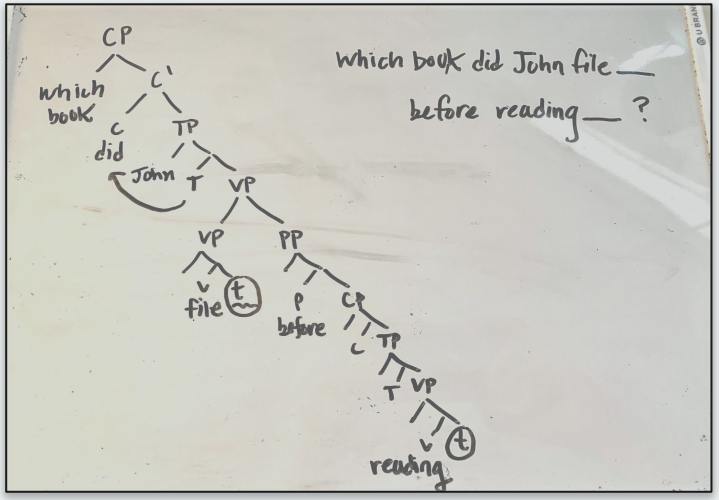
Real Time Processing of Parasitic Gap Constructions

By: Abigail Zuercher *B.S. Linguistics*

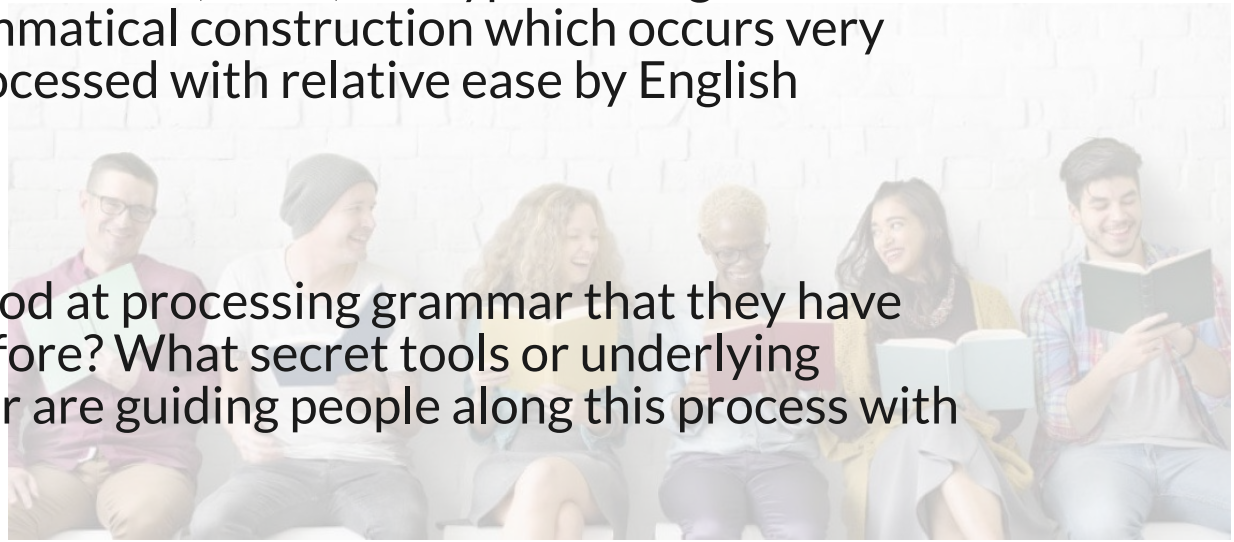


Introduction:

--Parasitic Gap Constructions (PGCs) are types of English sentences with a grammatical construction which occurs very rarely, but are still processed with relative ease by English speakers.

Important Questions:

Why are people so good at processing grammar that they have almost never seen before? What secret tools or underlying structures of grammar are guiding people along this process with such ease?



Background on PG Constructions:

Wh-movement:

--In English, wh-questions give rise to “gap positions”

Ex. “*Which book* did you file ___ before reading it?

--”Which book,” the wh-phrase, is acting as the object of the verb “file,” but in order form a question it has been moved to the front of the sentence.

Ex. “Which orange did you peel ___ before eating it?”

Ex. “Which dice did we lose ___ after buying them?”

No wh-movement:

Ex. “You filed that book before reading it.

--No gap here! The object is right after the verb, no movement occurs.

Background on PG Constructions:

Ex. "*Which book* did you file ___ before reading it?

--When the wh-phrase, "which book" has been moved to the front of the sentence, it leaves a **trace element** of itself in this gap position.

--The meaning of the wh-phrase can be "**reactivated**" by the reader upon hitting the trace or gap position

--Are these gaps real?

Ex. "Which food did the children read ___ in class?" (Pinker 1994)

--Using brain scanning technology, EEGs have shown a "boggle effect" at the exact point of this gap position when there is mismatch between subject and verb, suggesting a reactivation of the wh-phrase by the reader.

Parasitic Gaps:

--Parasitic Gap Constructions are wh-movement sentences **which instead of licensing one object gap, instead license two.** They are VERY rare. It was reported that in 9 corpora containing roughly 675,000 words, no PGC was found (Pearl and Sprouse 2013)

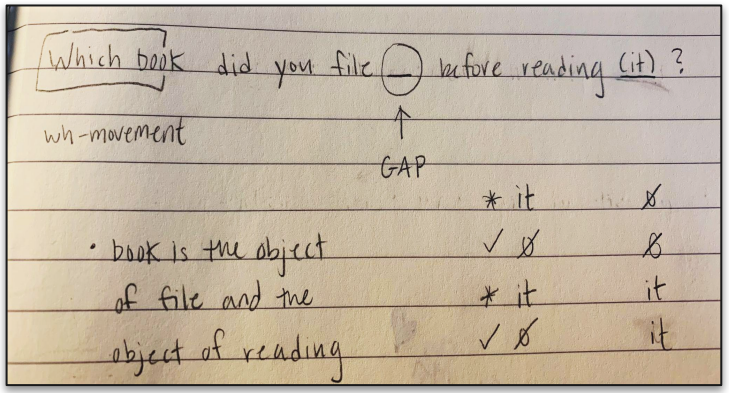
Ex. *Which book* did you file ___ before reading ___?

Ex. *Which orange* did you peel ___ before eating ___?

--The second gap is called "parasitic" upon the former because with the appearance of the second gap, the first gap must be present as well.

Ex A "Which book did you file ___ before reading _it_? GOOD

Ex B * "Which book did you file _it_ before reading ___? BAD



This Study:

--The rules of Parasitic gaps where the second gap is parasitic upon the former, seem somewhat complex, but are still uniformly agreed upon by English speakers. Your intuition tells you, Ex A is good and Ex B is bad.

--The question arises: What type of grammatical intuition do readers have to lead them to expect parasitic gaps in some places of a sentence, but not others? Or, why are examples like A so easily processed by readers?

--For our study, we compared two distinct grammatical environments and whether they give rise to PGs

1. Wh-object fronted sentences "**Which plantation** (wh obj) will the farmer present the plan...
2. Wh-subject fronted sentences "**Which plantation** (wh-subj) will present the plan...

This Study:

Employing a “plausibility”model, we investigated whether or not readers expected Parasitic gaps in the following four environments (P = Plausible) (IMP = Implausible)

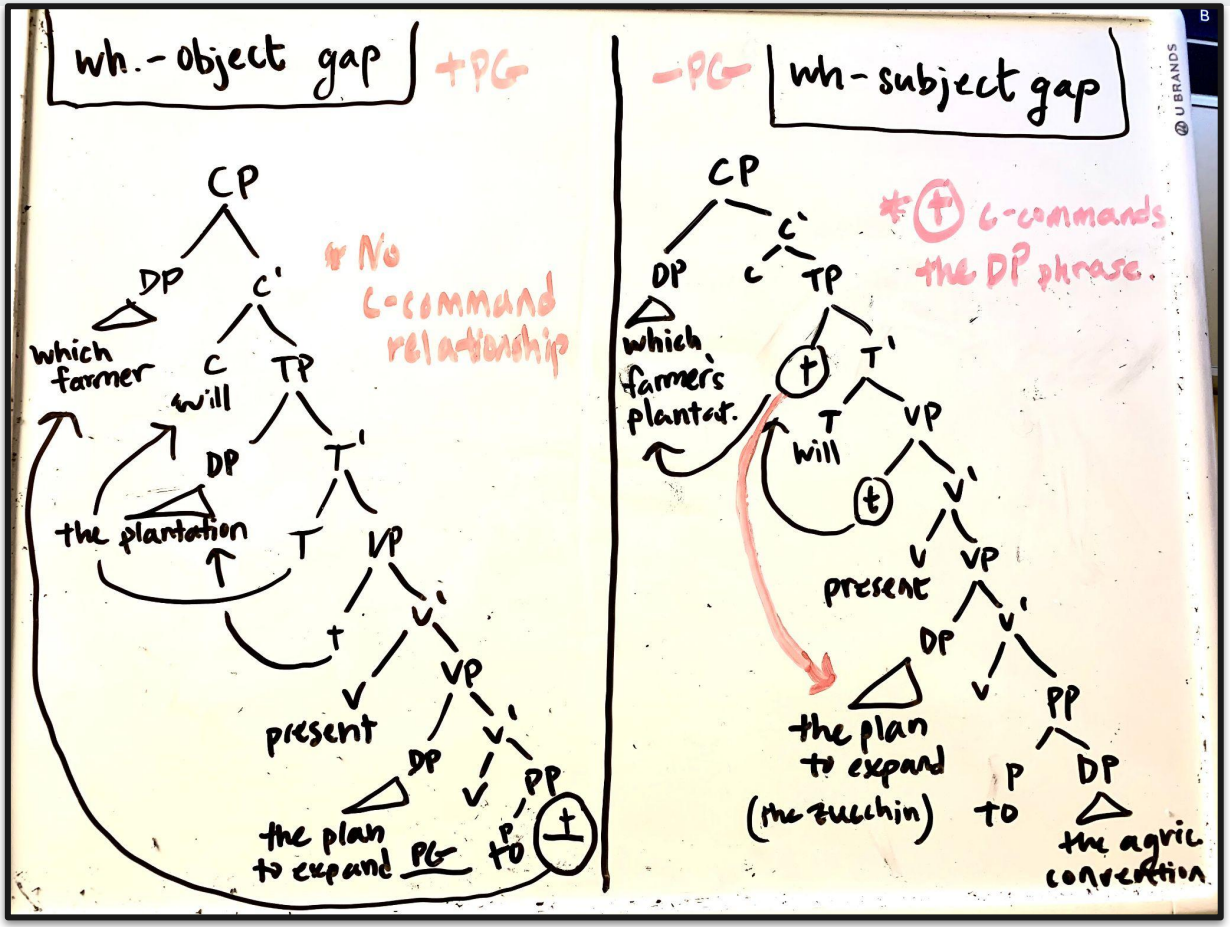
1. (wh-obj)P --“Which **plantation** will the farmer present the plan **develop** the zucchinis to at the agricultural convention.
2. (wh-obj) IMP --“Which **farmer** will the plantation present the plan **develop** the zucchinis to at the agricultural convention.”
3. (wh-subj) P --“Which **farmer’s local plantation** will present the plan to **develop** the zucchinis to the agricultural convention?”
4. (wh-subj) IMP -- “Which **plantation’s local farmer** will present the plan to **develop** the zucchinis to the agricultural convention?”

--The four sentences were shown to participants on a screen one word at a time so reading time could be tracked for each word

--For Ex 1, at the point of the verb “develop” readers may preemptively consider the wh-phrase “plantation” to be the object developed, and posit a gap here, however as shown, “zucchinis” fills this gap which could cause a surprise, or a “reading time slow down.”

--Because in Ex 1, a “plantation” can be “developed” this is a space where a reader may preemptively posit a parasitic gap, but in Ex 2, a “farmer” cannot be “developed” so the reader may not posit a gap and reading times may continue at normal speeds.

The Syntax:


wh.- object gap
+PG
* No c-command relationship
CP
DP
C'
which farmer
C
will
TP
DP
T'
the plantation
T
VP
t
V'
present
VP
DP
V'
the plan to expand PG
V
PP
P
to
t
-PG
wh- subject gap
* t c-commands the DP phrase.
CP
C'
DP
C
TP
which farmers plantat.
t
T'
T
will
VP
t
V'
V
present
VP
DP
V'
the plan to expand (the zucchin)
V
PP
P
to
DP
the agric conversation

Important Findings: **Have yet to run Exp**

--Should the eye tracking results yield differences in reading slow down times between examples 1 and 2 but NOT between examples 3 and 4, evidence is gathered to support the fact that people are subconsciously aware of these two different types of grammatical environments. They draw upon them to decide whether or not to posit a parasitic gap. These structures are guiding their intuition.

--People may be conscious of environments in which the trace element of the wh-phrase is NOT c-commanding the Parasitic Gap environment (Wh-object Sentences) and one where the trace element of the wh-phrase IS c-commanding the Parasitic Gap environment (Wh-subject Sentences)

Greater Context:

--It's demonstrated that native speakers can access English grammar quickly, inferring the grammatical structure and meaning of PGCs, regardless of their rarity. Our studies have shown that language processing mechanisms may occur beneath the level of consciousness of the speaker, independent of influences from daily language use.

--Questions arise as to how it is that native speakers acquire these grammatical rules and access them so quickly? How are speakers aware of a c-command relationship and use it to either posit or not posit a gap?

--What role does "grammar" or these syntactic models play in larger cognitive language processing functions?

Questions/Comments?

References

Pearl, Lisa & Sprouse, Jon. (2013). Syntactic Islands and Learning Biases: Combining Experimental Syntax and Computational Modeling to Investigate the Language Acquisition Problem. Language Acquisition. 20. 23-68. 10.1080/10489223.2012.738742.

Pinker, Steven. *The Language Instinct: The New Science of Language and Mind*. London: Allen Lane, the Penguin Press, 1994. Print.