eta^2 = .29 \)), 4-year-olds and 6-year-olds (U = 33.0, p = .00, \( \eta^2 = .26 \)), 5-year-olds and 6-year-olds (U = 155.0, p = .00, \( \eta^2 = .04 \)) respectively in making CAS responses, which means that with the growth of age, Mandarin-speaking children could master the distinction between event passive and state passive better and better. Next, we explored the within group effects between children’s selection of CAE and CAS under event and state conditions. Results indicated that children of 4 years old were more inclined to choose stative readings under the event conditions, and there was a significant difference and effect size between CAE and CAS (U = 45.5, p = .04, \( \eta^2 = .16 \)). Under the conditions of state passives, children were also more likely to choose the picture illustrating stative readings, and there was a significant difference and effect size between CAE and CAS (U = 3.0, p = .00, \( \eta^2 = .36 \)). For 5-year-old children, the percentage of CAE was a little higher than that of CAS under the event conditions, which suggests that 5-year-old children have begun to be aware of the distinction between event passives and state passives. There was a significant difference and effect size between CAE and CAS (U = 108.5, p = .01, \( \eta^2 = .16 \)). In the case of the state passives, a significant difference and effect size was shown between CAE and CAS (U = 0, p < .00, \( \eta^2 = .70 \)) for 5-year-olds. As to 6-year-old subjects, under the event conditions, there was a significant difference and effect size between CAE and CAS (U = 7.0, p < .00, \( \eta^2 = .70 \)). In addition, the dominance of CAS in state passives was even more obvious than was the case for the two younger groups. There was a significant difference and effect size between CAE and CAS (U = 0, p < .00, \( \eta^2 = .76 \)). In general, children at the age of six can clearly discriminate event passives and state passives. For the adult group, subjects displayed a noticeable distinction and effect size between CAE and CAS under event conditions (U = 0, p < .00, \( \eta^2 = .77 \)) and state conditions (U = 0, p < .00, \( \eta^2 = .80 \)), which indicated that adults had fully mastered the distinction between event and state passives.

We further probed the effect of verb types on children’s passive comprehension. Fig. 2 shows children’s comprehension of passives containing three types of verbs: achievement, destructive and creative verbs. Subjects’ responses were counted as correct as long as the subjects chose the correct agent, regardless of event or state conditions. From the histogram, it can be seen that none of the age groups displayed a clear verb type effect. Subjects at 4 years old gave correct responses of around 76% for creative verbs, a little worse than that for achievement verbs, with an accuracy of over 80% for destructive verbs. For the 5-year-old group, correct readings of all three types of verbs exceeded 95%. Moreover, children at the age of six showed almost perfect proficiency in both achievement and destructive verbs, performing a little worse in creative verbs with about 94% correct responses. In conclusion, there is no significant within-age difference in children’s passive comprehension.

Table 3 compares the results for event and state passives formed from the three types of verbs, testing for differences using the Mann–Whitney U Test. Children at all ages preferred to select stative readings under state conditions, and the percentages of CAS increased gradually with age, from around 65% for 4-year-olds to nearly 90% for 6-year-olds. A significant difference was also shown between CAE and CAS for all the three groups, indicating that children were able to identify state passives early and easily.

Children in all three groups showed differences between the three verb types in their comprehension of event passives. Children of 4 years old showed a near-significant or significant preference for CAE responses to event sentences for, respectively, achievement (U = 52.5, p = .09, \( \eta^2 = .22 \)) and destructive verbs (U = 23.5, p = .00, \( \eta^2 = .45 \)), but not for creative verbs. This preference was maintained for destructive verbs in 5 year olds (U = 115.0, p = .02, \( \eta^2 = .14 \)), but not for achievement verbs (to which responses were at chance) or creative verbs, to which the reverse preference for CAE responses was significant. The preference for CAE responses to event sentences was still evident and significant for destructive verbs in 6 years olds (U = 122.5, p = .03, \( \eta^2 = .12 \)), but had been reversed to a significant preference for CAE responses to achievement (U = .5, p < .00, \( \eta^2 = .77 \)) and creative verbs (U = .0, p < .00, \( \eta^2 = .77 \)). Children at all ages, then, chose stative readings of event passive sentences significantly more frequently than event readings for destructive verbs, although the proportion of event readings increased with age, from 26% by 4-year-olds to 41.9% by 6-year-olds. This bias towards a stative reading of event passive sentences

### Table 2

<table>
<thead>
<tr>
<th>Group</th>
<th>Event Condition(100%)</th>
<th>State Condition(100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAE (%)</td>
<td>CAS (%)</td>
</tr>
<tr>
<td>4-year-olds</td>
<td>34.3</td>
<td>46.8</td>
</tr>
<tr>
<td>5-year-olds</td>
<td>54.2</td>
<td>41.9</td>
</tr>
<tr>
<td>6-year-olds</td>
<td>65.2</td>
<td>33.3</td>
</tr>
<tr>
<td>Adults</td>
<td>87.9</td>
<td>12.1</td>
</tr>
</tbody>
</table>

Notes: CAE = correct agent eventive reading; CAS = correct agent stative reading.
was reversed in the 5 year old and 6 year old age groups.

As far as event passives with creative verbs were concerned, children of three groups all chose more CAE than CAS. The proportions of CAE were all above that of CAS for all the children. In addition, the proportions of CAE increased along with age, from 44.2% by 4-year-olds to 81.9% by 6-year-olds. Moreover, there were significant differences and effect sizes between CAE and CAS for both 5-year-olds ($U = 46.0, p < .00, r^2 = .45$) and 6-year-olds ($U = 0, p < .00, r^2 = .82$), but no significant difference for 4-year-olds ($U = 63.0, p = .26 > .05$). It can be concluded that the semantic type of the verb does affect the strength and duration of the bias towards stative readings.

4. General discussion

In this section, the major findings of this study are restated in relation to the hypothesis that event passives which are formed through movement in Mandarin are more difficult to comprehend, and later acquired, than state passives which may not involve movement.

4.1. Summary

Children of 4 years old displayed a clear bias to CAS responses under event passive conditions. They seemed not to distinguish event passives from the corresponding passives depicting a kind of state. In contrast, the tendency to select CAE was very apparent in the state situation. As to 5-year-old children, they preferred CAE in the event passive situation and they began to be aware of the divergences between the passives focusing on action and the passives stressing outcome. Children of 6 years old had no difficulty distinguishing event passives from state passives. The bias towards the state interpretation was modulated by the semantic type of the verb, being later overcome for destructive verbs than for achievement or creative verbs.

4.2. Discussion and conclusion

Previous studies indicate that, given the right experimental circumstances, children aged as young as three years old are able to acquire some abstract knowledge of the full passive (Brooks and Tomasello, 1999; Bencini and Valli, 2008); and that English children follow a developmental trajectory in their mastery of passives from adjective state passives to equivocal passives, and finally event passives (Israel et al., 2000). This study is the first to explore the acquisition of event and state passives by Mandarin-speaking children. Results in the present study were consistent with the above consensus on the acquisition of passives in English, indicating that Mandarin-speaking children at an early age were unable to distinguish event passives from state passives, reliably interpreting event passives with stative readings. These results can be analyzed from different perspectives.

Firstly, syntactic structures influence children’s understanding of event and state passives, which is consistent with syntactic account of passive acquisition. Both children’s early grammatical deficits assumed by A-chain Deficit Hypothesis and their processing difficulties for passives have provided plausible accounts of the asymmetry between event and state passive comprehension. In English, children may understand passives with action verbs better with the help of the corresponding adjectival counterparts. For instance, the children on average get a high score with above 80% correction in English actional passives and a low score with only around 40% correct in English psychological passives (Hirsch and Waxler, 2004). These results are consistent with the hypothesis that children sometimes regard verbal passives as homophonous adjectival passives, which lack the relevant A-movement. Since psychological passives cannot form adjectival passives, they are more difficult to acquire than actional passive structures. In the present study, all the age groups appropriately selected CAS responses under state conditions and younger children were likely to treat event passives as state passives. Usually, the more syntactic operations a sentence involves, the more difficulties children have in processing this sentence. In Mandarin Chinese, the syntactic structures of event and state passives are quite different, and state passives with no syntactic movement tend to be adjectival passives. Therefore, event passives formed through movement in Mandarin are more difficult to acquire than state passives which may not involve movement. In this study, all the subjects (53 kids) had no difficulty in the experimental tasks, in this sense, syntactic account can interpret the distinction between event passives and state passives, and children’s poor comprehension of event passives is to do with delayed acquisition of the syntax to a great extent.

Verb types also influence Mandarin-speaking children’s comprehension of passives. In Mandarin Chinese, achievement verbs link with immediate outcomes of actions, and Mandarin-speaking children tend to select stative readings for passives with achievement verbs. Children younger than five years old had a higher likelihood to interpret event passives with stative reading. Destructive verbs, which usually relate to negative consequences caused by some external forces, were also likely to receive stative readings. As to creative verbs in Mandarin Chinese, they have more to do with an action lasting a relatively long time rather than a clear and immediate state. Compared with passives with achievement or destructive verbs, children were more likely to choose evitative readings under event conditions for passives with creative verbs.

Table 3

Mann Whitney U Test for comprehension of passives with three verb types.

<table>
<thead>
<tr>
<th>Age</th>
<th>Event (100%)</th>
<th>State (100%)</th>
<th>Event (100%)</th>
<th>State (100%)</th>
<th>Event (100%)</th>
<th>State (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-year-olds</td>
<td>CAE 32.7</td>
<td>CAS 47.1</td>
<td>CAE 20.2</td>
<td>CAS 67.3</td>
<td>CAE 53.1</td>
<td>CAS 41.9</td>
</tr>
<tr>
<td></td>
<td>U - 52.5</td>
<td>*U - 5.5</td>
<td>U - 143.5</td>
<td>*U - 0</td>
<td>U - 0</td>
<td>*U - 5</td>
</tr>
<tr>
<td></td>
<td>p &lt; .09</td>
<td>&lt; .05</td>
<td>p &lt; .12</td>
<td>&lt; .05</td>
<td>p &lt; .00</td>
<td>&lt; .00</td>
</tr>
<tr>
<td>5-year-olds</td>
<td>CAE 26.0</td>
<td>CAS 57.0</td>
<td>CAE 41.3</td>
<td>CAS 54.4</td>
<td>CAE 11.3</td>
<td>CAS 83.8</td>
</tr>
<tr>
<td></td>
<td>’U - 23.5</td>
<td>’U - 1.5</td>
<td>’U - 115.0</td>
<td>’U - 2.5</td>
<td>’U - 2.5</td>
<td>’U - 122.5</td>
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<tr>
<td></td>
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<td>p &lt; .00</td>
<td>p &lt; .02</td>
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<td>p &lt; .00</td>
<td>p &lt; .03</td>
</tr>
<tr>
<td>6-year-olds</td>
<td>CAE 44.2</td>
<td>CAS 35.6</td>
<td>CAE 66.9</td>
<td>CAS 29.4</td>
<td>CAE 10.0</td>
<td>CAS 87.5</td>
</tr>
<tr>
<td></td>
<td>’U - 63.0</td>
<td>’U - 10.0</td>
<td>’U - 46.0</td>
<td>’U - 0</td>
<td>’U - 0</td>
<td>’U - 0</td>
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<td>&gt; .05</td>
<td>p &lt; .00</td>
<td>p &lt; .00</td>
<td>p &lt; .00</td>
<td>p &lt; .00</td>
</tr>
</tbody>
</table>

Notes: CAE — correct agent eventive reading; CAS — correct agent stative reading.
and even the youngest group showed a preference for eventive readings. Verb semantic type only affected children's interpretations of event passives; there was a clear preference for stative readings of state sentences at all ages.

The present study assumes that a clear stative reading can be achieved by adding verb complements in Mandarin short passives. In Mandarin Chinese, an event passive focuses on an event that the action conveys, whereas a state passive emphasizes on a kind of state the action brings about. The event passive NP₁+BEI₁+V is a verbal passive and there is an A-chain in its deep structure, while the state passive NP₂+BEI₂+V+Complement is an adjectival passive which does not include traces of moved elements. Children start with state passives because they are simpler in terms of syntactic structure.

The current research also provides a new perspective to analyze the acquisition of short and long passives by Mandarin-speaking children, attributing subjects' high proficiency in passives to their treatment of some short passives as adjectival structures. In English, the structure of short passives NP₁+be+V-ed (without a by-phrase), is identical with the adjectival structure NP₂+be+Adj. The by-phrase in long passive construction is incompatible with the adjectival structure. Thus, children usually display higher proficiency in the acquisition of actional short passives, with the evidence that early children rarely produce long passives and the short passives they produce tend to express adjectival stative meanings by Horgan (1978). In the case of Mandarin, all age groups in the present study scored highly for comprehension of actional short passives, with about 75.5% for the 4-year-old subjects, and around 96% for the two older groups. This contrasts with children's poor performance on the acquisition of Mandarin long passives (Liu and Ning, 2009).

In conclusion, this paper presents a comprehensive study of event and state passive acquisition by Mandarin-speaking children. Differently from the study by Israel et al. (2000), we tested children's comprehension of both event and state passives using comprehension experiments rather than naturalistic production data analysis. Additionally, in comparison with previous studies, a larger number and wider variety of verbs were used in this research. For instance, Hirsch and Wexler (2004) employed just four action verbs, and the number of verbs in each condition was only three in Xu and Yang (2008). In the present study, verbs were classified into three semantic types: achievement, destructive and creative verbs. Furthermore, instead of a forced choice using just two pictures depicting either eventive or stative conditions in the English study by Wexler (2004), we presented the subjects with four pictures for each sentence item, one pair denoting correct agent eventive and stative readings, the other pair expressing the opposite meanings. We conclude that children start with state passives because they are simpler in terms of syntactic structure, and continue by building abstract structure, later acquiring the structure of event passives. At the same time, Mandarin children's acquiring preference for the stative reading is also influenced by other factors, such as verb types, verb complements and so on.

There are some limitations of the present study. Firstly, the present research mainly centered on the effect of syntactic factor as well as verb type factor in interpreting children's preference for stative reading over eventive reading, rather than interpreting this fact from the different input frequencies of eventive and stative passives. It is possible that the input frequency would influence the experiment results, however, for lacking long-term investigation and for the research scope of present study, this factor was not taken into consideration. And this is one of the deficiencies of the current study. Secondly, each participant in this study was presented with all three sentences (one active and two passives) containing the same verb, while further studies might employ a Latin square design, in which each participant hears only one sentence for each verb. Other differences between Chinese adjectival passives and English adjectival passives also deserve further investigation. In Chinese, the stative reading is mainly expressed through the verb complement in short passives. Action verbs in Chinese passives do not have the same form of adjectival structure as those English ones. That is, only short passives with verb complements have corresponding adjectival counterparts in Mandarin Chinese. The implications for acquisition of this cross-linguistic difference will be a fruitful topic of further study.

Acknowledgement

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Appendix A. Test Sentences

<table>
<thead>
<tr>
<th>Achievement verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) a. xiao lanfeng zai da xiao hongfeng.</td>
</tr>
<tr>
<td>Blue Bee ZAI hit Red Bee</td>
</tr>
<tr>
<td>'Blue Bee is hitting Red Bee.'</td>
</tr>
<tr>
<td>b. xiao langfeng BEI da-sui le.</td>
</tr>
<tr>
<td>Blue Bee BEI hit broken ASP</td>
</tr>
<tr>
<td>'Blue Bee was hit and became broken.'</td>
</tr>
<tr>
<td>c. xiao lanfeng BEI da le.</td>
</tr>
<tr>
<td>Blue Bee BEI hit</td>
</tr>
<tr>
<td>'Blue Bee was hit.'</td>
</tr>
<tr>
<td>3) a. xiao lanfeng zai ti xiao hongfeng.</td>
</tr>
<tr>
<td>Blue Bee ZAI kick Red Bee</td>
</tr>
<tr>
<td>'Blue Bee is kicking Red Bee.'</td>
</tr>
<tr>
<td>b. xiao lanfeng BEI ti le.</td>
</tr>
<tr>
<td>Blue Bee BEI kick ASP</td>
</tr>
<tr>
<td>'Blue Bee was kicked.'</td>
</tr>
<tr>
<td>c. xiao lanfeng BEI ti-huai le.</td>
</tr>
<tr>
<td>Blue Bee BEI kick broken ASP</td>
</tr>
<tr>
<td>'Blue Bee was kicked and got broken.'</td>
</tr>
<tr>
<td>2) a. xiao hongfeng zai pai xiao hongfeng.</td>
</tr>
<tr>
<td>Red Bee ZAI swat Red Bee</td>
</tr>
<tr>
<td>'Blue Bee is swatting Red Bee.'</td>
</tr>
<tr>
<td>b. xiao hongfeng BEI pai le.</td>
</tr>
<tr>
<td>Red Bee BEI swat ASP</td>
</tr>
<tr>
<td>'Red Bee was swatted.'</td>
</tr>
<tr>
<td>c. xiao hongfeng BEI pai-yun le.</td>
</tr>
<tr>
<td>Red Bee BEI swat dizzy ASP</td>
</tr>
<tr>
<td>'Red Bee was swatted and became dizzy.'</td>
</tr>
<tr>
<td>4) a. xiao lanfeng zai zha xiao hongfeng.</td>
</tr>
<tr>
<td>Blue Bee ZAI bomb Red Bee</td>
</tr>
<tr>
<td>'Blue Bee is bombing Red Bee.'</td>
</tr>
<tr>
<td>b. xiao lanfeng BEI zha le.</td>
</tr>
<tr>
<td>Blue Bee BEI bomb ASP</td>
</tr>
<tr>
<td>'Blue Bee was bombed.'</td>
</tr>
<tr>
<td>c. xiao lanfeng BEI zha-shang le.</td>
</tr>
<tr>
<td>Blue Bee BEI bomb hurt ASP</td>
</tr>
<tr>
<td>'Blue Bee was bombed and got hurt.'</td>
</tr>
</tbody>
</table>

(continued on next page)
Achievement verbs

5) a. xiao lanfeng zai xi xiao hongfeng.
Blue Bee ZAI wash Red Bee.
'Blue Bee is washing Red Bee.'
b. xiao lanfeng ZAI xi guang lai.
Blue Bee ZAI wash clean ASP
'Blue Bee was washed and became clean.'
c. xiao lanfeng ZAI xi le.
Blue Bee ZAI wash ASP
'Blue Bee was washed.'
7) a. xiao lanfeng zai ya xiao hongfeng.
Blue Bee ZAI press Red Bee
'Blue Bee is pressing Red Bee.'
b. xiao lanfeng BEI ya bian lai.
Blue Bee BEI press flat ASP
'Blue Bee was pressed and got flat.'
c. xiao lanfeng BEI ya le.
Red Bee BEI press
'Blue Bee was pressed.'

Destructive verbs

1) a. xiao hongfeng zai ba xiao lanfeng.
Red Bee ZAI pluck Blue Bee.
'Red Bee is plucking Blue Bee's hair.'
b. xiao hongfeng BEI ba guang lai.
Red Bee BEI pluck all ASP
'Red Bee's hair was all plucked.'
c. xiao hongfeng BEI ba le.
Red Bee BEI pluck ASP
'Red Bee's hair was plucked.'
3) a. xiao lanfeng zai shao xiao hongfeng.
Blue Bee ZAI burn Red Bee.
'Blue Bee is burning Red Bee.'
b. xiao lanfeng BEI shao shang le.
Blue Bee BEI burn hurt ASP
'Blue Bee was burned and got hurt.'
c. xiao lanfeng BEI shao le.
Blue Bee BEI burn ASP
'Blue Bee was burned.'
5) a. xiao hongfeng zai za xiao lanfeng.
Red Bee ZAI smash Blue Bee.
'Red Bee is smashing Blue Bee.'
b. xiao hongfeng BEI za le.
Red Bee BEI smash ASP
'REd Bee was smashed.'
c. xiao hongfeng BEI za sui le.
Red Bee BEI smash into pieces ASP
'Red Bee was smashed into pieces.'
7) a. xiao shayu zai chi xiao e'yu.
shark ZAI eat crocodile
'The shark is eating crocodile.'
b. xiao shayu BEI chi le.
shark BEI eat ASP
'The shark was eaten.'
c. xiao shayu BEI chi guang le.
shark BEI eat up ASP
'The shark was eaten up.'

Creative verbs

1) a. xiao hongfeng zai zao xiao lanfeng.
Red Bee ZAI build Blue Bee.
'Red Bee is building Blue Bee.'
b. xiao hongfeng BEI zao hao le.
Red Bee BEI build finished ASP
'Red Bee was built.'
c. xiao hongfeng BEI zao le.
Red Bee BEI build ASP
'Red Bee was built.'
3) a. xiao hongfeng zai xi xiao lanfeng.
Red Bee ZAI embroider Blue Bee
'Red Bee is embroidering Blue Bee.'
b. xiao hongfeng BEI xi hao le.
Red Bee BEI embroider finished ASP
'Red Bee was embroidered.'
c. xiao hongfeng BEI xi le.
Red Bee BEI embroider ASP
'Red Bee was embroidered.'
5) a. xiao hongfeng zai diao xiao lanfeng.
6) a. xiao hongfeng zai zhuang xiao lanfeng.
Red Bee ZAI crash Blue Bee.
'Red Bee is crashing Blue Bee.'
b. xiao hongfeng BEI zhuang hua lai.
Red Bee BEI crash broken ASP
'Red Bee was crashed and got broken.'
c. xiao hongfeng BEI zhuang le.
Red Bee BEI crash ASP
'Red Bee was crashed.'
8) a. xiao lanfeng zai tu xiao hongfeng.
Blue Bee ZAI paint Red Bee.
'Blue Bee was painting Red Bee.'
b. xiao lanfeng BEI tu zang le.
Blue Bee BEI paint dirty ASP
'Blue Bee was painted and got dirty.'
c. xiao lanfeng BEI tu le.
Blue Bee BEI paint ASP
'Blue Bee was painted.'
Appendix B. Picture Samples

1. Verbs (achievement)

<table>
<thead>
<tr>
<th>Achievement verbs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Bee ZAI carve Blue Bee</td>
<td>Blue Bee ZAI pile up Red Bee</td>
</tr>
<tr>
<td>‘Red Bee is carving Blue Bee.’</td>
<td>‘Blue Bee is piling up Red Bee.’</td>
</tr>
<tr>
<td>b. xiao hongfeng BEI diao le.</td>
<td>b. xiao lanfeng BEI dui-hao le.</td>
</tr>
<tr>
<td>Red Bee BEI carve ASP</td>
<td>Blue Bee BEI pile up ASP</td>
</tr>
<tr>
<td>‘Red Bee was carved.’</td>
<td>‘Blue Bee was piled up.’</td>
</tr>
<tr>
<td>c. xiao hongfeng BEI diao-hao le.</td>
<td>c. xiao lanfeng BEI dui le.</td>
</tr>
<tr>
<td>Red Bee BEI carve finished ASP</td>
<td>Blue Bee BEI pile ASP</td>
</tr>
<tr>
<td>‘Red Bee was carved.’</td>
<td>‘Blue Bee was piled.’</td>
</tr>
<tr>
<td>7) a. xiao hongfeng zai zhi xiao lanfeng.</td>
<td>8) a. xiao lanfeng zai bai xiao hongfeng.</td>
</tr>
<tr>
<td>Red Bee ZAI weave Blue Bee</td>
<td>Blue Bee ZAI put together Red Bee</td>
</tr>
<tr>
<td>‘Red Bee is weaving Blue Bee.’</td>
<td>‘Blue Bee is putting Red Bee together.’</td>
</tr>
<tr>
<td>b. xiao hongfeng BEI zhi-hao le.</td>
<td>b. xiao lanfeng BEI bai le.</td>
</tr>
<tr>
<td>Red Bee BEI weave finished ASP</td>
<td>Blue Bee BEI put ASP</td>
</tr>
<tr>
<td>‘Red Bee was weaved.’</td>
<td>‘Blue Bee was put.’</td>
</tr>
<tr>
<td>c. xiao hongfeng BEI zhi le.</td>
<td>c. xiao lanfeng BEI bai-hao le.</td>
</tr>
<tr>
<td>Red Bee BEI weave ASP</td>
<td>Blue Bee BEI put together ASP</td>
</tr>
<tr>
<td>‘Red Bee was weaved.’</td>
<td>‘Blue Bee was put together.’</td>
</tr>
</tbody>
</table>

Example: za ‘hit’
2. Verbs of the destructive kind (accomplishment)

Example: *jian* ‘cut’
3. Verbs of the creative kind (accomplishment)

Example: *dui* ‘pile’

References


Li, S., 1993. A Study of Sentences with the Modern Chinese Character "Bei". The Peking University Publishing House, Beijing, China.
