Repetition brings success: Revealing knowledge of the passive voice

Kamil Deen, Ivan Bondoc, Amber Camp, Sharon Estioca, Haerim Hwang, Gyu-Ho Shin, Maho Takahashi, Fred Zenker, Jing Crystal Zhong

University of Hawai'i at Mānoa

42nd Annual Boston University Conference on Language Development
3 November 2017

Outline of the Talk

- Theoretical Review
  - Grammatical theory of the late development of the passive (Snyder & Hyams, 2015)
  - Parsing theory of the late development of the passive (Huang et.al., 2013)
- Discrepancy in results in the field (O'Brien et.al / Nguyen & Snyder)
- Three experiments
- Experiment 1: Replication of O'Brien et.al
- Experiment 2: Testing the UFH
- Experiment 3: Repeating test items
- Conclusion

Background

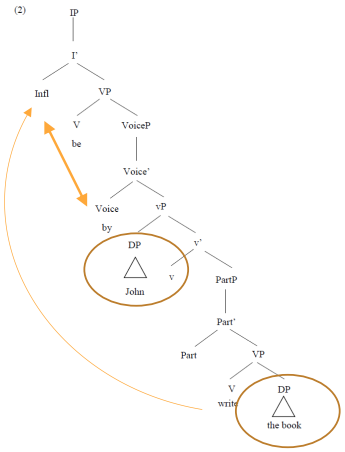
Various theories attempt to account for the difficulties children exhibit with the passive:

- Argument-Chain Deficit Hypothesis (Borer & Wexler, 1992)
- Theta Transmission Model (Fox & Grodzinsky, 1998)
- Universal Phase Requirement (Wexler, 2004)
- Universal Freezing Hypothesis (plus semantic coercion, Snyder & Hyams, 2015;See also Orfitelli's (2012) Argument Intervention Hypothesis)
- Incremental Processing Hypothesis (Huang et.al., 2013)

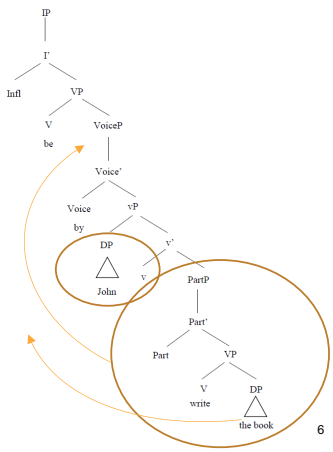
Universal Freezing Hypothesis

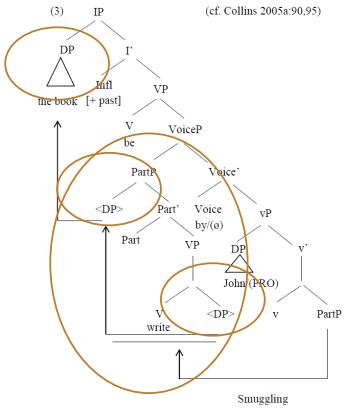
Snyder & Hyams make use of a claim by Collins (2005) that the passive involves something called 'smuggling'.

- The book was written by John (2)



- The book was written by John (2)





Universal Freezing Hypothesis

- Movement of a constituent out of an already-moved constituent is generally seen as ill-formed, formalized as the Freezing Principle (Wexler & Culicover,1980)
- For this to work, Freezing must not apply for passives.
- Snyder & Hyams: Children universally adhere to the Freezing Principle
- At around age 4yrs, the UFH goes "offline" maturationally
- Semantic coercion is proposed to be the root of the difficulty with non-actional passives, and at age 6-7yrs, children come to be able to do semantic coercion, thereby allowing non-actional passives. This is also maturational.

Incremental Processing Hypothesis
(Huang et.al. 2013)

- Children acquire canonical word order (in English) very early.
- This results in a (parsing) preference for the first nominal being an agent.
- When a child hears the first nominal in a passive test sentence, the child assigns it the agent role.

The girl	was hugged	by the boy
Agent role assigned	?	unable to reanalyze

- Upon encountering evidence of a passive (verbal morphology, or the by-phrase), children are unable to reanalyze.

→ The expectation that the first nominal will be the agent is at the root of the problem for passives.

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

Universal Freezing Hypothesis

- Snyder & Hyams: in Crain et.al, 2009; Pinker et.al., 1987, the subject was marked with a +Topic or +Q feature, thereby differentiating the object from the subject.
- Freezing never came into play because RM was never violated.

(1) Which car gets crashen by the bus? (Crain, Thornton & Murasugi, 2009)

Universal Freezing Hypothesis - Summary

- Passives involve a suspension of the Freezing Principle
- Children universally enforce the Freezing Principle – unable to comprehend passives.
- If logical object is +Topic marked, then children should be able to understand passives.
- The ability to suspend Freezing matures at around age 4yrs
- non-actional passives are understood after age 6-7yrs, due to maturation of semantic coercion.

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

Background (O'Brien, Grolla, & Lillo-Martin, 2006)

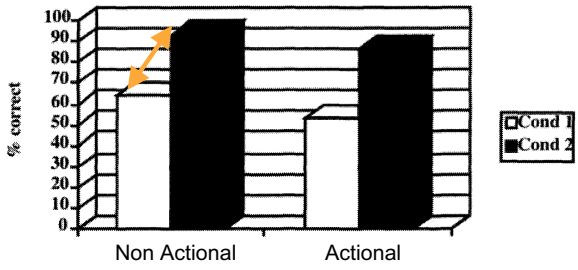
- Previous experiments tested children on sentences like
- *The boy was hugged by the girl*
- Where there was a boy and a girl in the context. O'Brien et.al. hypothesized that this makes the use of the by-phrase infelicitous.
- Tested children on a new scenario in which there are two potential agents, thereby motivating the use of the by-phrase.

Background (O'Brien, Grolla, & Lillo-Martin, 2006)

Experiment 2

- seven 3-year-old children (mean age 3;4)
- Truth Value Judgment Task
- two conditions, presented to all participants
  - ➔ Condition 1: No extra character
  - ➔ Condition 2: Extra third character (agent/experiencer)

O'Brien et.al. - Results



O'Brien et.al. - Conclusion

- O'Brien et al. (2006) conclude that young children can understand the passive as long as the *by*-phrase is felicitously used.
- Nguyen & Snyder (2017) attempt to replicate O'Brien et.al.

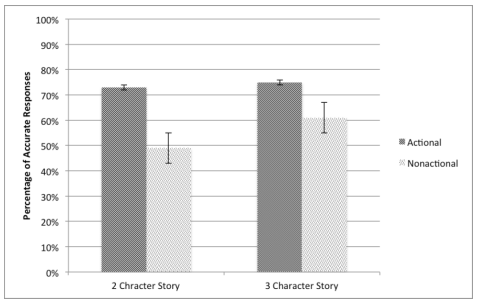
Background (Nguyen & Snyder 2017)

- 20 children (3;06-6;01, mean age = 4;06)
- TVJT replicating stimuli from O'Brien et al. (2006)
- Items: *chase*, *hug, see & like*
- *Condition 1: 2 character story*
- *Condition 2: 3 character story*

Results

- Children performed significantly better on actional verbs ($p = .0139$)
- Story type had no significant effect
  → *unable to replicate findings from O'Brien et al. (2006)*

Nguyen & Snyder - Results



This Study

Our goal was to address two seemingly distinct issues:

Research Goal 1: What is the cause of the discrepancy between O'Brien et.al. and Nguyen& Snyder? We refer to this as the Connecticut Gulf (CG)

→ We assumed the CG had something to do with methodological differences.

Research Goal 2: Can test the UFH and the IPH?

Method

- Used stories from O'Brien et.al.
- Used more non-actional verbs (taken partially from Maratsos et.al., 1985): anger, hate, remember, surprise, forget, understand, hear
- Our actional verbs: lift, cover, pull, push, chase
- Some verbs were used as control items (actives), and some were used as training items.

Method

- Hypothesized that the Connecticut Gulf was due to unnoticed methodological differences. Needed careful control of presentation of stories.
- Presented the stories in video format, pre-recorded
- This allowed for identical presentation across children and experiments

Method

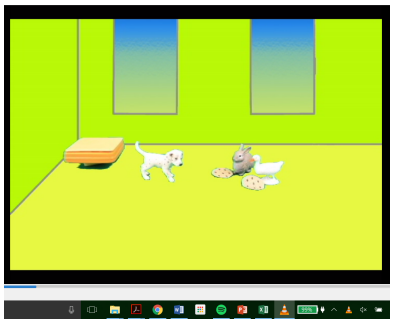
- Hypothesized that the Connecticut Gulf was due to unnoticed methodological differences. Needed careful control of presentation of stories.
- Presented the stories in video format, pre-recorded
- This allowed for identical presentation across children and experiments
- Also allowed precise manipulation of various factors
- Puppet was also on-screen
- Experimenter was live and elicited judgment and justification from child after each story and puppet test item.

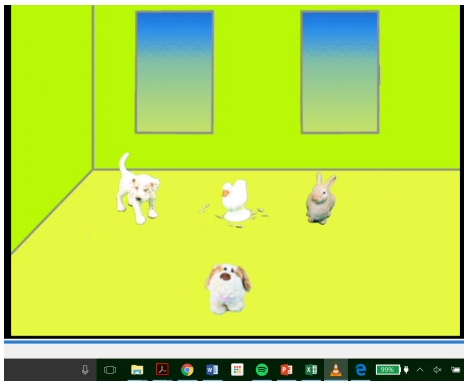
Method

Stimuli

- Stories were audio recorded by native speakers of English in child friendly voices
- Photographs were taken of the story board using toys and a green screen
- Voices were dubbed over the story line in Adobe Premiere
- Puppet voice was on screen with test sentence pre-recorded and presented automatically.

Method





Experiment 1: Baseline

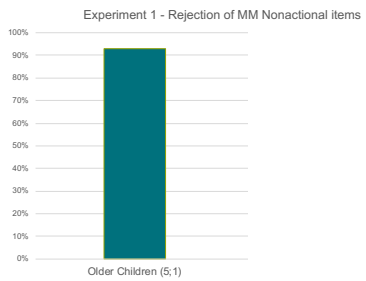
Participants
Older children: n=7, mean age 5;1 (4;8-5;8)
Younger children: n=9, mean age 4;1 (3;10-4;6)

Task
Video version of the Truth Value Judgment Task, modeling in O'Brien et.al.'s 3-character story.

Stimuli
- 3 training items
- 8 critical items
  - 4 actional verbs (surprise, anger, understand, remember) & 4 non-actional verbs (push, pull, cover chase)

Experiment 1: Results

TVJT results



Experiment 1: Discussion

- We found that older children are able to comprehend the 3-character stories very well (actional and non-actional)
- Younger children, on the other hand, had difficulty with non-actional passives.
- Replicates Nguyen & Snyder (2017).

- This *might* suggest that children are not able to comprehend non-actional passives at young ages (though we'll come back to this).
- This is as the UFH predicts.

Experiment 2: Topical Object

● In experiment 2, we changed the lead in to the test sentence such that the object is made topical.

Experiment 2: Topical Object

● Lead-in to Experiment 1 (Baseline):

Narrator: Hey Momo, can you tell us what happened in that story?

Puppet: That was a fun story about A, B and C. Let's see…in that story, <test sentence>

Experiment 2: Topical Object

● Lead-in to Experiment 1 (Baseline):

Narrator: Hey Momo, can you tell us what happened in that story?

Puppet: That was a fun story about A, B and C. Let's see…in that story, <test sentence>

● Lead-in to Experiment 2 (Topicality):

Narrator: Hey Momo, that was a fun story about A, B and C. They made such a mess with those crumbs, didn't they? (or some equivalent) And something interesting happened with A. Could you tell us what happened?

Puppet: Hmm…let's see…in that story…<A was verbed by B>

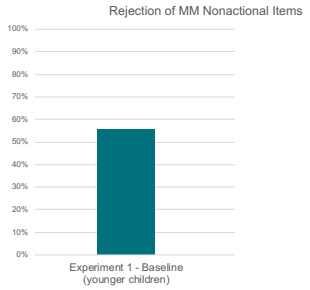
Experiment 2 (Topicality): Method

Participants
9 English-speaking children, mean age 3;11.17 (3;9-4;3)

All materials were identical to Experiment 1 except for the lead-in, as described earlier

Experiment 2 (Topicality): Results

TVJT results



Experiment 2 (Topicality): Discussion

● Consistent with the UFH

● Consistent with the IPH too

Experiment 2 (Topicality): Discussion

- Consistent with the UFH
- Consistent with the IPH too
- If object is topicalized in the lead-in, the child might expect it to be the subject of the test sentence. Thus expectations have been changed, thereby facilitating the processing of passive sentences.
- In the third experiment, we attempt to tease these two theories apart by introducing a novel manipulation: repeat the test sentence.

Experiment 3 (Repeated test sentence): Procedure

- We used the baseline lead-in (not the topicalized lead-in)
- We presented the first test sentence, followed by 1 second of silence, followed by the identical test sentence again.

Experiment 3 (Repeated test sentence): Rationale

- Repeating the test sentence may aid comprehension
- But will this work on passives?
- On the UFH story, repeating the test sentence should have no effect.
- Smuggling is not permissible, no matter how many times we repeat the passive test sentence.
- Expect no effect of repeated test sentence.

Experiment 3 (Repeated test sentence): Rationale

- But on the IPH, we do expect an effect of repeating the test sentence
- We hypothesized that a repeated test sentence should allow children to overcome expectations from the first test sentence.

Test sentence 1: `The girl was hugged by the boy
agent

Experiment 3 (Repeated test sentence): Rationale

- But on the IPH, we do expect an effect of repeating the test sentence
- We hypothesized that a repeated test sentence should allow children to overcome expectations from the first test sentence.

Test sentence 1: `The girl was hugged by the boy
agent ? Unable to reanalyze

Test Sentence 2: The girl was hugged by the boy
"can't be agent"

Experiment 3: Method

Participants
9 children, mean age 4;0 (3;8-4;6)

All materials were identical to Experiment 1 except the test sentence was repeated:

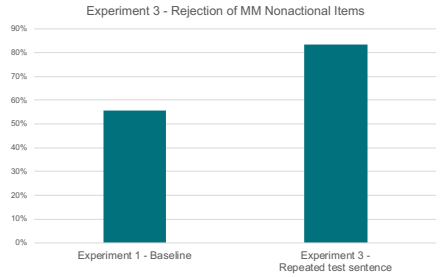
Example Lead-in + Repeated Test Sentence

Narrator: Hey Momo, can you tell us what happened in that story?
Momo: That was a fun story about A, B and C. Let's see…In that story,

→ Monkey was surprised by Elephant.
(1s pause)
Monkey was surprised by Elephant.

Experiment 3: Results

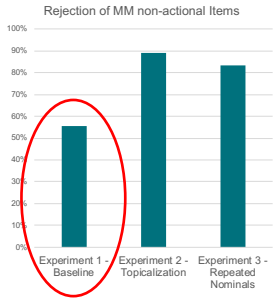
TVJT results



Summary of Results

Experiment 1 – Baseline Condition

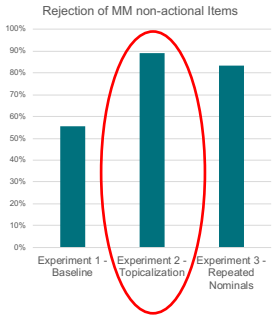
Children are at chance in rejecting mismatch non-actional passives.



Summary of Results

Experiment 2: Topicalized Condition

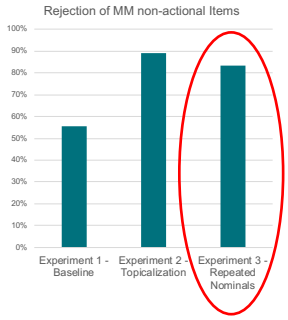
When the theme is topicalized in the lead-in, children reject mismatch non-actional passives at a rate of 89%.



Summary of Results

Experiment 3: Repeated Test Sentence

When the test sentence is repeated, children correctly reject non-actional mismatch items at 83%.



Experiment 3 (Repeated test sentence): Discussion

Why does the repeated test sentence result in improved accuracy?

- Not a deficit in competence
- A grammatical account of failure on the passive does not predict any improvement in comprehension of the passive.
- If smuggling is not permitted, it's just not permitted, no matter how many times you hear a test sentence.
- IPH accounts for this nicely.

Summary and Discussion

- We tried and failed to replicate O'Brien et.al.(2006), suggesting that the felicity of the long passive sentence (using the 3-character story) by itself does not address the obvious difficulty that children face with passive sentences.
- We showed that topicalizing does indeed alleviate the difficulty children face with the passive voice.
- We showed that when the test sentence is repeated, children do significantly better with the passive. (note: between-subjects design…)
- Conclude that the difficulty with the passive cannot be due to a divergence of the child grammar from the adult grammar.
- Rather, child grammar is maximally continuous with adult grammar, but parsing and expectations interfere with the expression of that grammar.

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

Sesotho passives are much more frequent than in English – 6% compared to 0.29%. Expectations are set by frequency.

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

Topicalized / Wh-questioned objects change expectations of the first nominal

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

Topicalized objects reduce expectation that first nominal is the agent

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

In priming, children get primed with a theme-verb-agent pattern, and this reduces the preference for assigning the first nominal of the next sentence the agent theta role

Sometimes, children can do the passive

- There is a growing body of literature that shows that children can (sometimes) succeed on passives
  - Demuth (1989) & Demuth, Moloi & Machobane (2010)
    - Picture selection; naturalistic data; elicited production; novel verb production
  - Crain, Thornton & Murasugi (2009)
    - Elicited Production
  - Pinker, Lebeaux & Frost (1987)
    - Elicited Production
  - Messenger, Branigan & McLean (2011)
    - Priming
  - O'Brien, Grolla & Lillo-Martin (2006)
    - Truth Value Judgment

We don't have an explanation of why O'Brien et.al. found a result while Nguyen & Snyder didn't. But we do have some hunches.

Micro-variation in interaction, presentation style, prosodic emphasis, etc.

References

Crain, Stephen, Thornton, Rosalind & Murasugi, Keiko. 2009. Capturing the evasive passive. *Language Acquisition* 16(2): 123-133.

Demuth, K., Moloi, F, Machobane M. (2010). 3-Year-olds' comprehension, production, and generalization of Sesotho passives. *Cognition*, 115(2):238-51. doi: 10.1016/j.cognition.2009.12.015.

Huang, Y. T., Zheng, X., Meng, X., & Snedeker, J. (2013). Children's assignment of grammatical roles in the online processing of Mandarin passive sentences. *Journal of memory and language, 69*(4), 589-606.

Messenger, K., Branigan, H., McLean, G (2011). Evidence for (shared) abstract structure underlying children's short and full passives. Cognition, 121(2):268-74. doi: 10.1016/j.cognition.2011.07.003.

Nguyen, E. & Snyder, W. (2017). The (non)-effects of pragmatics on children's passives. In M. LaMendola & J. Scott (Eds.), *The Proceedings of the 41st Annual Boston Conference on Language Development* (pp. 441-451). Somerville, MA: Cascadilla Press.

Pinker, Steven, LeBeaux, David S. & Frost, Loren Ann (1987). Productivity and constraints in the acquisition of the passive. *Cognition* 26:195-267.

O'Brien, K., Grolla, E., & Lillo-Martin, D. (2006). Long passives are understood by young children. In D. Bammam, T. Magnitskaia, & C. Zaller (Eds.), *The Proceedings of the 30rd Annual Boston Conference on Language Development* (pp. 441-451). Somerville, MA: Cascadilla Press.

Snyder, W. & N.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.]

Thanks

- Children and administrators of the University of Hawaii Children's Center
- Elaine Lau for discussion of these ideas
- William Snyder for materials used in Nguyen & Snyder
- Department of Linguistics at the University of Hawaii for student conference funding