1. Introduction

Most maturational accounts for passive acquisition claim that the passives seen in early child speech are not adult-like verbal passives, but rather a syntactic (s-)homophone, an adjectival construction with a simpler syntax (Borer and Wexler 1987, Babyonyshev et al. 2001). Verbal and adjectival passives in English can be disambiguated with purpose phrases (PPs) and progressive aspect. Verbal passives contain a syntactically represented implicit argument (IMP), which can license a PP (Roberts 1987 a.o.), while adjectival passives do not. If young children’s passives are verbal, they should judge passives with PPs as acceptable, just like they do actives with purpose phrases. If children’s passives are adjectival and do not contain an intervening IMP, they should judge passives with purpose phrases to be as unacceptable as inchoatives with purpose phrases. In this study, twenty-one 4;0-7;0-year-olds participated in a targeted Grammaticality Judgment Task (Stromswold 1990, McDaniel and Cairns 1996, Hiramatsu 2000). The results show that children use verbal passive syntax to comprehend passives, providing evidence against Wexler (2004), Hirsch and Wexler (2006b) and Orfitelli (2012). The results provide preliminary evidence for Snyder and Hyams’ (2008) proposal, though more data is required. Following Grillo (2008), I propose children’s difficulties with certain (non-actional) passives may stem from constructing the complex event structure required for passives of activity and stative predicates. In Section 2, I will review the Maturational theories and the s-homophone proposal. In Section 3, I will present the verbal/adjectival diagnostics used in this study. I will present the study and the results in Sections 4 and 5. Section 6 provides some discussion and concludes the paper.

2. Maturation and s-homophones

It has long been observed that English-speaking children have difficulties in comprehension and production of the verbal passive construction (Horgan 1978). In an influential proposal, Borer and Wexler (1987) propose that the syntactic operations required to create the verbal passive undergo maturation. Specifically they proposed that children have difficulty with A-movement of the object to subject position. Along with the classic studies, there have been many recent studies suggesting that young English-speaking children perform well on passives, with above chance performance on short passives of actional verbs like hit, kick, kiss, and carry (Hirsch and Wexler 2006b, Orfitelli 2012)

2.1. S-homophones

To make these English results compatible with maturational theories, proponents of maturation have made use of the fact that verbal and adjectival passives are homophones in English, but vary slightly in syntactic form. The explanation has been that if children subject to maturation are producing and comprehending constructions that look like verbal passives, it is because they are

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actually using an adjectival passive syntax. In other words, children with pre-mature grammars make use of syntactic homophones (s-homophone):

(1) A phrase $\alpha$ is an s-homophone of $\beta$ if $\alpha$ and $\beta$ have distinct structure but common pronunciation (Babyonyshev et al. 2001:7)

Until relevant mechanisms for the verbal passive matures, children produce adjectival passives.

2.2. Maturational theories that rely on s-homophones

The Universal Phase Requirement (UPR, Wexler 2004) posits that children under the age of 7;0 have difficulties with passives because they cannot move the object argument out of the complement of $v$. The Result Passive Hypothesis of the UPR, put forth by Hirsch and Wexler (2006b), posits that until this mechanism matures, children are using an adjectival s-homophone strategy when comprehending and producing verbal passives. Specifically, they suggest that children are using resultative adjectival passive syntax and follow the structure proposed in Embick (2004). The Argument Intervention Hypothesis (AIH, Orfitelli 2012) posits that children have difficulties with passives because they have difficulties moving an argument past an intervening argument in passive and raising constructions. In the case of passives, the AIH posits that children have difficulties moving the object argument past the syntactically represented subject argument. Like the Result Passive Hypothesis of the UPR, the AIH must posit s-homophones to explain good performance in English passive studies — if children are doing well, it is because they are making use of an s-homophone passive structure that does not have an intervening argument in its syntax.

2.3. Other Maturational theories

The Discourse Feature Hypothesis (DFH, Snyder and Hyams 2008) argues that children have the syntax for verbal passives, but can only overcome the locality constraint of moving an object past a subject when the context provides a discourse feature to one of the arguments to distinguish the chains. Snyder and Hyams remain neutral on whether it is the grammar proper, or the language processing systems, that undergo maturation. Grillo (2008) also supports a full competence approach to passives. He argues that passives require a semantic BECOME component, and that difficulties with certain passives may stem from a type shifting requirement required for passives of verbs without a BECOME component, i.e., state and activity verbs. Grillo suggests that adding this extra structure could have consequences not only for processing, but could also make the acquisition of certain passives difficult, particularly non-actional passives. While this study focuses on the maturational theories that rely on s-homophones, the results also bear on these other maturational theories of passive acquisition.

3. Verbal/adjectival passive distinction

Embick (2004) proposes two major differences between what he calls the eventive (verbal) passive and the resultant state (adjectival) passive. First, he argues that the eventive passive has an agentive feature on $v$, and the adjectival passive does not. He argues that it is the agentive feature on $v$ that licenses external argument-type components such as the $by$-phrase in verbal passives$^1$. The second difference between verbal passives and resultant state passives is aspect. Embick argues that resultant state adjectival passives have an aspectual head with resultative stative interpretation while verbal passives do not. In short, I take Embick’s and hence Hirsch and Wexler’s proposal to be that the verbal/adjectival distinction comes down to (1) the presence/absence of an implicit agent argument, and (2) a difference in ongoing vs stative aspect. To the extent that Embick’s proposal is correct, the verbal/adjectival distinction in English can be disambiguated with purpose phrases and progressive aspect.

$^1$ The $by$-phrase is not a foolproof diagnostic for the verbal/adjectival distinction. For acquisition arguments addressing this diagnostic, see Weinberg (1987) and Pinker et al. (1987).
3.1. Purpose phrases

Verbal passives have a syntactically represented implicit agent argument (IMP, Roberts 1987, VanUrk 2011). Implicit agent arguments can license purpose phrases, a clause indicating the reason for an action\footnote{What I am calling purpose phrases has also been referred to in the literature as Rationale Clauses (Roberts 1987, Nissenbaum 2005).}. The presence/absence of an implicit argument and its ability to license a purpose phrase is can be seen in verbs that participate in the causative/inchoative alternation. Purpose phrases are grammatical/acceptable with active transitives and verbal passives, but not with inchoative forms of verbs, because inchoative forms do not contain an implicit argument.

\begin{equation}
\begin{align*}
\text{(2) a. John is breaking the candy bar to share with friends} \\
\text{b. The candy bar is being broken IMP PRO to share with friends} \\
\text{c. *The candy bar is breaking to share with friends}
\end{align*}
\end{equation}

Like inchoative forms of verbs, and in line with Embick’s proposal, it is also the case that adjectival passives do not allow purpose phrases. Using the adjectival passive diagnostic of un-prefixation (Levin and Rappaport 1986), adjectival and resultative participles are not acceptable with purpose phrases:

\begin{equation}
\begin{align*}
\text{(3) *The candy bar is unbroken to keep for later}
\end{align*}
\end{equation}

3.2. Progressive aspect

Another feature that is argued to distinguish verbal passives from stative adjectival passives and resultant state adjectival passives is progressive aspect. Grimshaw (1990) and Pesetsky (1995) both focus on progressive aspect as a test for the verbal/adjectival passive distinction\footnote{Purpose phrases introduce a structure with PRO, which is associated with the notion of control. I make no assumptions about children’s knowledge of control, and the controller properties of PRO are not at issue here. The study does not make use of control verbs. Furthermore, the subjects of the passive sentences tested here are non-agentive and inanimate. They cannot license purpose phrases and are not a candidate for controlling PRO.}. If children’s passives are in a state as a result of an event, they should not be compatible with progressive aspect.

\begin{equation}
\begin{align*}
\text{(4) a. *The door is being open (to let air in)} \\
\text{b. *The candy bar is being unbroken (to share with friends)}
\end{align*}
\end{equation}

The prediction for s-homophone maturational theories is that if children are interpreting passives as adjectival, they should judge passives with purpose phrases in progressive aspect (2b) to be as ungrammatical as an inchoative with a purpose phrase (2c). If children’s passives are verbal, they should judge passives with purpose phrases (2b) similarly to their judgment of an active with a purpose phrase (2a)\footnote{Like all diagnostics, Pesetsky points out that the progressive test is somewhat problematic, but in most cases it does seem to differentiate between verbal and adjectival passives.}. As these are judgments of acceptability for adults, a grammaticality judgment task is appropriate. Unlike other studies that have looked at children’s understanding of the pragmatics of...
implicit arguments in passives (Roeper 1987, Verrips 1996, Okabe and Sano 2002), this study is a
direct test of syntax (see arguments against these studies in Machida, Miyagawa and Wexler 2004).

4. Method
4.1. Adult Pilot

An adult pilot grammaticality judgment task was conducted on Amazon Mechanical Turk to
determine which verbs with purpose phrases showed the greatest contrast for adults. Adults were asked
judgments on verb/purpose phrase pairs. Verb/purpose phrase pairs were given in 4 forms: active
progressive, passive progressive, inchoative progressive, and inchoative present. Two sets of verbs
were tested. In both sets of verbs, passives with purpose phrases varied from inchoatives with purpose
phrases at the $p < .001$ level. Passives varied slightly from actives at the $p = .01$ level. The verbs with
the greatest contrast were bake, break, grow, light, and sink. The results are in Figure 1.

4.2. Subjects

21 children between the aged 4;0-6;0 (M=5;4) participated in the study. This below 7;0 age range
was chosen because it is relevant for testing the predictions of the maturation hypothesis.

4.3. Training, pre-test, and test

Children were given a Targeted Grammaticality Judgment Task (Stromswold 1990, McDaniel and
Cairns 1996, Hiramatsu 2000). To my knowledge, this method is unattested in passive studies.
Following Hiramatsu (2000), children gave judgments under the guise of helping a puppet named Lulu
learn English. The study consisted of three parts: a training session, a pre-test, and the test. In the
training session, children were trained to give judgments on a variety of constructions, including active
verbs with purpose phrases and inchoative verbs with purpose phrases. These constructions were used
in the training because they serve as the anchors for the judgments on passives in the experiment, and
are expected to be uncontroversial. Children were given feedback if they were giving judgments to
meaning instead of form, e.g., a no judgment to a grammatical sentence like Is the cow purple? After
the training, children were given a 6 question pre-test containing 3 active verbs with purpose phrases
and 3 inchoative verbs with purpose phrases. No feedback was given during the pre-test, and children
passed the pre-test if they gave a yes judgment to at least 2 of 3 active verbs with purpose phrases and
a no judgment to 3 out of 3 inchoatives with purpose phrases. If they passed, children moved on to the
experiment.

The test was the first time children heard a passive with a purpose phrase. Children heard 5
verb/purpose phrase pairs (bake to celebrate Mary’s birthday, break to share with friends, grow to
make soup, light to see the book, sink to win the game) in 4 different forms: one each of an active
progressive, passive progressive, an inchoative in the progressive aspect, and an inchoative in the
simple present tense. As in the adult study, having two types of inchoatives was done to balance the
expected number of yes and no responses. Though not the main focus, having the inchoative in simple
present also allowed me to evaluate the effect, if any, of progressive aspect on the acceptability
judgment. Items were presented in a pseudorandomized order. As the Targeted Grammaticality
Judgment Task is a hybrid between a relative judgment and an absolute judgment task, the purpose
phrases were kept identical and the items themselves served as controls. Each item was accompanied
by a story. To address the claims of the DFH, the stories were told to emphasize the subject of the
passive.

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6 There were 25 children who passed the pre-test and participated in the experiment. Children were excluded
from the analysis (i) if they responded yes to all of the experiment items, indicating they were not judging any
relevant contrasts (n=3), or (ii) if they were not at least 80% correct on responses to active items (=4 or 5 out of 5
yes responses) (n=1). This left an analysis of 21 children.
Figure 1: Adult pilot on Amazon Mechanical Turk.

The following is a sample story:

Experimenter: Let’s tell the candy bar story again. John has a candy bar. He wants to share with friends, but he only has one candy bar. So he takes it, cracks it in half, and now, he can share with his friends!

Hey Lulu, can you tell us something about the candy bar in this story?

Lulu: The candy bar is being broken to share with friends.

Experimenter: Did Lulu say that right?

Child: Yes.

5. Results
5.1. Overall

There was a significant difference on responses to passives compared to progressive inchoatives ($t(1,20)=3.25$, two-tailed $p = .004$). There was a highly significant difference between responses to passives and present tense inchoatives ($t(1,20)=5.59$, two-tailed $p < .001$). Like adults, children’s passives also differed significantly from actives ($t(1,20)=4.24$, two-tailed $p < .001$). Inchoatives did not vary significantly from one another. The results are shown in Figure 2.

5.2. Adult-like Inchoatives

The main results show that children are giving fairly high yes responses to inchoatives with purpose phrases. This result is unexpected, given that children had to answer no to 3 out of 3 inchoatives with purpose phrases in the pre-test in order to move on to the experiment. Children were split into groups based on their ability to maintain adult-like responses to inchoatives. Children were marked adult-like if they answered 4 or 5 no responses to present tense inchoatives. The results are in Figure 3. The adult-like subgroup has results similar to the overall group: a 2x2 repeated measures ANOVA shows a main effect of verb type (Greenhouse-Geisser $F(1.750,53.328)=42.412$, $p < .001$).
The group that showed adult-like judgments on inchoatives were on average 5 months older than the group who did not maintain adult-like judgments.

The non-adult-like subgroup trends in the same direction as the adult-like subgroup. As the testing session was long, this high yes response rate could have been a result of judgment fatigue. A one tailed t-test was conducted on responses in the first half vs. responses in the second half. The non-adult group had more yes responses in the second half compared to the first half (one-tailed $t(12)=1.75$, $p = .05$). The adult group did not show this difference.

![Figure 2: Overall results by verb type.](image)

5.3. Individual Items

An analysis was also conducted on the individual verbs in the different verb type conditions. A 2x2 ANOVA with verb and verb type as within subjects factors reveal a main effect of verb type ($F(1,3.219)=17.979$, $p < .001$) and a marginal effect of verb ($F(4,.305)=2.220$, $p = .07$). In comparing actives and passives, there was no interaction of verb and verb type in ($F(4,.076)=.772$, $p = .547$). In comparing passive responses to responses on inchoative present items, there was a main effect of verb type ($F(1,4.876)=31.220$, $p < .001$). Although there was no effect of individual verb ($F(4,.148)=.703$, $p = .592$), there was a significant interaction of verb and verb type ($F(4,662)=3.689$, $p = .008$). The results of the passive/inchoative present comparison are shown in Figure 4.
6. Conclusion

In this paper, I have shown that children from 4;0-7;0 year-old children accept verbal passives with purpose phrases in progressive aspect as grammatical, a construction for which no adjectival s-homophone is available. This result suggests that children of this age are using a verbal passive syntax to comprehend verbal passives. This result is not compatible with the Result Passive Hypothesis of the UPR nor is it compatible with the predictions of the AIH. Since I used a felicity condition, the results are compatible with the DFH. This is also compatible with other studies which have shown good performance on other types of passives in English (long non-actional passives, O’Brien, Grolla, Lillo-Martin 2006). This also supports recent results from studies in other languages like Sesotho where no s-homophone is available. In Crawford (2012), I show that resultant state passives in Sesotho are not homophonous with verbal passives, and Sesotho-speaking children are completely adult-like on short
actional passives. These results are also compatible with the priming literature suggesting that children have a representation of the passive (Bencini and Valian 2008). If children have the syntax for verbal passives, then the question also arises as to why they have difficulties with certain types of passives, like non-actional passives.

If children’s passives are adult-like, the question also arises as to why children overall did not respond yes to passives with purpose phrases at the rate of the adults in the pilot study (70% overall yes response rate vs. 90% adult yes response rate. This study showed that some children had judgment fatigue and a yes bias in the second half of the experiment. The current study was very long and should be shortened to minimize task demands.

A reviewer notes that for the children in the sub-group that did maintain adult-like judgments throughout the task, their average yes response rate for passives was only 55% vs. a 90% average yes judgment on passives for adults7. The responses to individual items provide a partial answer to the discrepancy. As can be seen in Figure 4, the child judgments on passives of individual verbs vary widely. In particular, children gave non adult-like judgments to passives of the verbs grow and sink. In one sub-analysis with children in the adult-like subgroup, children were responding on average 75% yes to the passive of break, but only 13% yes to the passive of grow. These disparate responses to individual items give a lower overall average.

The difference in response to actional verbal passives according to verb is not predicted by the UPR, AIH or DFH. It is not predicted by a simple frequency argument, either. While all the verbs used in this study are incredibly infrequent in child directed speech (<1% of all utterances), it is not the case that the two outliers in this study are the least frequent of the verbs in the corpus. For example, in the adult speech to Adam, Eve, and Sarah, tokens of bake and light are less frequent than tokens of the verb grow (see Crawford 2012 for details).

Following Grillo (2008), I suggest that children’s difficulty with certain types of non-actional and actional passives may come from the type shifting operation that is required to form passives from state and activity predicates. The results of current study support this; grow and arguably sink are activity predicates, and children’s judgments of passives of these verbs were the least adult-like. Passive studies that consider passives of a variety of verb types are an important avenue for future research and will be able to address this issue8.

Some have argued (Bruening 2012, McIntyre 2012) that although adjectival and verbal passives differ with respect to acceptability of purpose phrases, that adjectival passives have an external argument. If adjectival passives contain an external argument, the results are still a problem for the AIH, since an adjectival s-homophone structure would contain an intervening argument. Ken Wexler (p.c.) point out that some resultant state passives might allow certain kinds of purpose phrases, e.g., ?The soccer ball is painted to be seen in the dark/?The soccer ball is painted to see in the dark. While the relevant judgments should be further tested on adults, the passive results found here are still a problem for the Result Passive Hypothesis of the UPR. The passives tested in this study used progressive aspect; the resultant state aspectual component of these s-homophones is not compatible with progressive aspect.

In this study I have shown that children have adult-like knowledge of the verbal passive construction. Future research will determine why certain types of passives remain difficult and what the child needs to learn in order to become fully adult-like with the construction.

References

Babynyshev, Maria; Ronald Fein; Jennifer Ganger; David Pesetsky; and Kenneth Wexler. 2001. The maturation of grammatical principles: Evidence from Russian unaccusatives. Linguistic Inquiry 32.1-44.


7 See Crawford (2012) for a discussion on determining above-chance performance for individual children in this task.
8 As purpose phrases are not a good diagnostic for non-actional verbs, a relevant test for non-actional verbs is desirable.