Acquisition of exhaustification: Two case studies in 'only'

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Core-to-core project meeting

March 17, 2023

Outline

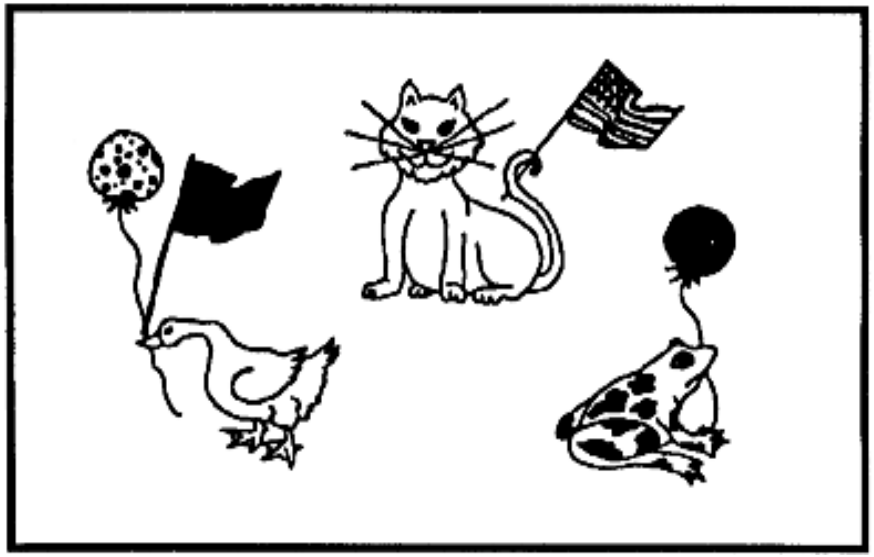
1. Background
2. Situation on face-to-face experiments
3. Case study 1: Manipulation on context
4. Case study 2: Ditransitive
5. Discussion

Objectives

- To investigate Japanese-speaking children's understanding of sentences with focus sensitive operators (*only*-equivalent: "*dake*" "*shika…nai*")
  - Specifically, knowledge of *Subject-only*

- To analyze these terms ("*dake*" "*shika…nai*") from the perspectives of syntax, semantics and pragmatics

Acquisition of sentences with *only*



Crain, Ni & Conway (1994)

Only the cat is holding a flag.

Majority of children interpret this as 'The cat is only holding a flag.'

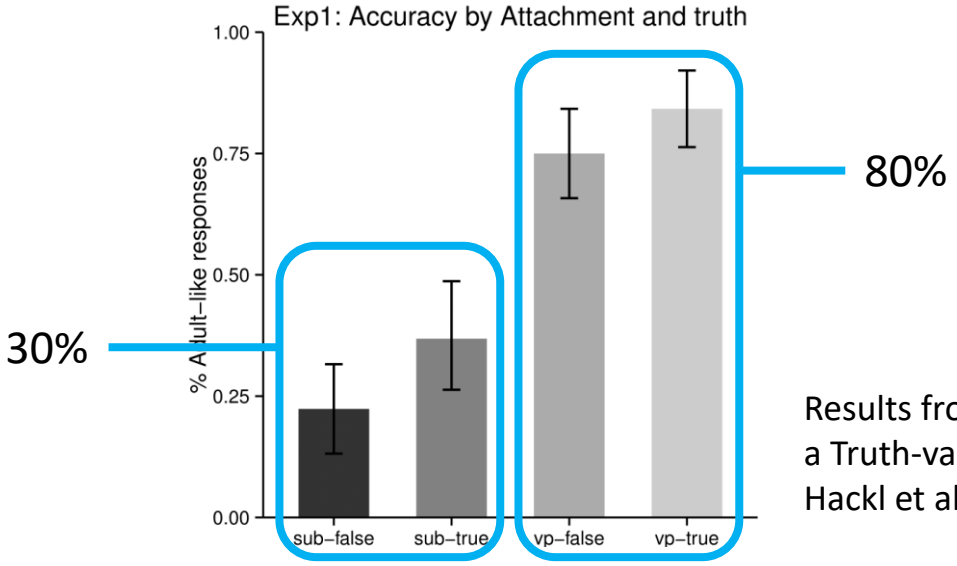
→ Previous studies have observed children's puzzling behavior

Previous studies

- Crain et al. (1994) and others (incl. Eng, Chinese, Japanese, German)
  - Children's non-adult-like behavior
    - "Subject-only" … difficult (interpret as if it were VP-only)
    - "VP-only" … easy

Subject-only
"Only the cat is holding a flag."

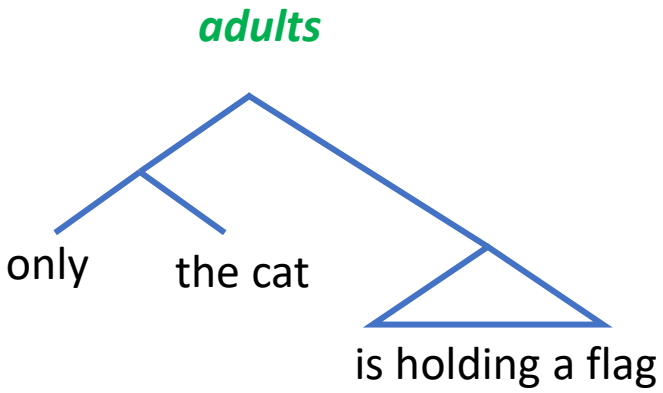
VP-only
"The cat is only holding a flag."

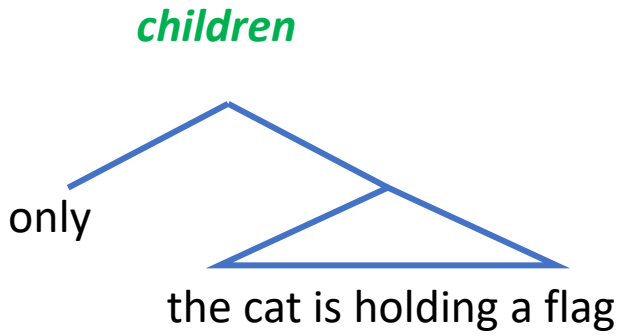


Results from English-speaking children on a Truth-value judgment task
Hackl et al. 2015, Sugawara 2016

Previous studies

- Why?
  - "Subject-only serves as if it were a sentential adverb in child grammar" (Crain et al. 1994, Notley et al. 2009)





Our project:
- If "only" really attaches at the sentential level, is it equally biased to modify the indirect object and the direct object? (Case study 2)

Previous studies (ctnd.)

Hackl, Sugawara & Wexler (2015), Sugawara (2016)

- Manipulation on context – Question Answer Congruence (Rooth 1992)

	Who-question	What-question
Subj-*only*	***Congruent*** Kermit, can you tell me who got ice cream? Only the cat got ice cream.	***Incongruent*** Kermit, can you tell me what the cat got? Only the cat got ice cream.
VP-*only*	***Incongruent*** Kermit, can you tell me who got ice cream? The cat only got ice cream.	***Congruent*** Kermit, can you tell me what the cat got? The cat only got ice cream.

- Truth is defined in terms of adult responses to the *only*-sentences
- Truth is counter-balanced by the attachment site of *only*

Previous studies (ctnd.)

- They divided the experiment into two between-subject experiments.
- How?
  - Divide by the sub-question type, or by the attachment of *only*

Exp. 2A

	Who	What
Subj-*only*	Congruent	Incongruent
VP-*only*	Incongruent	Congruent

Exp. 2B

	Who	What
Subj-*only*	Congruent	Incongruent
VP-*only*	Incongruent	Congruent

Each participant saw…
- 4 Subj-*only*, 4 VP-*only*, 4 fillers
- All *who*-Q OR all *what*-Q
  (pseudo-randomized, 2 different orders)

Each participant saw…
- 4 *who*-Q, 4 *what*-Q, 4 fillers
- All Subj-*only* OR all VP-*only*
  (pseudo-randomized, 2 different orders)

SKIP

Previous studies (ctnd.)

Exp. 2A

	Who	What
Subj-*only*	Congruent	Incongruent
VP-*only*	Incongruent	Congruent

Exp. 2B

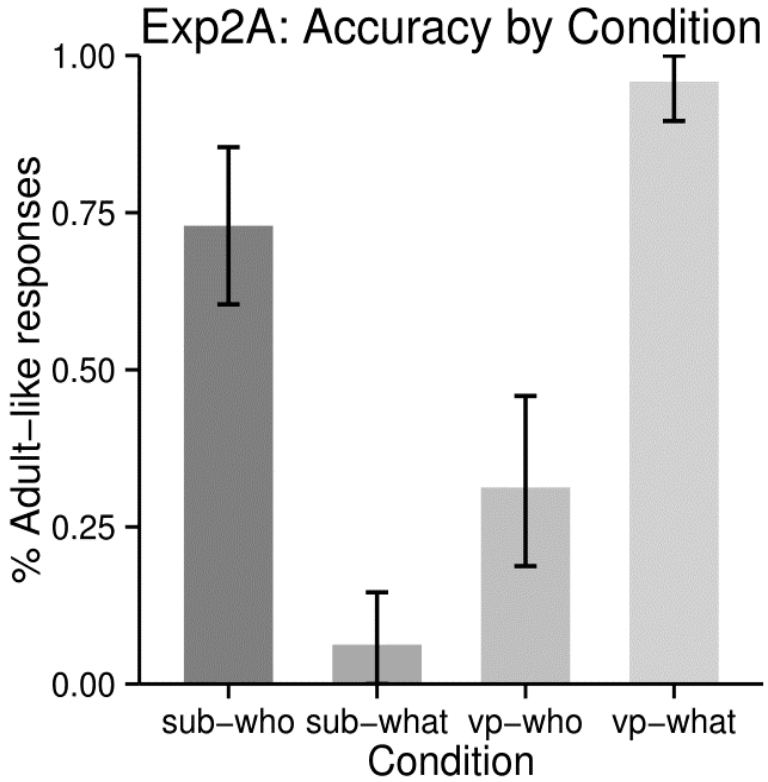
	Who	What
Subj-*only*	Congruent	Incongruent
VP-*only*	Incongruent	Congruent

The question cue is constant.
→ Strategy to align focus with answer term is facilitated

The attachment site is constant.
→ Strategy to align focus with its associate is facilitated

- The idea behind the design: the constant cues will provide a stronger cue for determining the location of F

Experiment 2A (Q-type is constant)



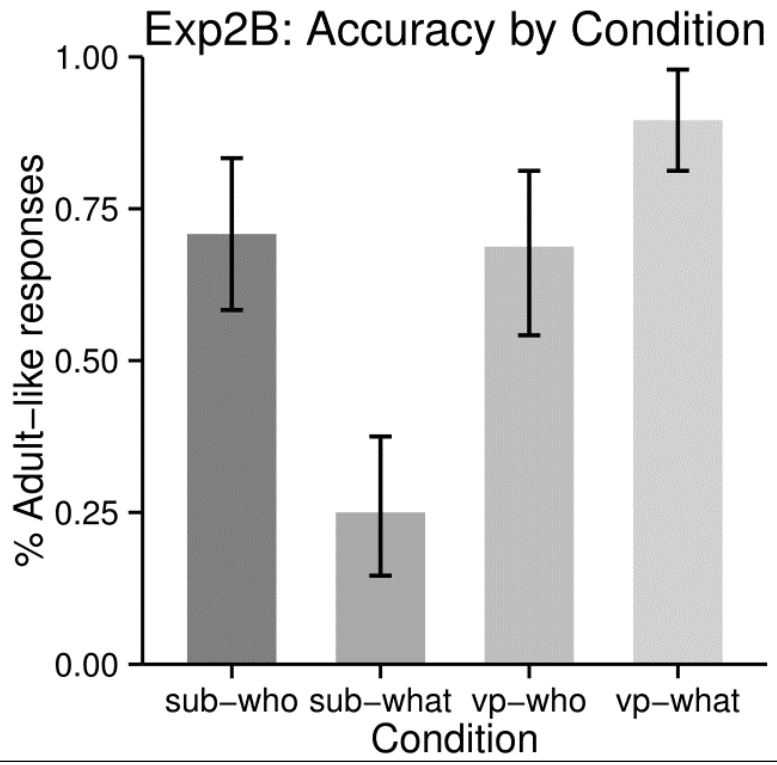
- 72.9%, 6.3%, 31.3%, 95.8% (L to R)
- Analysis uses GLMEM*
- Main effect of attachment site ($p < .01$)
- Main effect of question type ($p < .01$)
- **Interaction ($p < .001$)**

Behavior towards incongruent cases is systematic. The children interpreted the sentences as if they had *only* attached to the **opposite** attachment site.

*Maximally specified model did not converge; the order of presentation was investigated only for a potential main effect.

```
# (Intercept)              -11.7469     5.4265  -2.165 0.030408 *
# attachmentvp              21.6620     8.3379   2.598 0.009377 **
# qTypewho                  18.3089     5.7522   3.183 0.001458 **
# order2                    -1.1454     0.8691  -1.318 0.187545
# attachmentvp:qTypewho    -30.5889     8.9078  -3.434 0.000595 ***
```

Experiment 2B (Attachment is constant)



- 70.8%, 25%, 68.8%, 89.6% (L to R)
- Analysis uses maximally specified GLMEM
- Main effect of attachment site ($p < .01$)
- Main effect of question type ($p < .01$)
- **Interaction ($p < .001$)**

```
#                          Estimate Std. Error z value Pr(>|z|)
# (Intercept)               -1.1318     0.6419  -1.763 0.077872 .
# attachmentvp               3.5516     1.0658   3.332 0.000861 ***
# qTypewho                   1.9927     0.7085   2.812 0.004916 **
# order2                    -0.4896     1.0126  -0.483 0.628771
# attachmentvp:qTypewho     -4.0246     1.1401  -3.530 0.000416 ***
```

*Maximally specified model converged; interactions with the order of presentation was not detected.

Previous studies (ctnd.)

- Summary of Hackl et al. (2015)
  - Context manipulation by **overtly** asking a sub-question (who-Q or what-Q)
  - Congruent Q and A pair led to **improvement in *Subj-only***
  - → Children do have the knowledge of *Subj-only*
  - → What they are yet to learn (in typical, baseline-experiments) is the pragmatic skills to accommodate the appropriate sub-question when the congruency is not guaranteed

Our project:

- If the context is introduced in such a way that a who-Q is **implicitly** assumed, do children understand *Subj-only* better than otherwise? (Case study 1)

Situation on face-to-face experiments

Coronavirus situation?

- In 2020-2021: No entry of outside people!
- In summer of 2022:
  - Public/open space

    - Parents bring children to the venue
    - Consent on site, kids join the experiments
    - Parents can observe what is going on

  - → Conference room in neighborhood

    - Compensation (1,000 yen / 1 hour)
    - Recruiting by distributing advertisement to neighborhood
    - Promote on website w/ pictures

Website

AcqLab: 菅原彩加研究室 - 早稲田大学理工学術院

実験の予約は「メニュー」→「イベント・実験予約」のページからお願いします。

- トップページ
- プロフィール
- お知らせ
- スタッフ紹介
- カレンダー
- イベント・実験予約
- フォトギャラリー

スタッフ紹介

すがわら　あやか　先生

＜ひとことメッセージ＞
言語学のほかは、最近はじめたゴルフ⛳にはまっていま

りさ

＜ひとことメッセージ＞
歳の離れた三人姉妹の長
笑顔いっぱいでお待ちし

まさる

＜９月＞実験の様子🟡🐄















Conference room

Advertising flyer

ことばゲームに参加しませんか？

「子どもの言語獲得」に関する研究にご協力ください！

シティタワー大井町居住者でもある私
菅原とアシスタントの学生が実施します

お子さんには、小さな人形を使ったお話や、
パソコンの画面でのお話を聞いていただき、
ゲームに参加していただきます

実施日時：
2022 年　8 月 19 日(金)
8 月 28 日(日)・29 日(月)

実施場所：シティタワー大井町 1 階集会室

対象年齢：４歳～６歳の日本語を母語とする幼児（学年は問いません。４歳０か月から６歳 11 か月までご参加いただけます。シティタワー大井町居住者の皆様に限らせていただきます。）

謝礼：1,000 円分の図書カード

10:00～14:50 の間の 50 分間

（下の QR コード「イベント・実験予約」より
"10:00～10:50" などご都合の良い時間帯を
お選びになり、お申込み下さい）

※ 各時間帯、定員になり次第受付終了となります。
※ ５０分ほどの中で、３つのゲームをスタンプラリー形式で回っていただきます。万が一、途中でつかれてしまった場合には、１つのゲームだけの参加も可能です。
※ １つの時間帯におおむね３名まで一緒に参加していただけます。居住者のお友達をお誘いの上でのご参加も大歓迎です！

新型コロナウイルス対策のため、「研究参加者の方への説明文書」に前もって目を通していただくよう、お願い申し上げます。
参加同意書は当方で当日ご用意いたします。口頭での説明の簡略化にご協力いただけますと幸いです。このチラシの裏面に、より詳しい研究内容および研究者の連絡先の記載がございます。ご興味がありましたらご覧ください。

「イベント・実験予約」
はこちらから →

HP: https://r.goope.jp/kotobawaseda

保護者の皆様へ

こんにちは！早稲田大学理工学術院准教授の菅原彩加と申します。

今回は、住友不動産建物サービス様のご厚意で、表面に記載の日時にシティタワー大井町 1 階集会室を使用して「子どもの言語獲得」に関する研究をさせていただくことになりました。コロナ禍でなかなか幼稚園・保育園での対面実験がかなわない中、居住者に限った実験実施であれば保護者の皆様も安心してご参加いただけるのではないかと、今回の実験実施の運びとなりました。

私はアメリカで大学院生をしていた頃より、「子どもたちはどのように母国語を獲得し発達させていくのか？」という問いに答えるための研究をしています。研究、というと堅苦しいイメージがあるかもしれませんが、子どもたちが喜んで参加してくれるようゲームのように設定されています。アメリカの保育園や日本の幼稚園・保育園での実験の際には、次から次へと子どもたちが自発的に参加してくれています。参加は必須ではなく、保護者様の同意書をいただいている子で、やりたい！と言ってくれた場合のみの参加です。ぜひともご協力をお願いいたします。

●どういう手順の実験なの？

「真偽値判断課題(Truth-value judgment task)」または「絵選択タスク(Picture-selection task)」または「発話課題(Elicitation task)」と呼ばれる実験を予定しています。

真偽値判断課題は、名前だけ見ると難しそうですが、パソコン上の絵や小さい人形を使って短い「お話」を見せたあと、ぬいぐるみが「今のお話では、○○だったよ」と言うので、発言が合っているか間違っているかを子どもたちに決めてもらうというゲームです。

絵選択タスクは、パソコンの画面で短い「お話」を見せたあと、画面に４つの絵が現れます。あらかじめ録音しておいた音声で文が流れるので、どの絵が文に合っているかを選んでもらうというゲームです。

発話課題は、パソコンの画面や人形を使って短い「お話」を見せたあと、実験者またはぬいぐるみが子どもに質問をします。その質問に対して答えてもらうという課題です。１回の実験は 10～15 分くらいで、子どもたちは途中でやめたくなればいつでもやめることができます。

子どもの発言や答えを出すまでの時間なども研究の対象であるため、その場での記録には限界があり、後で書きおこしができるよう音声のみ録音させていただいております。録画はいたしません。データの書きおこしを行った後のデータは適切に廃棄し、記録は残りません。

●実際には何を調べているの？

予定している実験はいくつか種類がありますが、そのうちの一つの説明をさせていただきます。

例えば、寝ているパンダばかりがいることで有名な動物園に行くことになったとします。その日も評判どおりほとんどのパンダが寝ていました。しかしなんと一頭だけ元気に愛嬌を振りまいていました。そしてあなたは帰ってきてお友達にこう言いました。「パンダみんなは寝てなかったよ！」

そして起きているパンダがいるなら、とお友達が動物園に行くと、その日はなぜか、他の動物たちと同様、パンダはみんな元気に起きて愛嬌を振りまいていました。そこで帰ってきてお友達はこう言いました。「パンダみんなは寝てなかったよ！」

私たちはこのような同じ文なのに違う意味に取れる文(注意深く発話してみると、最初の文は「みんな」が高くあとは平坦に読まれ、二番目の文では「みんな」に高さは置かれず、「寝てなかった」で高さが加わります。)について、年齢により習得の度合いが違うのかや、他の構造の習得との相関があるかについて研究しています。

●実験の目的は何？

研究の目的は個々の言語能力を測るテストのようなものではなく、子どもたちがいずれ習得する、(大人が話す)日本語との違いを見つけることで今の言語学理論への貢献を目指すものです。

実験データは個人が特定されないよう暗号化されて保存され、子どもたちのデータ全体の傾向を統計的に処理し、大人の文法と比較する分析方法が取られます。ですので、「うちの子がテストされて間違えたら恥ずかしい」などのご心配はいりません。また、実験データは将来、言葉の発達に障がいのある子どもを助けるプログラムを作る際に使用されることがあります。

言語獲得の研究は、保護者の皆様のご協力の下に成り立っています。皆様のご協力に心より感謝申し上げます。

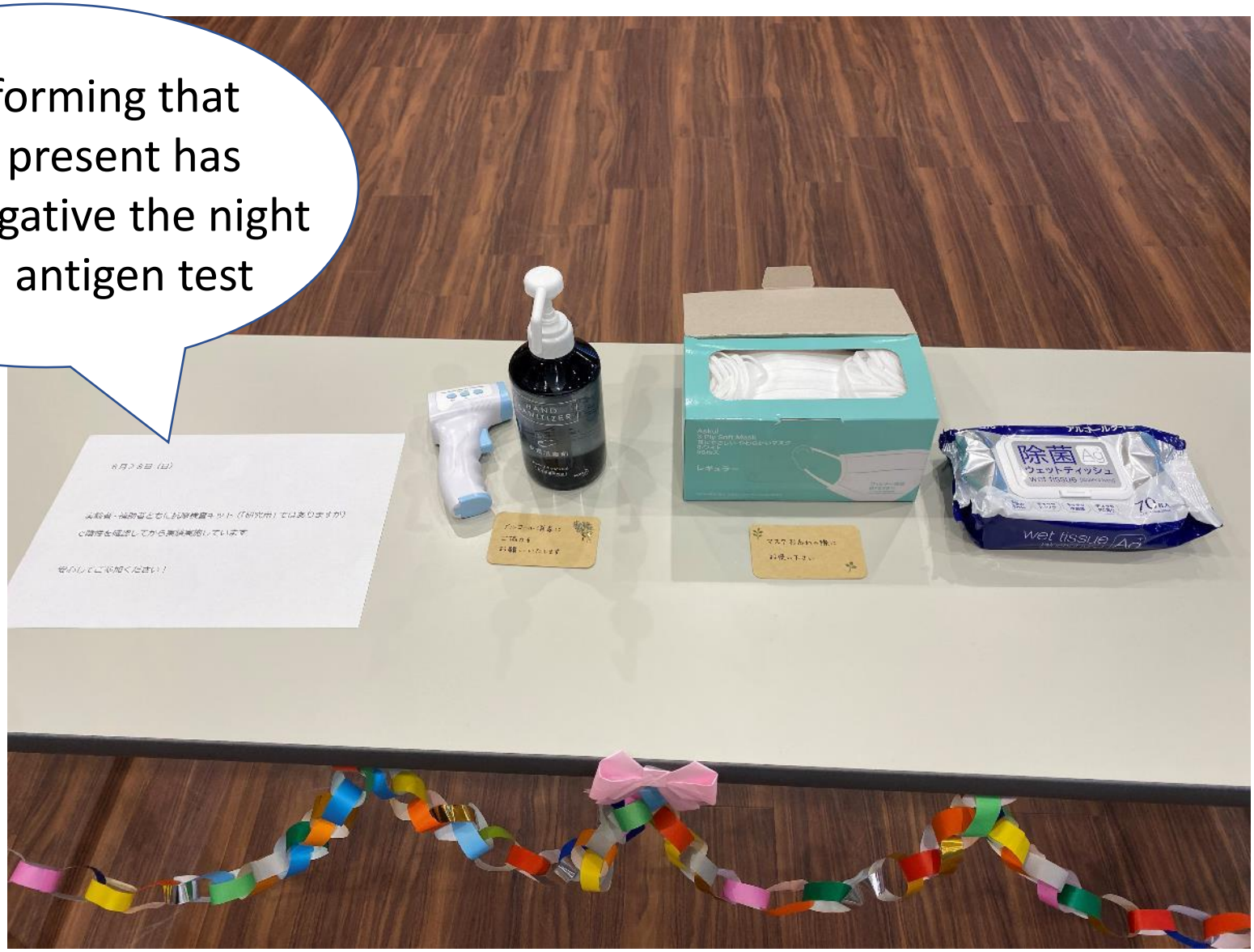
ご質問がございましたら、以下までお問い合わせください。

■菅原彩加 (ayakasug@waseda.jp)
ことば教室およびことばゲームに関するお問い合わせは
kotobawaseda@gmail.com まで
早稲田大学理工学術院　准教授
マサチューセッツ工科大学博士課程修了　博士(言語学)
(連絡先) 03-5286-3519
080-4716-9568

Decoration in the room!

Measures against coronavirus

Notice informing that everyone present has tested negative the night before on antigen test



Measures against coronavirus

- How does a session last for an hour (to give compensation to parents)?

Kids get a medal which has 3 empty slots – once they complete an experiment, they get a sticker. They are eager to complete the three tasks.

Sticker with popular characters with encouraging words e.g. “Good job!”

- TVJT is much easier face-to-face

- Act-out tasks can also be implemented

- PVT-R (Japanese version of PPVT)

Coronavirus situation at daycares?

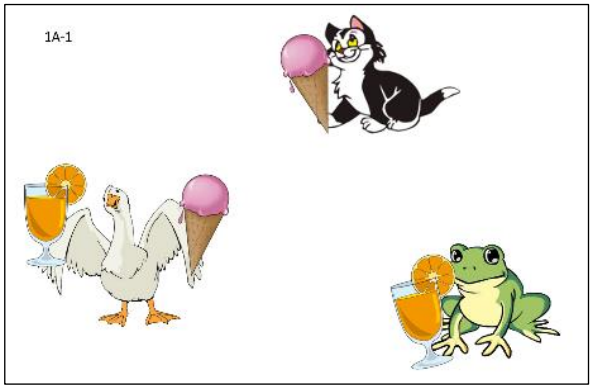
- Starting from fall/winter of 2022
- After running the “conference room”-experiment events several times (we have evidence that we safely conduct f2f experiments), I contacted daycares for possible visits
  - One daycare agreed to our visit in November 2022
  - Another daycare agreed in February 2023
  - Another daycare (at Osaka U) …
- We only have limited number of data, but # is growing!

Case 1:
Manipulation on context

(This experiment was started as a part of my KAKENHI 19K13221 project. I owe Core-to-Core members for brainstorming and discussing ideas) (This experiment was started as a part of my KAKENHI 19K13221 project. I owe Core-to-Core members for brainstorming and discussing ideas)

Manipulation on “sorting key”/ “sortal key” (Kuno 1982)

- Broad question broken down into a set of object-questions (Subject as a sorting key)



What is happening in the picture?

[Question about the cat]
What is the cat holding?

Is the cat holding ice cream? Is the cat holding juice? …

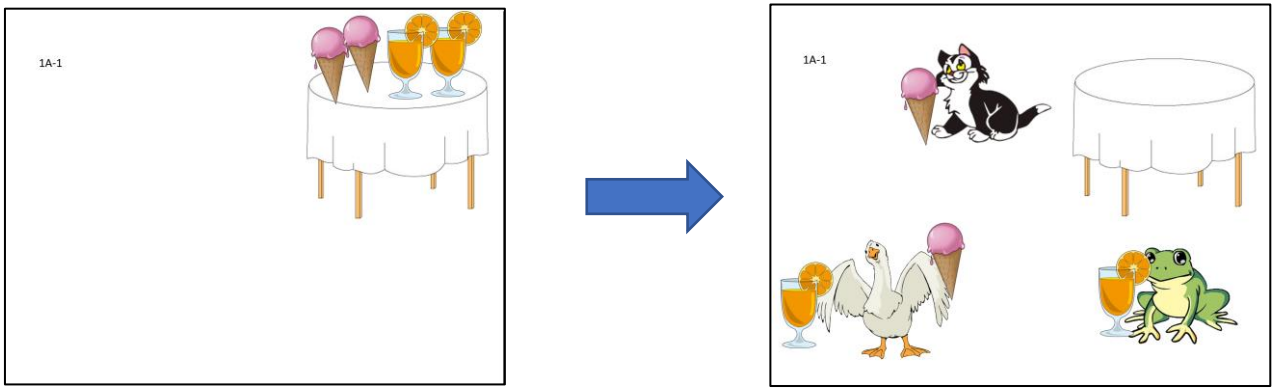
[Question about the goose]
What is the goose holding?

…

For the notion of D-tree, see Roberts’ (1996/2012) QUD stack and Büring (2003). See Sugawara (2016) for details

Manipulation on “sorting key”/ “sortal key” (Kuno 1982)

- Broad question broken down into a set of subject-questions (**Object** as a sorting key)



What is happening in the picture?

Subj-Q is implicitly assumed

[Question about ice cream]
Who is holding ice cream?

[Question about juice]
Who is holding juice? …

Is the cat holding ice cream? Is the goose holding ice cream? …

Experiment

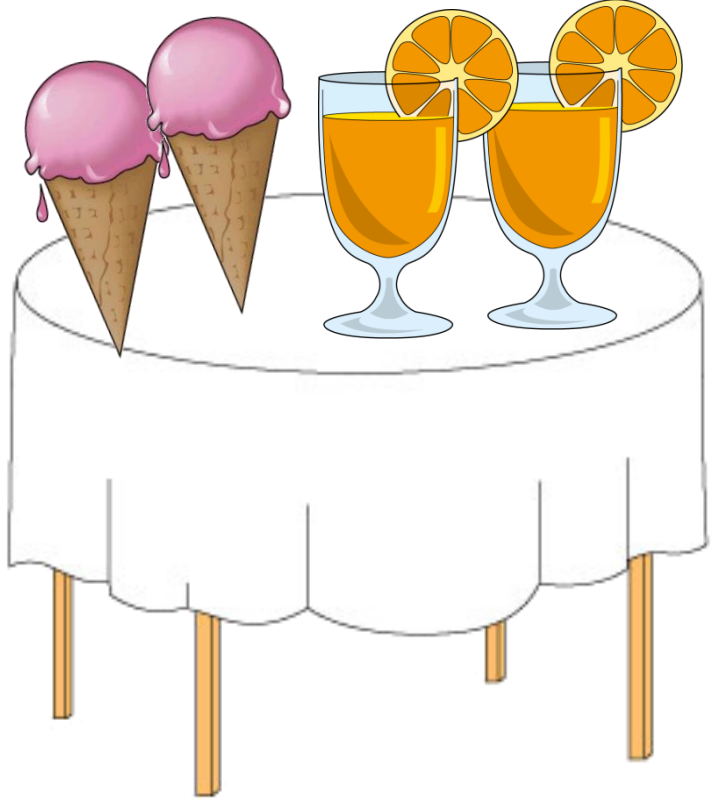
- Participants (J-speaking children, pre- & post-corona)
  - Baseline-dake: N=12 (4;0-6;8, M=5;5)
  - Baseline-sika: N=11 (4;1-6;7, M=5;7)
  - ObjSort-dake: N=15 (4;2-6;7, M=5;8)
  - ObjSort-sika: N=12 (4;6-6;11, M=5;7)

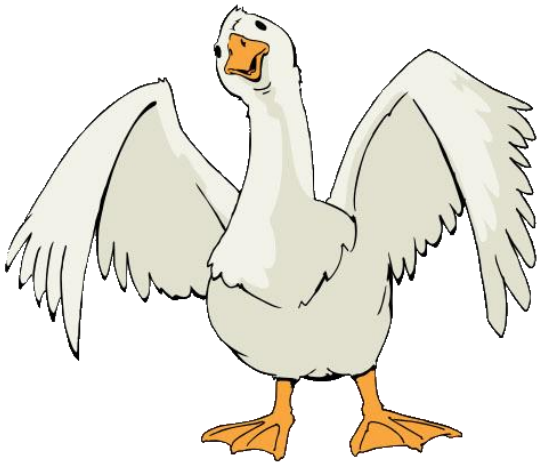
  } Most of them: pre-corona

  } All of them: post-corona

- Design
  - Food items are introduced first → Animals come in.
  - "Who are these ice creams flying to? Look, ice creams went to the cat and the goose!"
  - 4 Subj-only, 4 Obj-only, 4 fillers. Pseudo-randomized.

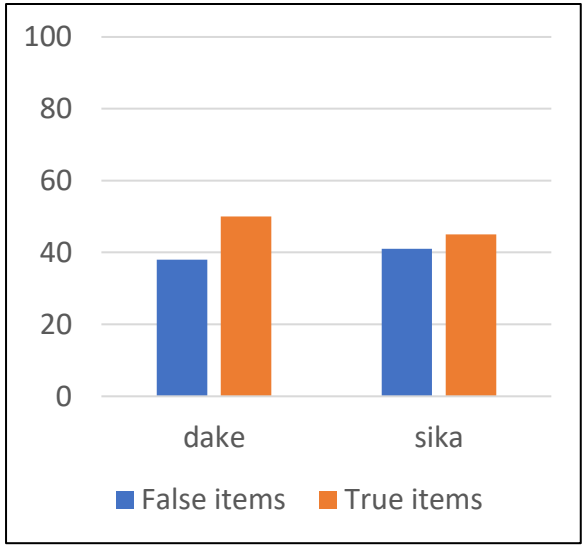
1A-1

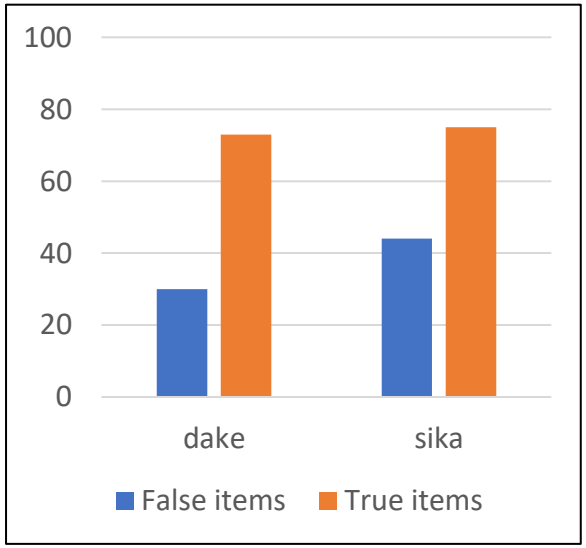




Experiment - Results

- Baseline
  - Dake F: 38%
    T: 50%
  - Sika F: 41%
    T: 45%
- Object as Sorting key
  - Dake F: 30%
    T: **73%**
  - Sika F: 44%
    T: **75%**





Discussion??

- They are not “yes-sayers.”
  - They have rejected false items on fillers.
- Experimental design is minimally different from Baseline.
  - It is unlikely that they got confused by complexity
- Could we say they got (at least a bit) better in understanding *Subj-only* sentences?
  - Maybe. Context manipulation might have made *Subj-only* sentences understood slightly easier (?).
- They are generally good at their **first** *Subj-only* item.
  - [Baseline] first *subj-only* accuracy: 40% (dake), 60% (sika)
  - [ObjSort] first *subj-only* accuracy: 78% (dake), 100% (sika)

  ➔ Accessing an Obj-only item might prime the interpretation?

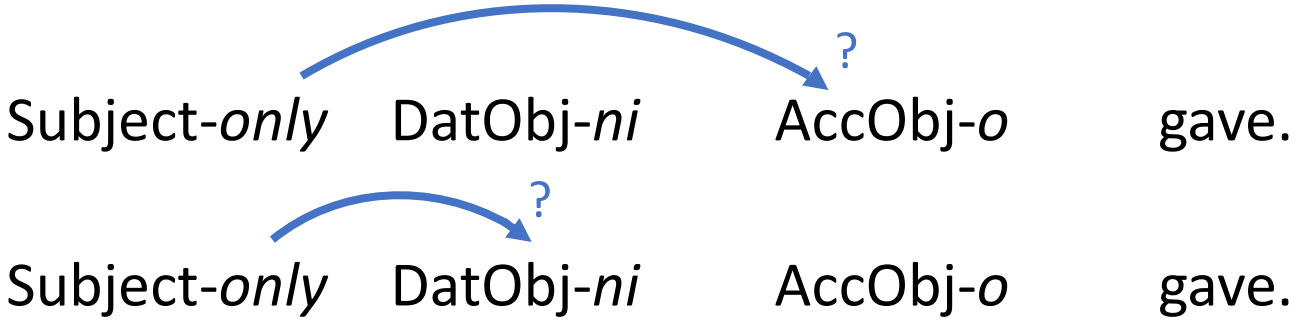
Case 2:
Ditransitive sentences

(This project was initiated in the Core-to-Core program.
The project is in its pilot phase.)

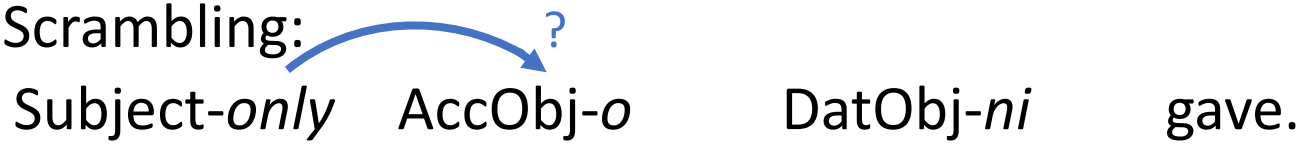
Recap…

Structural approach

Q: Do we observe the "reassigning focus from subject to object" in **ditransitive sentences** as well?



w/ Scrambling:



Planned experiments in this project

[A] Dative object constant

(1)	Subject-*only-ga*		AccObj-*o*	gave.
(2)	Subject-*only-ga*	DatObj-*ni*	AccObj-*o*	gave.
(3)	Subject-*only-ga*	AccObj-*o*	DatObj-*ni*	gave.

[B] Subject constant

(1)	Subject-*ga*	DatObj-only-*ni*	AccObj-*o*	gave.
(2)	Subject-*ga*	AccObj-*o*	DatObj-*only-ni*	gave.

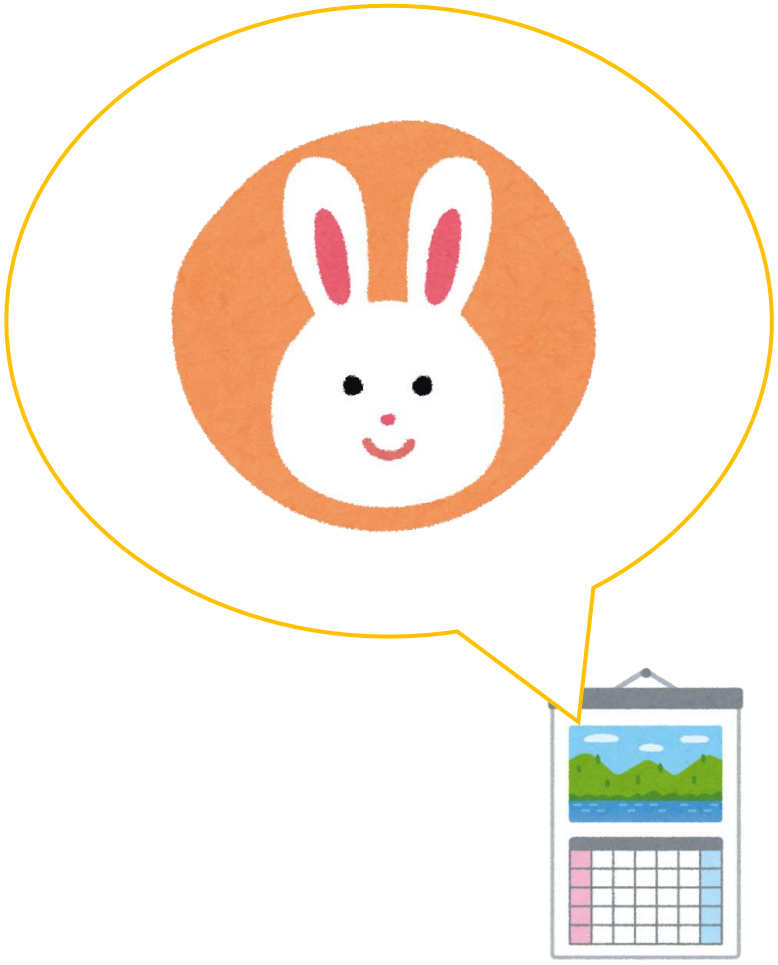
[C] Accusative object constant

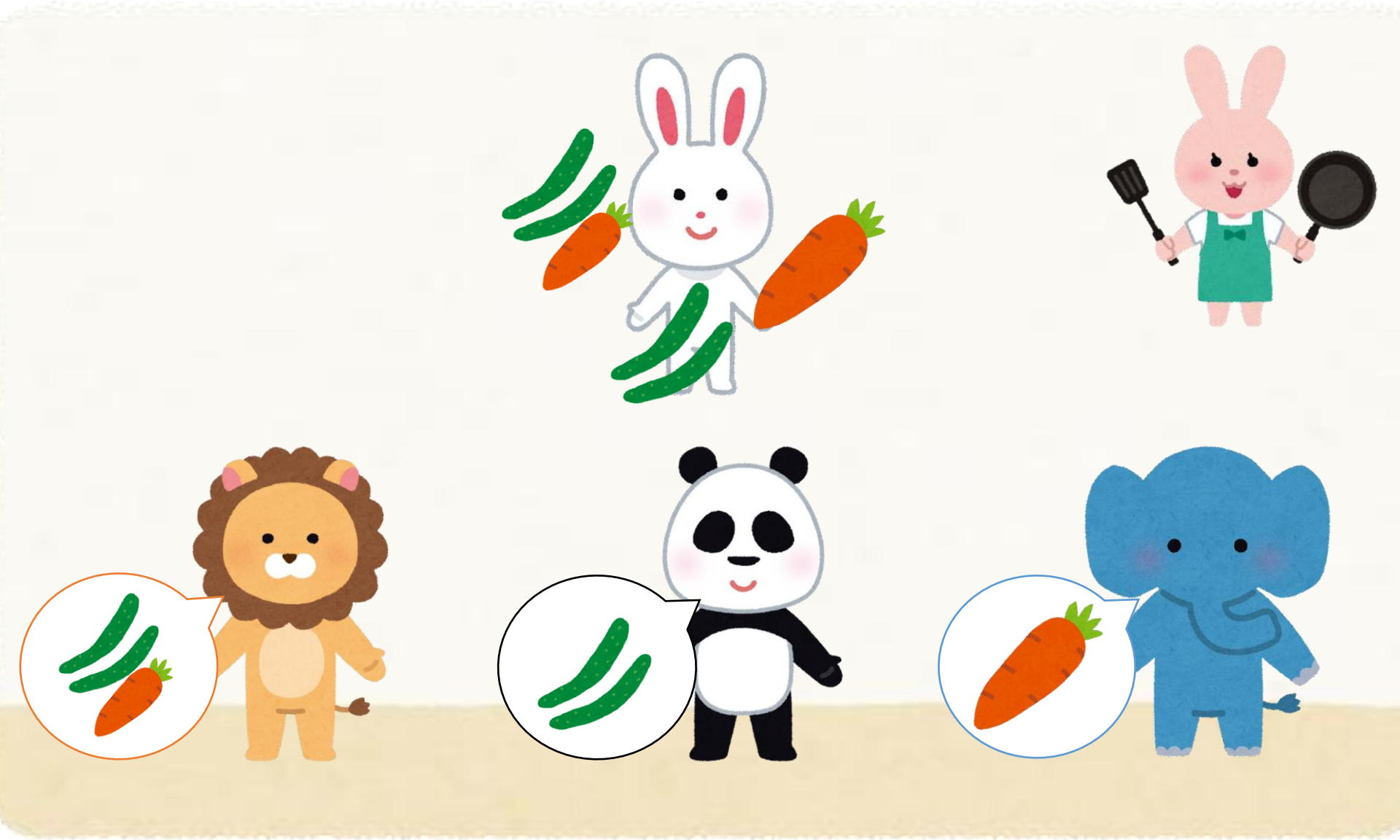
(1)	Subject-*only-ga*	DatObj-*ni*	AccObj-*o*	gave.
(2)	Subject-*only-ga*	AccObj-*o*	DatObj-*ni*	gave.

[D] (variation of [B])

(1)	Subject-*ga*	DatObj-*ni-only*	AccObj-*o*	gave.
(2)	Subject-*ga*	AccObj-*o*	DatObj-*ni-only*	gave.

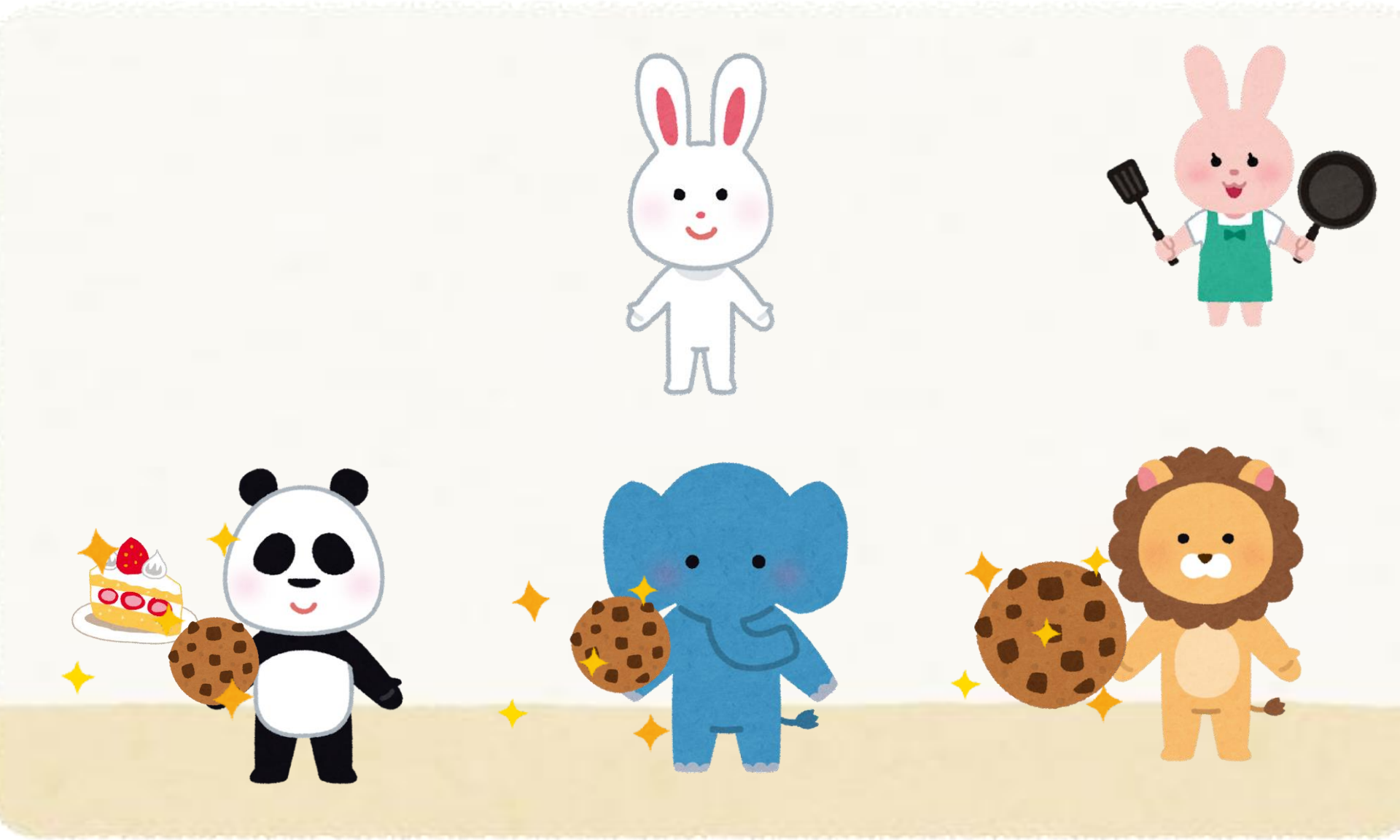
A-1





[Target] Only [the elephant]$_F$ gave the rabbit a carrot. (F)

B-1



[Target] The rabbit only gave [the panda]$_F$ a cake. (T)

Pilot experiment 1 - predictions

[A] Dative object constant

(1) Subject-*only*-*ga* DirObj-*o* gave.

Exhaustive bias to AccObj?

(2) Subject-*only*-*ga* IndirObj-*ni* DirObj-*o* gave.

If less bias → Intervention?

(3) Subject-*only*-*ga* DirObj-*o* IndirObj-*ni* gave.

If intervention → more bias?

◆ We're reporting the pilot results.

Pilot experiment 2 - predictions

[B] Subject constant

(1) Subject-*ga* IndirObj-only-*ni* DirObj-*o* gave.

Any misinterpretation as "AccObj-only"?

(2) Subject-*ga* DirObj-*o* IndirObj-*only-ni* gave.

If linear order matters → Less errors?

◆ We're reporting the pilot results.

Pilot experiment & Results

- Participants (J-speaking children, post-corona)
  - N=14 (5;10-6;9, M=6;5)
  - … plus several 5 y.o. whose data are not analyzed yet

Note: relatively old!

- Design
  - [*Subj-only* → *IndirO-only*] x 3 or 4 stories (i.e. 6 or 8 trials)
  - No fillers
    - 12-18 mins per session.
  - Pseudo-randomized. Two lists alternated.
    - S-ga **IndirO-only-ni** DirO-o: N=7 (M=6;6)
    - S-ga DirO-o **IndirO-only-ni**: N=7 (M=6;4)

Accuracy: 73%

Accuracy: 61%

Observations and notes

- There was one child who assigned “sentential only”, wherever ‘only’ attaches.
  - Justification: “No, because A got X, B got Y, and C got X and Y. It’s not just C got Y.”
- Unusually high number of yes-sayers (esp. in 5 y.o. whose data are yet to be entered).
  - Unusually high number of children were distracted by the cuteness (?) of Mr. Parrot during the session
  - The stories might be too complex?
  - There were two experiments going on in the same room. They felt competitive? (“I finished earlier than the other kid!”)
- Overall, a careful look at existing data is needed. After some revision, we will resume the experiment!

Thank you!

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