Set up:

* Human communication is smooth.
* Anaphora is used for efficiency in smooth communication, e.g. avoid repetition, while still conveying information that the other person in a dyadic social interaction needs to comprehend.
  + Gricean maxim of quantity: "Make your contribution as informative as is required (for the current purposes of the exchange), but do not make your contribution more informative than is required"
  + Gricean maxim of manner: be brief
  + One important point here: speakers won't provide information they assume listeners can derive or infer from how they say things, the discourse and dialogue context as well as the task and environmental context
* anaphora is widely used in everyday adult-to-adult conversation.
* Little is known when we start to use it. Whether its usage starts even early on during parent-child interaction (when a developed adult talks to a developing child who doesn't have a full language capacity, and who may or may not be able to infer the referent used in anaphora). if the child cannot understand the referential intent of the parent, using anaphora would hurt parent-child communication. However, if the child can understand it, then it would make parent-child interaction more efficient and more adult like.
  + *We don’t know when parents start using anaphora when talking to kids*
    - *Could be possible that its usage starts before children can actually understand it*
  + *Using anaphora may or may not hurt parent-child communication, depending on whether child can understand anaphora*

**Overall hypothesis:** If anaphora is used for smooth and efficient communication, then parents should use it according to their perception of how well their children can understand what they refer to by anaphora (how often parents use anaphora should relate to not their child's age, but to their child's language level)

* **Hypothesis 1:** parents with high-vocab children use anaphora more than parents with low-vocab children do 🡪 anaphora frequency
* **Hypothesis 2:** parent with low-vocab children use visual cues in accompany with anaphora to help children understand her referential intent 🡪 visual cues
* **Hypothesis 3:** if anaphora serves for efficient communication, no matter how often anaphora is used and how often visual cues are used, parents and children maintain a high level of communication through using anaphora and visual cues as needed.
  + the results on no difference in child's attention, suggests that they maintain the same level of communication with or w/o anaphor and visual cues.

Regardless of what gets used, children are able to understand what’s going on

This fits into the Gricean viewpoint of parents doing what needs to be done to get their point across

**Overall hypothesis:** anaphora helps communication, makes it more efficient and smoother

**Overall finding:** parents modified their speech (anaphora usage) to fit their children's needs

* **Specific 1:** parents with high-vocab children use anaphora more than parents with low-vocab children do. 🡪 facilitate communication
* **Specific 2:** parent with low-vocab children use visual cues in accompany with anaphora to help children understand her referential intent. 🡪 facilitate communication
* **Specific 3:**  1 and 2 focused on one specific factor – language ability. But more broadly, anaphora usage can be more flexible and context specific (e.g. you may still need to use visual cues/labels to help disambiguate in certain situations even when the learners have perfect linguistic knowledge) 🡪 facilitate communication

parents adjust the ways they talk to their children (e.g. whether and when to use anaphora) based on their perception of their child's language knowledge. Meanwhile, even without visual cue, high vocab kids can still resolute the problem (hope/expect the results turn out that way). therefore, using more anaphora utterances in parent speech would not hurt  communication with high-vocab kids.

This result can be viewed as supporting the communication theory that one of my previous students Dan Yurovsky strongly advocates

[https://www.cmu.edu/dietrich/psychology/callab/papers/leung\_cogsci2019.pdf](http://callab.uchicago.edu/papers/y-nip-2017.pdf)

I think with a little bit more results on accuracy, we should start writing a manuscript. If we could try "cognitive science" if we start with the importance of communication, and one place to study it is to examine the origin of communication by studying parent-child interaction.