Processing Relativization in Ojibwe

Christopher Hammerly - University of Minnesota
Move & Agree Forum 2021
06.03.21

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  2. Use of passive voice (promotes the patient to subject position)
  3. Use of "object" relative clause (makes a long movement dependency)

Guiding Questions

Why are some movement dependencies harder to process than others?

1. What effect does *person-animacy* information have? Specifically obviation, a system common in Algonquian languages

2. How is *voice* used? Specifically direct-inverse agreement systems

The testing ground: Filler-gap processing in relative clauses in Border Lakes Ojibwe!

Ojibwe Quick Facts

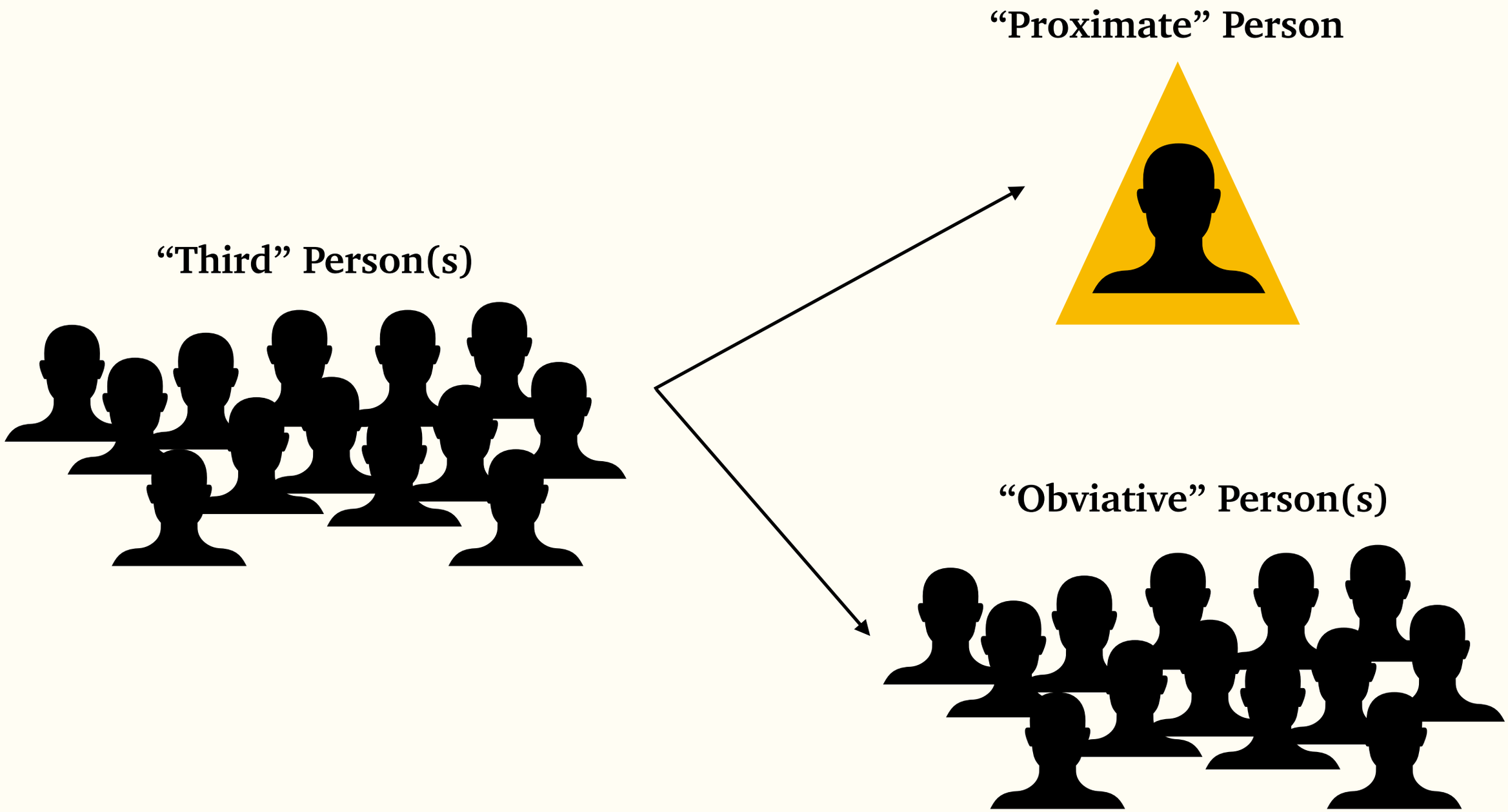
1. An Algonquian language, spoken around the Great Lakes Region of North America

2. As many as 90,000 speakers across a wide variety of dialects

3. It is called Anishinaabemowin by speakers

4. The data presented here is from work with speakers of the Border Lakes dialect (within the broader dialect group of Southwestern Ojibwe), spoken in Northwest Ontario

What is “obviation”?



Obviation: Transitive Sentence

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o-baapi’-**aa**-n iniwe abinoojiin-yan awe ikwe
3-laugh-**DIRECT**-OBV that child-OBV that woman.PROX
“That woman (PROX) is laughing at that child (OBV)”

“DIRECT”
PROX → OBV

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3-laugh-**INVERSE**-OBV that woman-OBV that child.PROX
"That child (PROX) is being laughed at by that woman (OBV)"

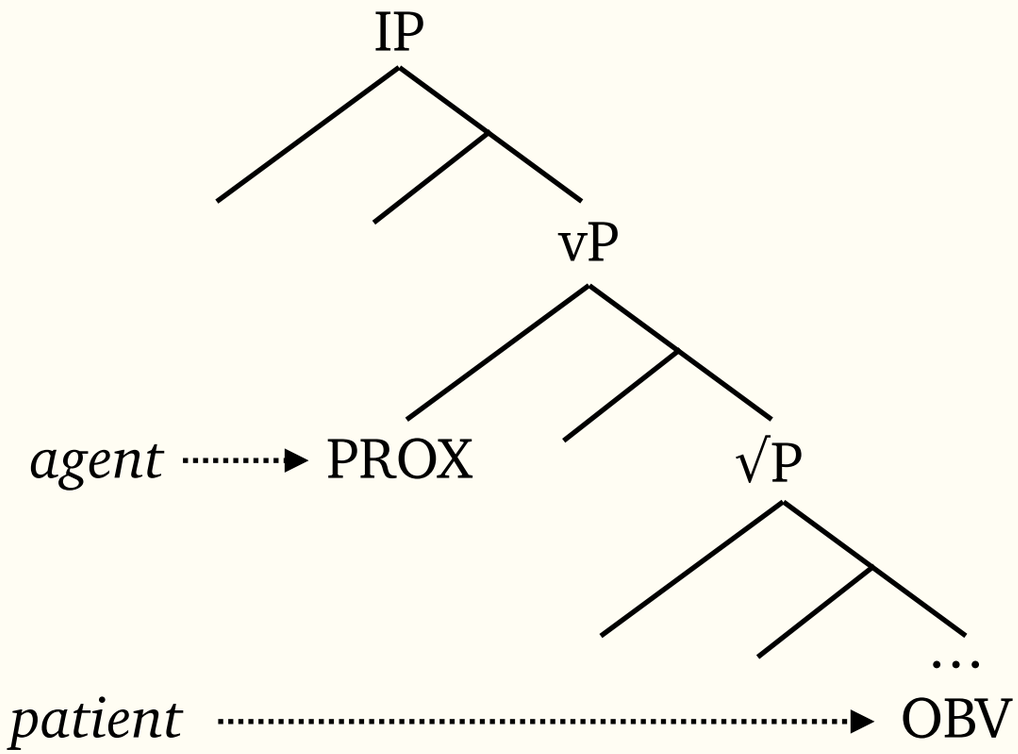
"INVERSE"
OBV → PROX

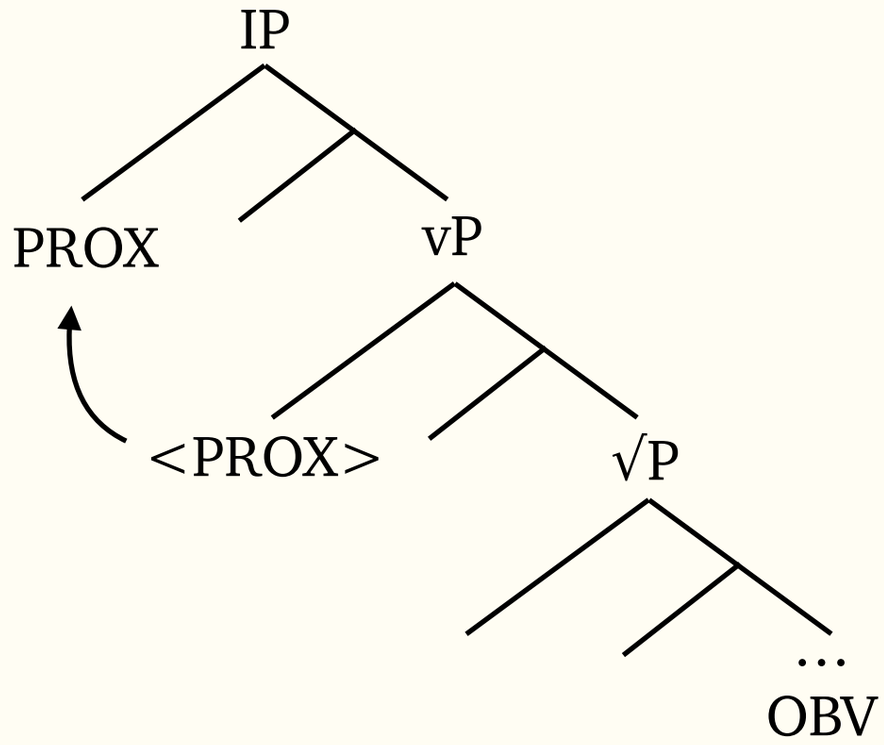
Direct-Inverse Marking: Syntactic consequences

“DIRECT”

o-baapi’-aa-n	iniwe	abinoojiin-yan	awe	ikwe
3-laugh-DIRECT-OBV	that	child-OBV	that	woman.PROX

“That woman (PROX) is laughing at that child (OBV)”





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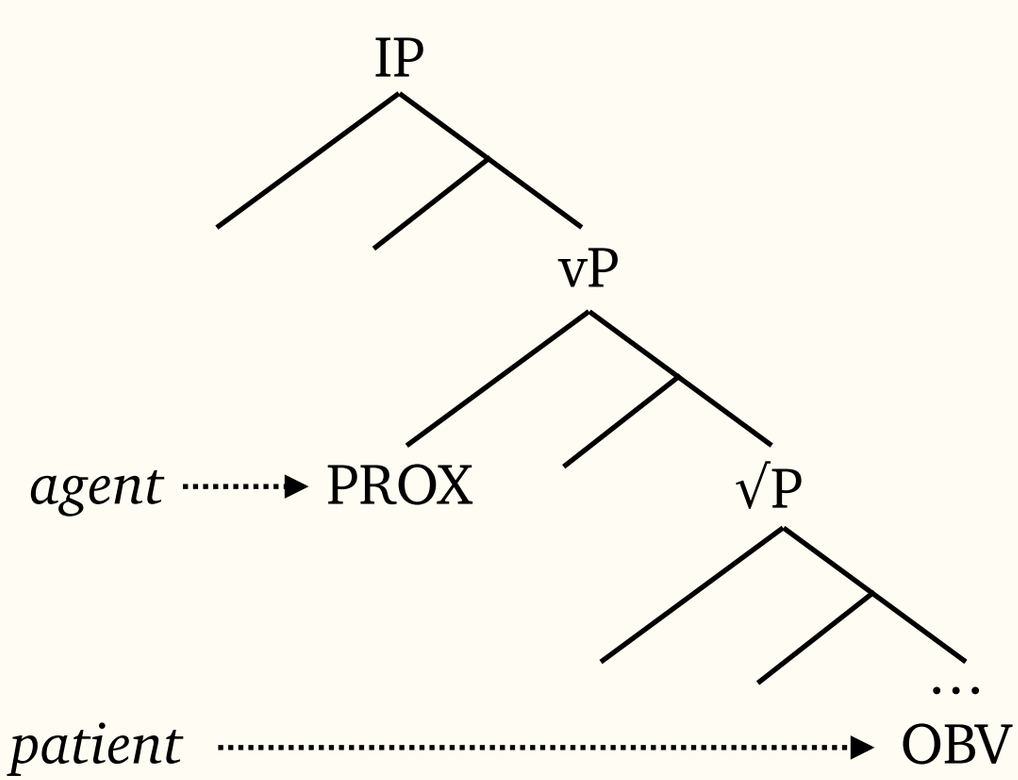

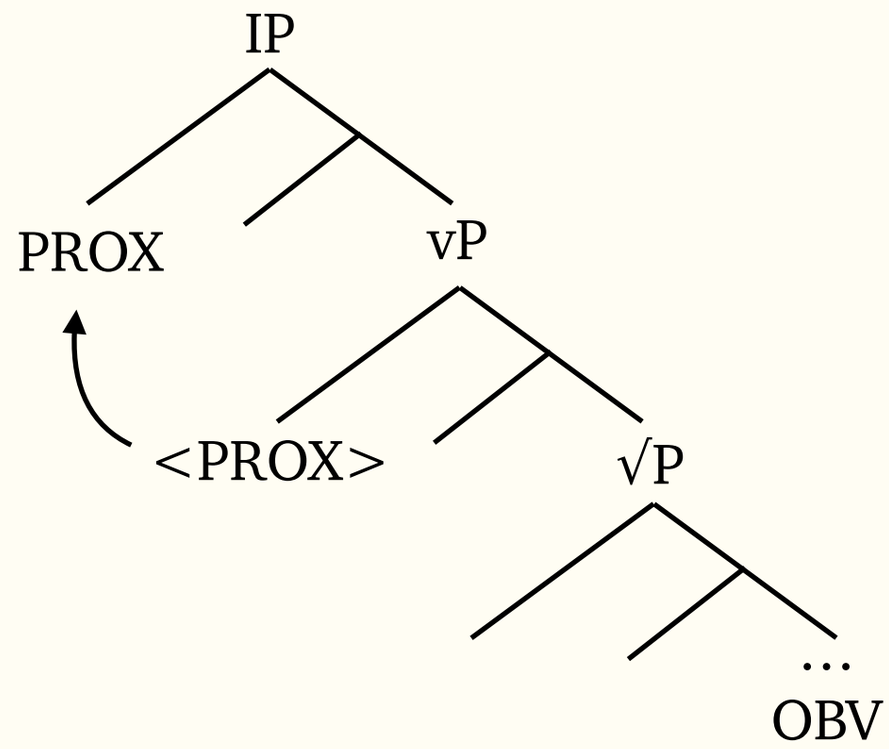

With “direct” alignments, the proximate <u>agent</u> is promoted to subject position

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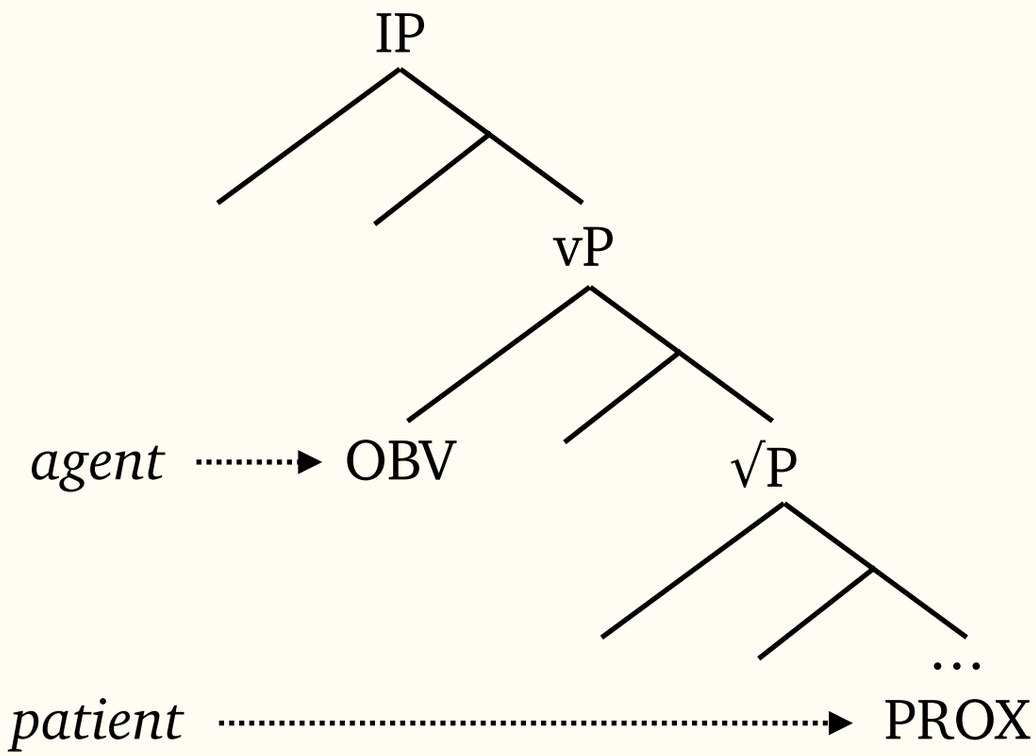

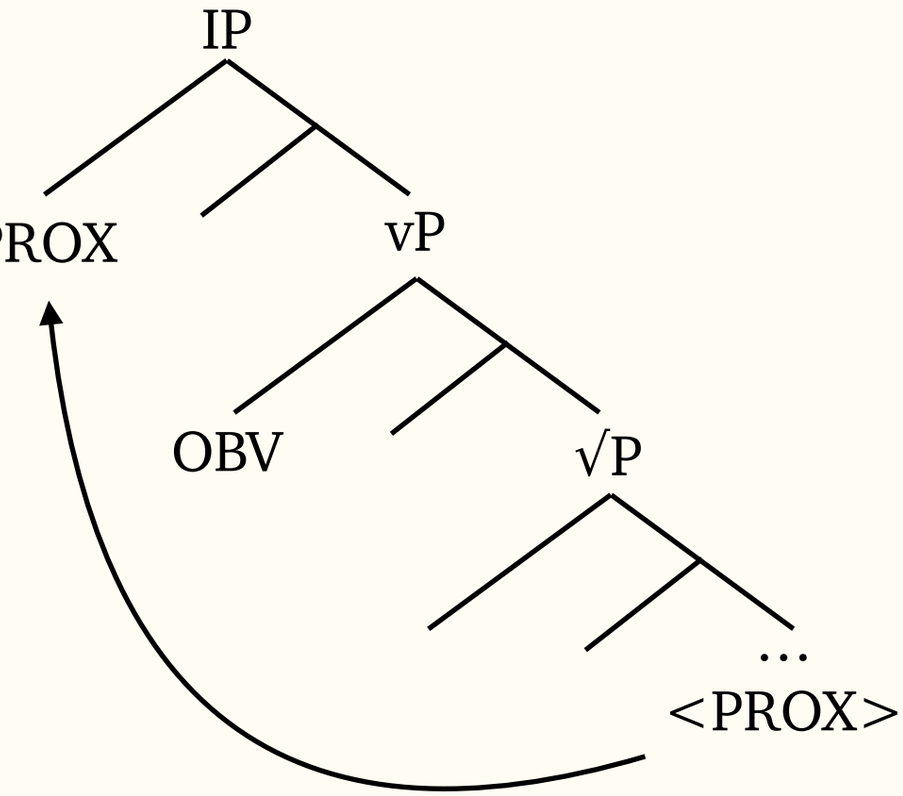

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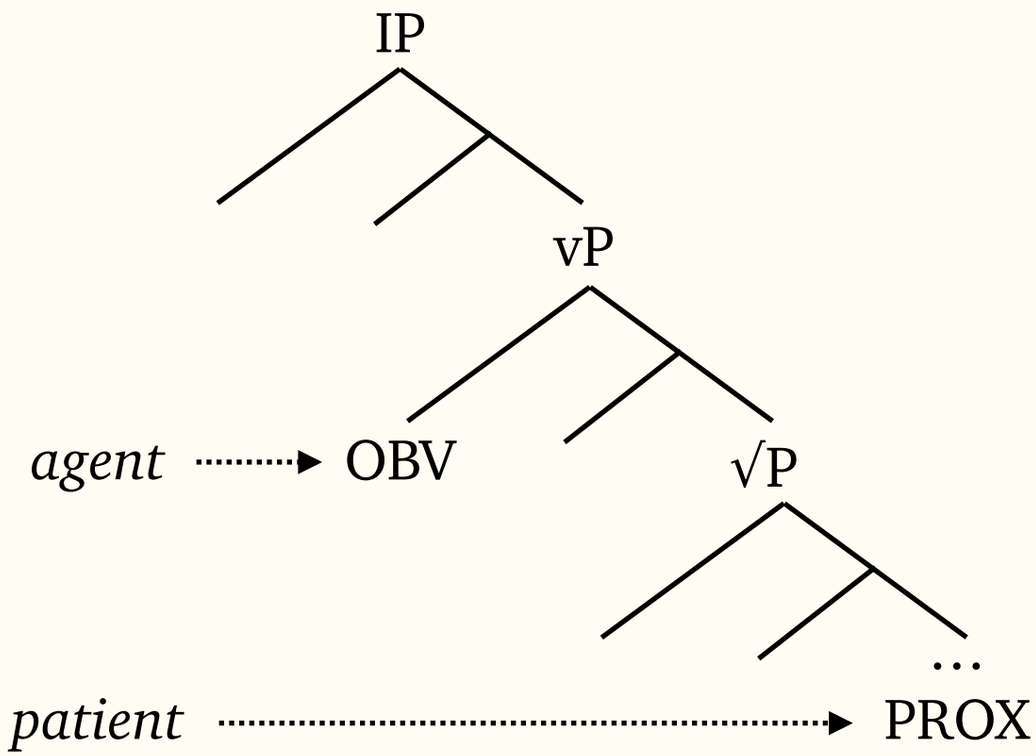

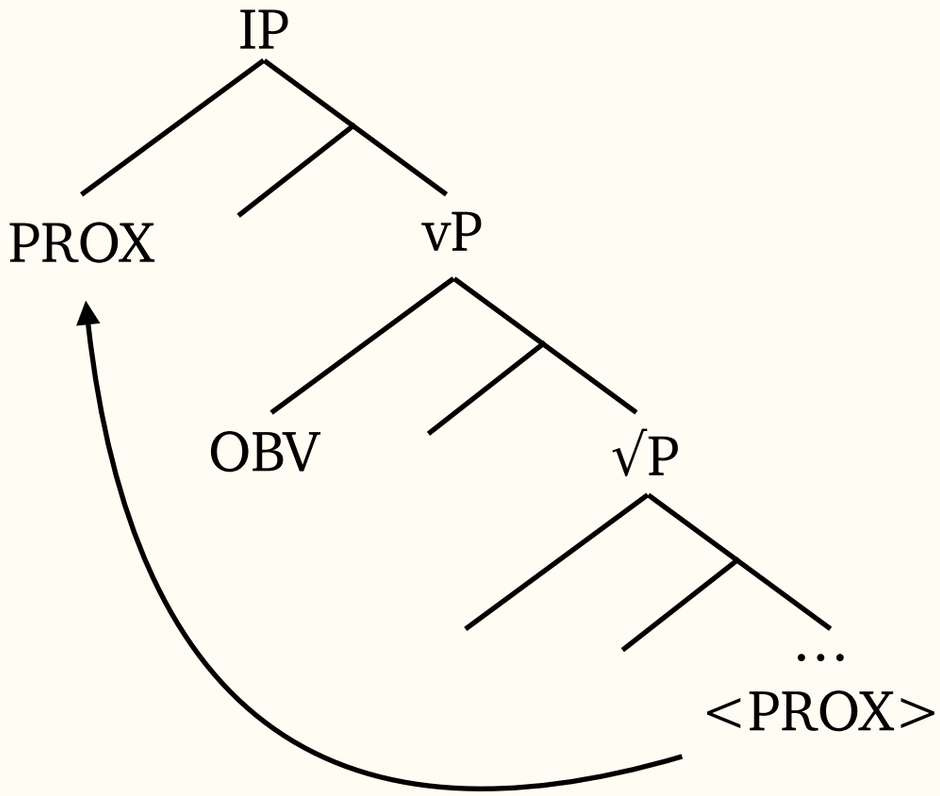

With “inverse” alignments, the proximate <u>patient</u> is promoted to subject position

Summary: Obviation & Direct-Inverse

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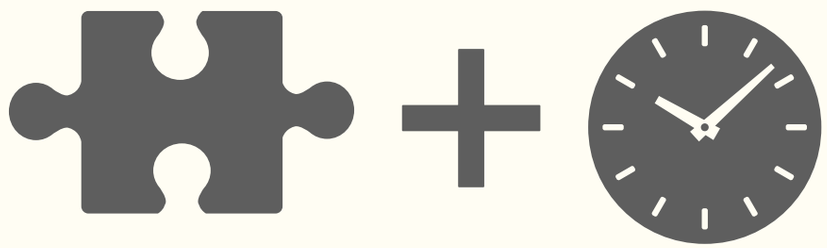
- Being **proximate** puts that noun/referent **“in the spotlight”**
- Being **proximate** results in promotion to **subject position**
- Direct-inverse agreement indicates whether the proximate noun is the agent (*direct*) or the patient (*inverse*)
  - **Direct** is akin to the **“active” voice**: The agent is the subject
  - **Inverse** is akin to the **“passive” voice**: The patient is the subject

From the grammar to the parser

Theories of Grammar:
What representations underly well-formed utterances?

Theories of Parsing:
How are (well-formed) representations created in real-time?



Seemingly small, but critical, fact: Incrementality
We receive input bit by bit, but do not wait to parse and interpret

The challenge of incrementality:
How do we make parsing commitments with incomplete information?

Three components of incremental processing

🔮 **Prediction**: Generating expectations about upcoming input based on current input.

🔑 **Integration**: Determining how new input fits with (the parse/interpretation of; predictions generated from) previous input

♻️ **Reanalysis**: Modifying existing representations and commitments when new input is impossible to integrate

Move: A processing perspective

There's the senator who

...

Move: A processing perspective

There's the senator who

…

Move: A processing perspective

… the NOUN VERBED __

There's the senator who

…

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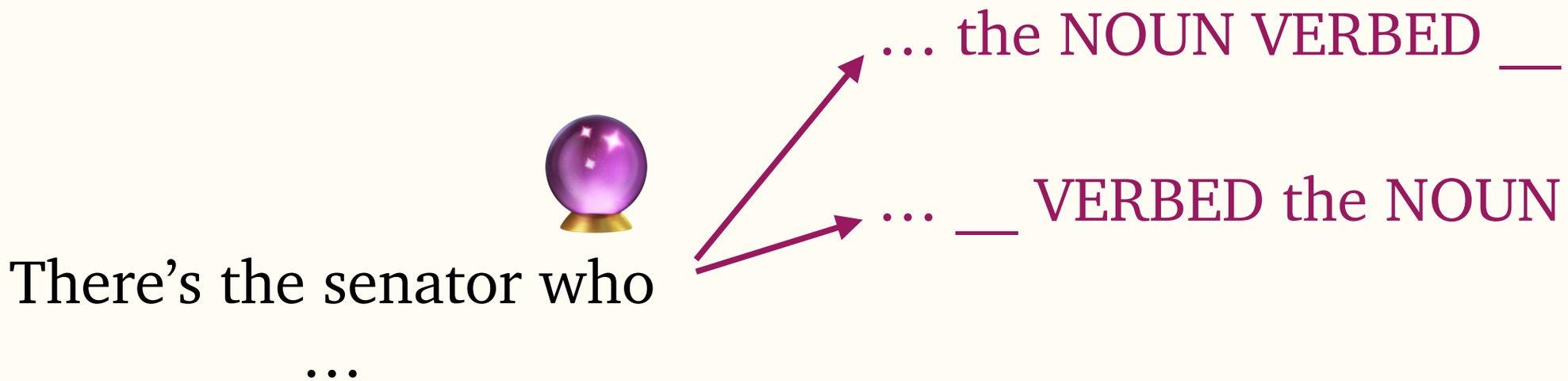

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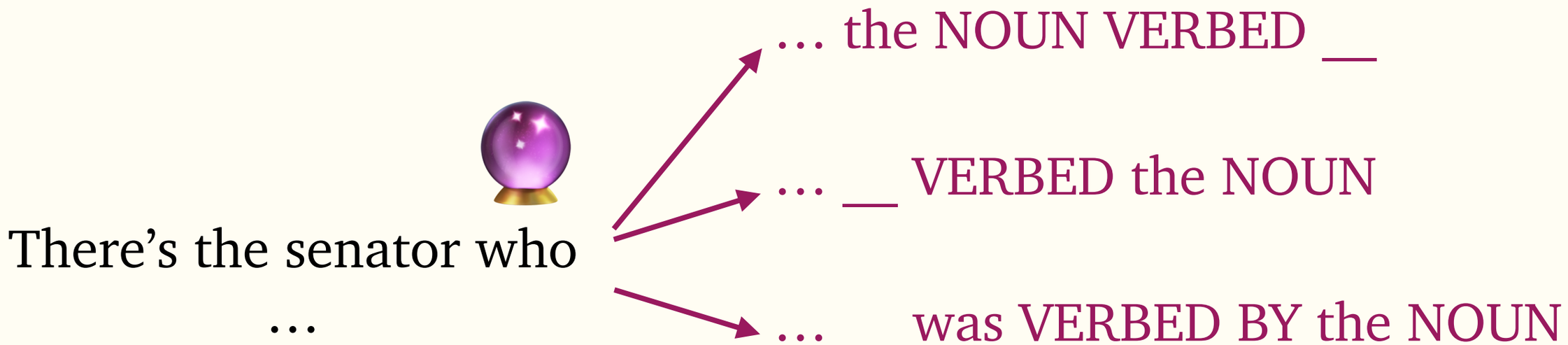

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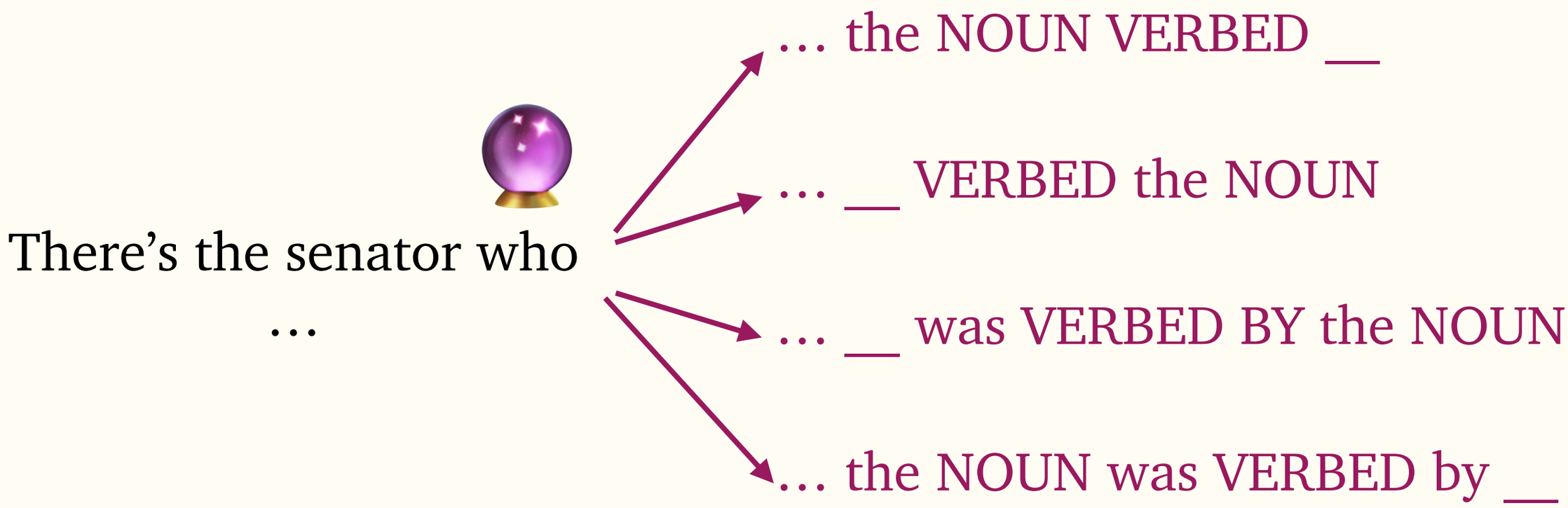

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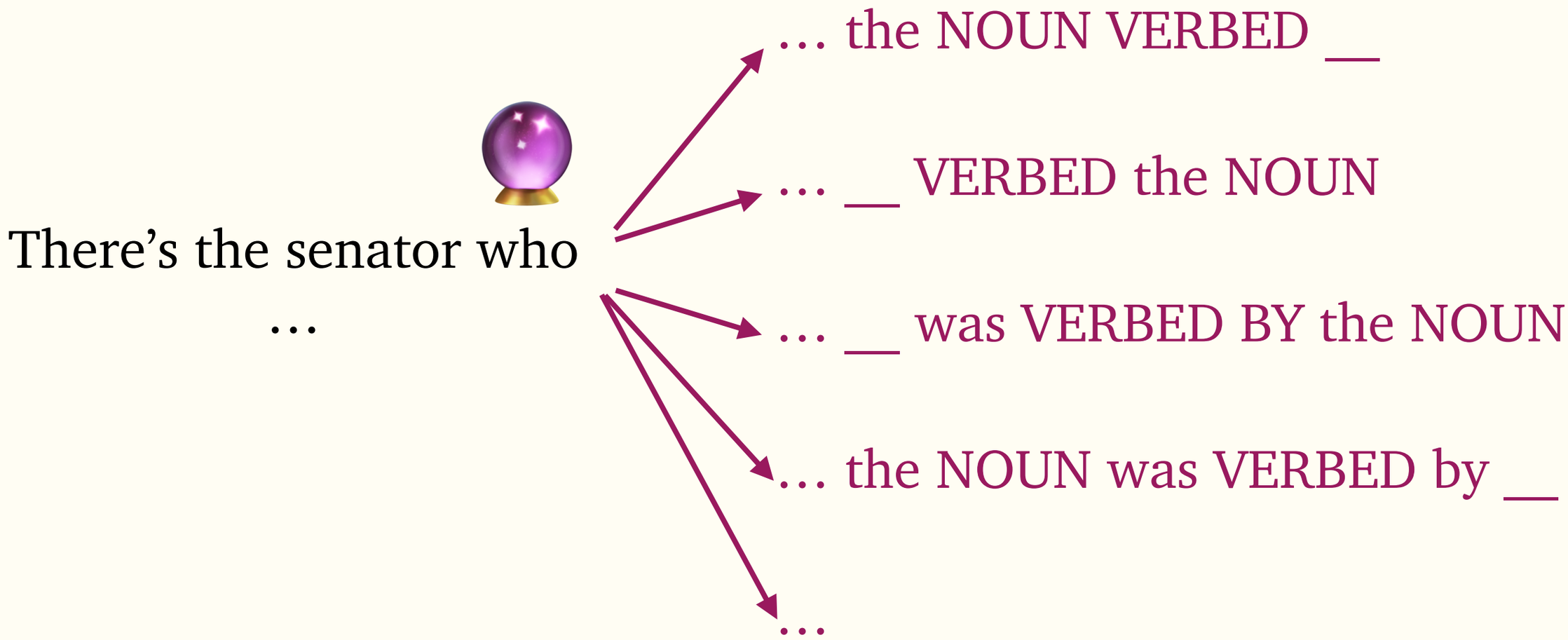

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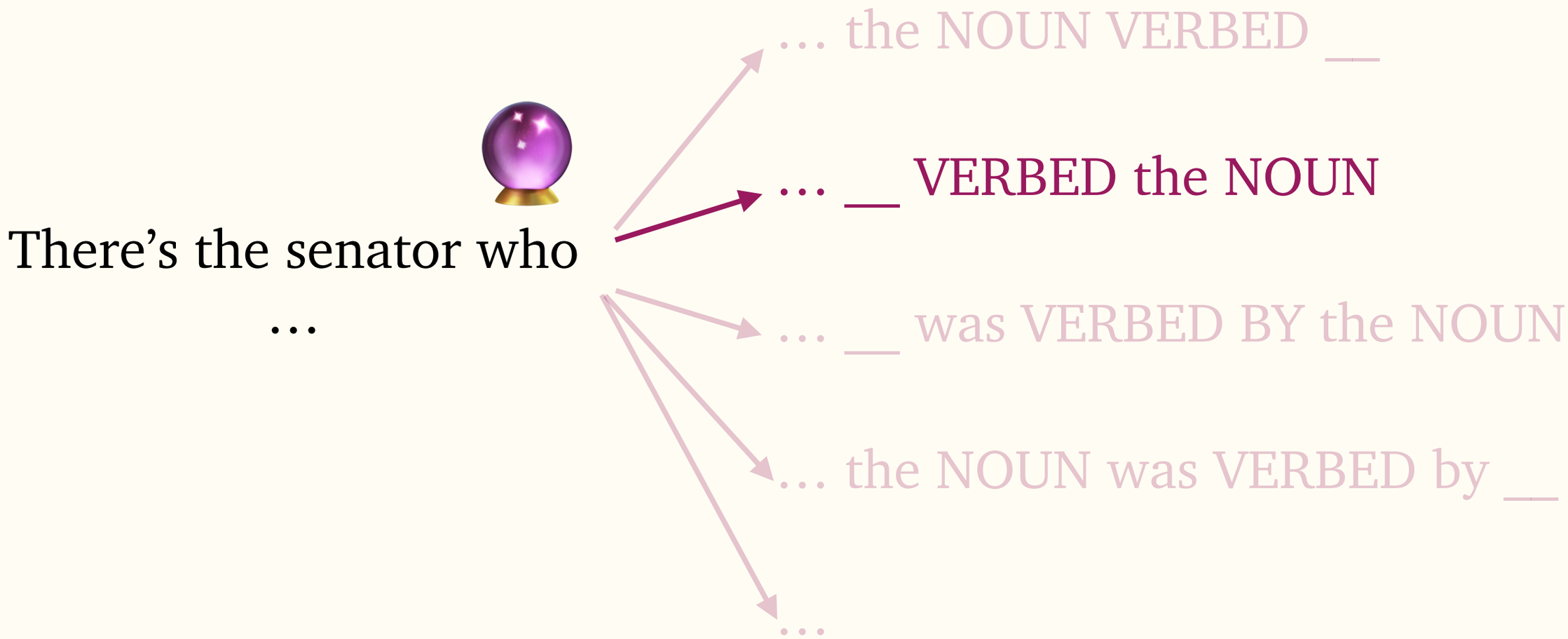

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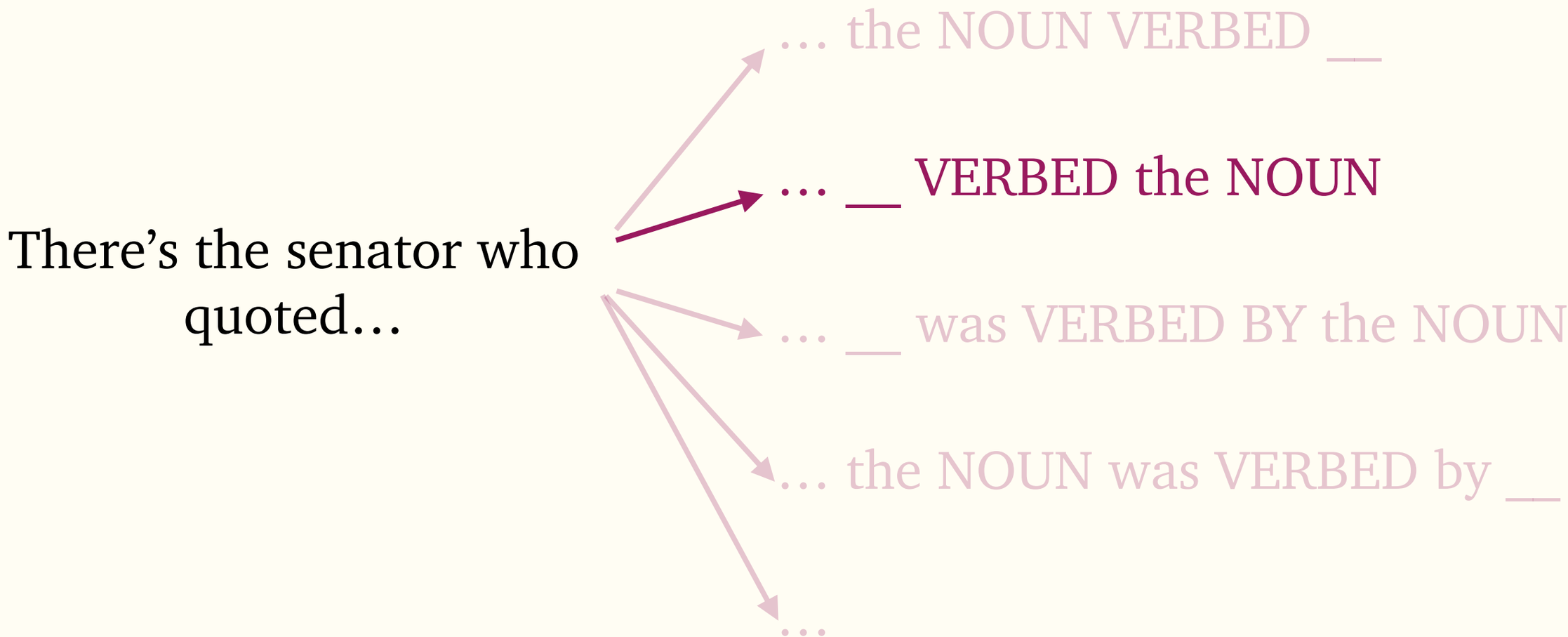

Move: A processing perspective

There's the senator who quoted…

… the NOUN VERBED __

… __ VERBED the NOUN

… __ was VERBED BY the NOUN

… the NOUN was VERBED by __

…

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Subject Gap Advantage

S*ubject relative clauses* (and subject gaps in general) are easier to process than *object relative clauses* (e.g. Kwon et al. 2010 for a review)

Animate SRC: *There's **the senator** who ___ quoted the journalist.*

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- When correct (with SRCs) processing is easy.
- When not correct (with ORCs) processing is harder due to reanalysis.

Animacy and the Subject Gap Advantage

Inanimate SRC: *There's **the report** that ___ quoted the journalist.*

Inanimate ORC: *There's **the report** that the journalist quoted ___ .*

Animacy Effect: The "subject gap advantage" is diminished or disappears when the head noun is inanimate (Mak et al. 2002; Traxler et al. 2005; Gennari & MacDonald 2008; Wagers & Pendleton 2016).

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➡**Animate** nouns lead to a **strong** subject-gap (or agent) prediction

➡**Inanimate** nouns **weaken/erase** the subject-gap (or agent) prediction

Towards a generalization: the PAH

- **Person-based prominence** is the observation that certain *categories* of "person" are privileged by the grammar (e.g. Silverstein 1976; Lockwood & Macaulay 2012).

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- The central question: **How is this information used in processing movement/agreement (by speakers of Ojibwe)?**

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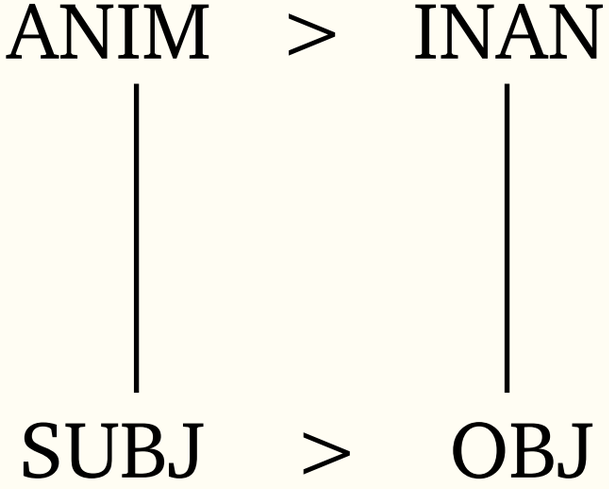

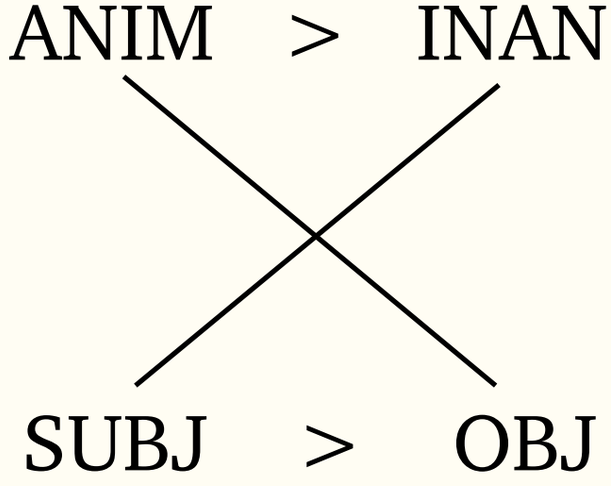

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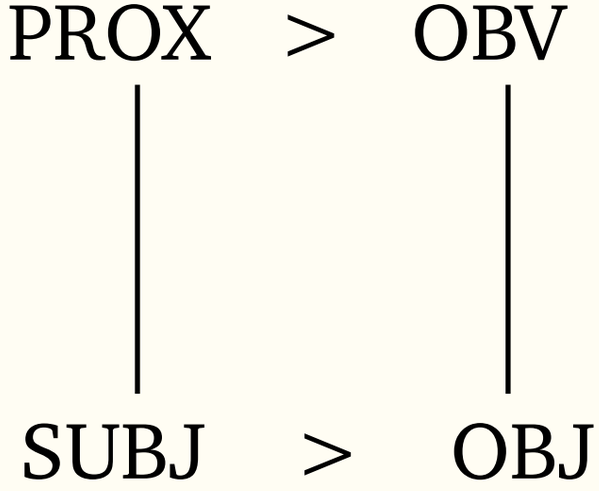

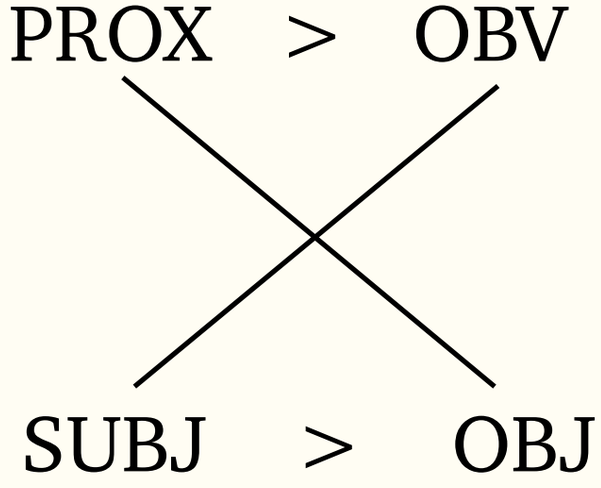

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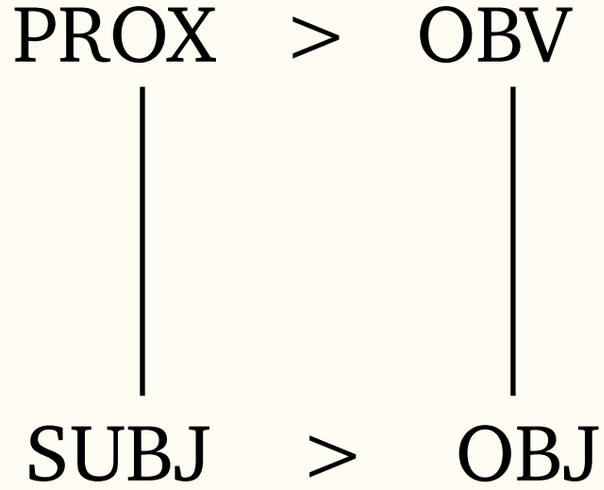

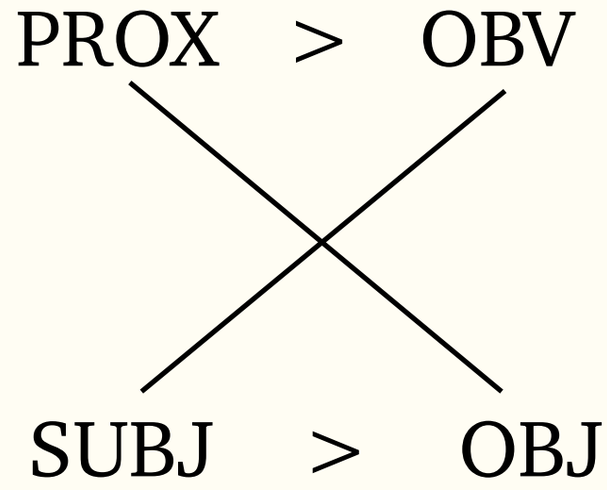

Hypothesis: Like animate nouns in English, proximate nouns in Ojibwe should be predictively encoded as subjects/agents.

Border Lakes Ojibwe

Nigigoonsiminikaaning
(Red Gut)

Seine River

The current study

Outline of the task

*Choose the picture with **the elder** who ___ is laughing at the man.*

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*Choose the picture with **the elder** who ___ is laughing at the man.*

Stimuli Design

Onaabandan mazinaakizon …
chooose picture
“Choose the picture with…”

… **gichi-aya’aa** gaa-baapi’-aa-d inini-wan
… **elder.PROX** REL-laugh-DIRECT-3 man-OBV
“… **the elder (PROX)** who __ is laughing at the man(OBV)”

Head = Proximate
Voice = Direct

… **gichi-aya’aa** gaa-baapi’-igo-d inini-wan
… **elder.PROX** REL-laugh-INVERSE-3 man-OBV
“… **the elder (PROX)** who __ is being laughing at by the man (OBV)”

Head = Proximate
Voice = Inverse

… **gichi-aya’aa-n** gaa-baapi’-igo-d inini
… **elder-OBV** REL-laugh-INVERSE-3 man.PROX
“… **the elder (OBV)** who the man (PROX) is being laughed at by __”

Head = Obviative
Voice = Inverse

… **gichi-aya’aa-n** gaa-baapi’-aa-d inini
… **elder-OBV** REL-laugh-DIRECT-3 man.PROX
“… **the elder (OBV)** who the man (PROX) is laughing at __”

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“… the elder (PROX) who is laughing at the man (OBV)”

"Elder laughing at man”

"Man laughing at elder”

Stimuli Design

Onaabandan mazinaakizon …
chooose picture
“Choose the picture with…”

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Voice = Direct

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“… the elder (PROX) who is being laughed at by the man (OBV)”

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Stimuli Design

Onaabandan mazinaakizon …
chooose picture
“Choose the picture with…”

Head = Proximate
Voice = Inverse

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Stimuli Design

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chooose picture
“Choose the picture with…”

Head = Obviative
Voice = Inverse

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… **elder-OBV** REL-laugh-INVERSE-3 man.PROX
“… the elder (OBV) who the man (PROX) is being laughed at by”

"Elder laughing at man”

"Man laughing at elder”

Stimuli Design

Onaabandan mazinaakizon …
chooose picture
“Choose the picture with…”

Head = Obviative
Voice = Inverse

… **gichi-aya’aa-n** gaa-baapi’-igo-d inini
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Stimuli Design: Analysis Regions

…Preamble…	*Ambiguity!*	*Disambiguation!*		
… gichi-aya’aa	gaa-baapi’-	aa-d	inini-wan	**Head = Proximate**
… elder.PROX	REL-laugh-	DIRECT-3	man-OBV	**Voice = Direct**
… gichi-aya’aa	gaa-baapi’-	igo-d	inini-wan	**Head = Proximate**
… elder.PROX	REL-laugh-	INVERSE-3	man-OBV	**Voice = Inverse**
… gichi-aya’aa-n	gaa-baapi’-	igo-d	inini	**Head = Obviative**
… elder -OBV	REL-laugh-	INVERSE-3	man.PROX	**Voice = Inverse**
… gichi-aya’aa-n	gaa-baapi’-	aa-d	inini	**Head = Obviative**
… elder -OBV	REL-laugh-	DIRECT-3	man.PROX	**Voice = Direct**

The main questions

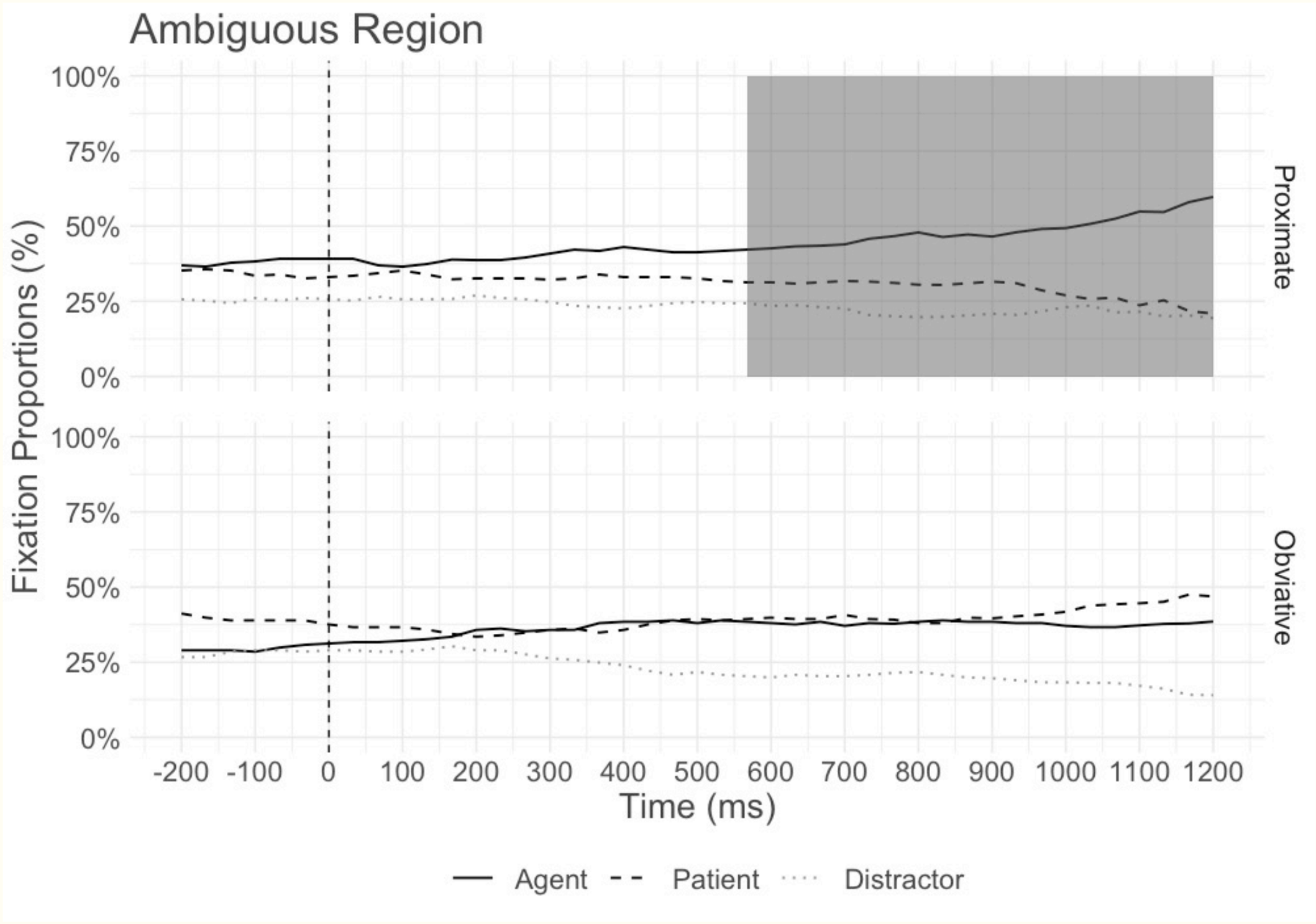
During the ambiguous region, where it is not yet known *for sure* whether the head noun is the agent or patient, do Ojibwe listeners make an assumption based on obviation?

- By looking at how people's eyes move around to different pictures during this region we can ask…
- …do they look more at the picture where this noun is the *agent* or do they look more at the picture where this noun is the *patient*?

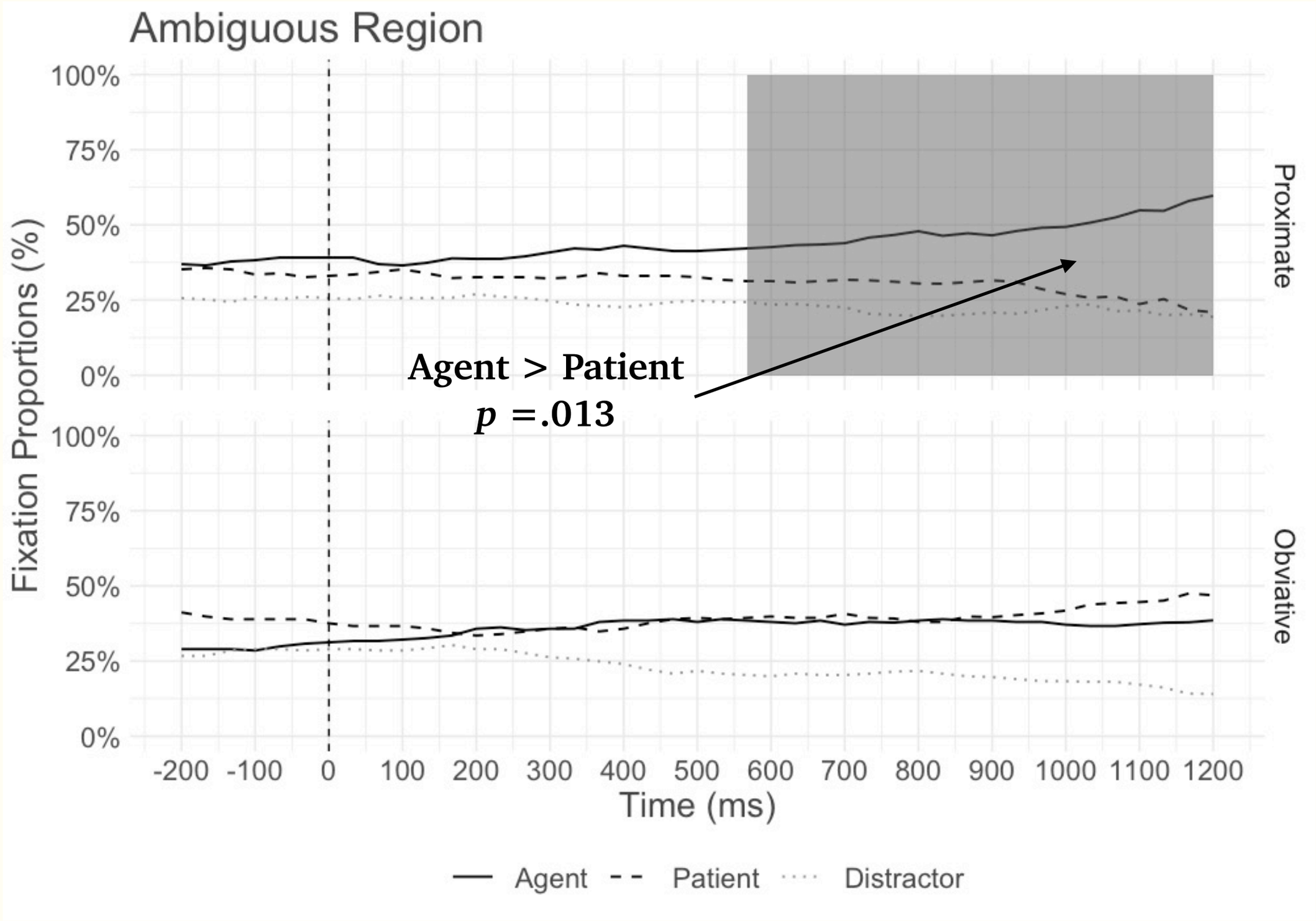
How accurate is interpretation after disambiguation?

- We can measure this by examining picture selections.

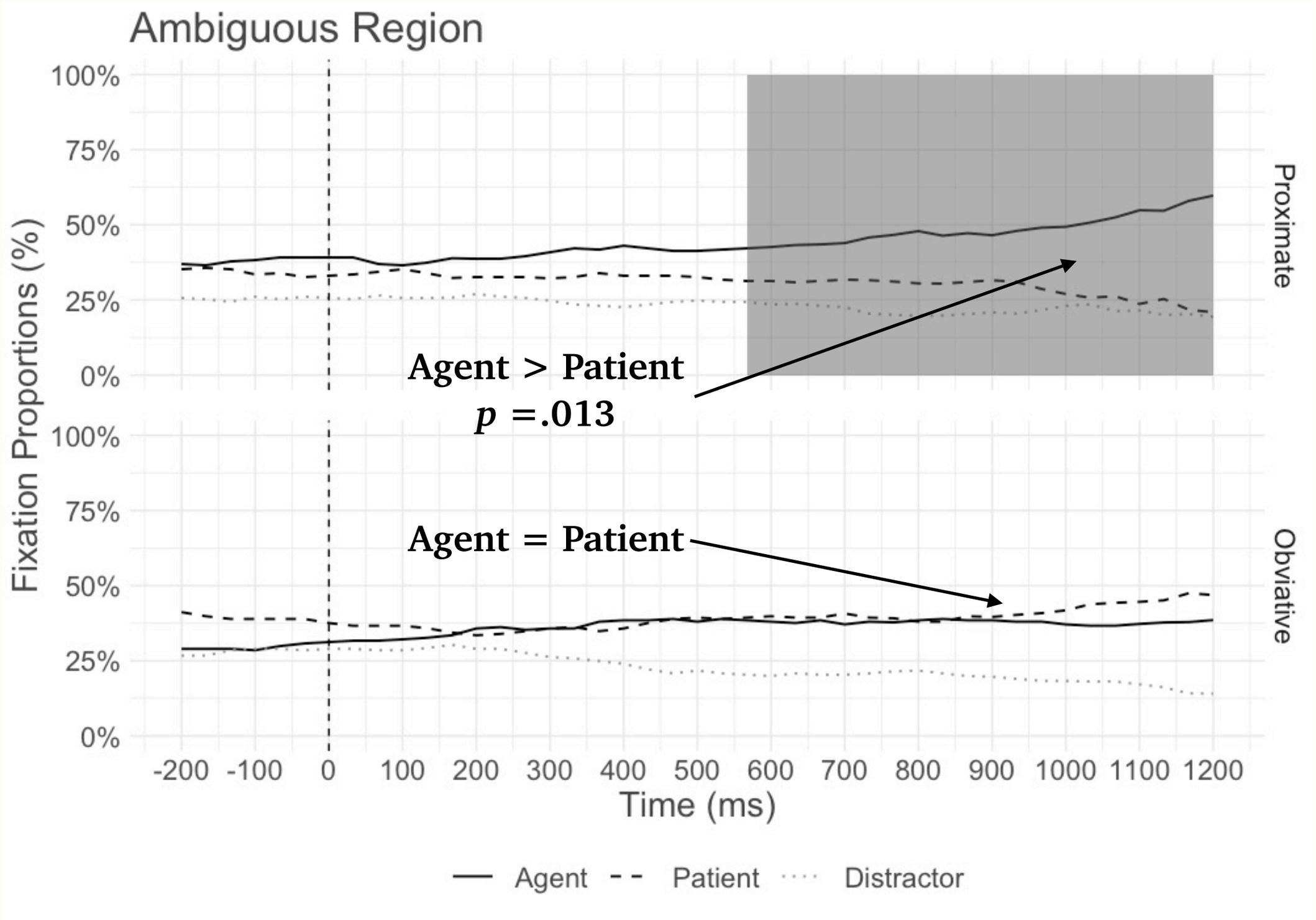
Ambiguous Region Looks



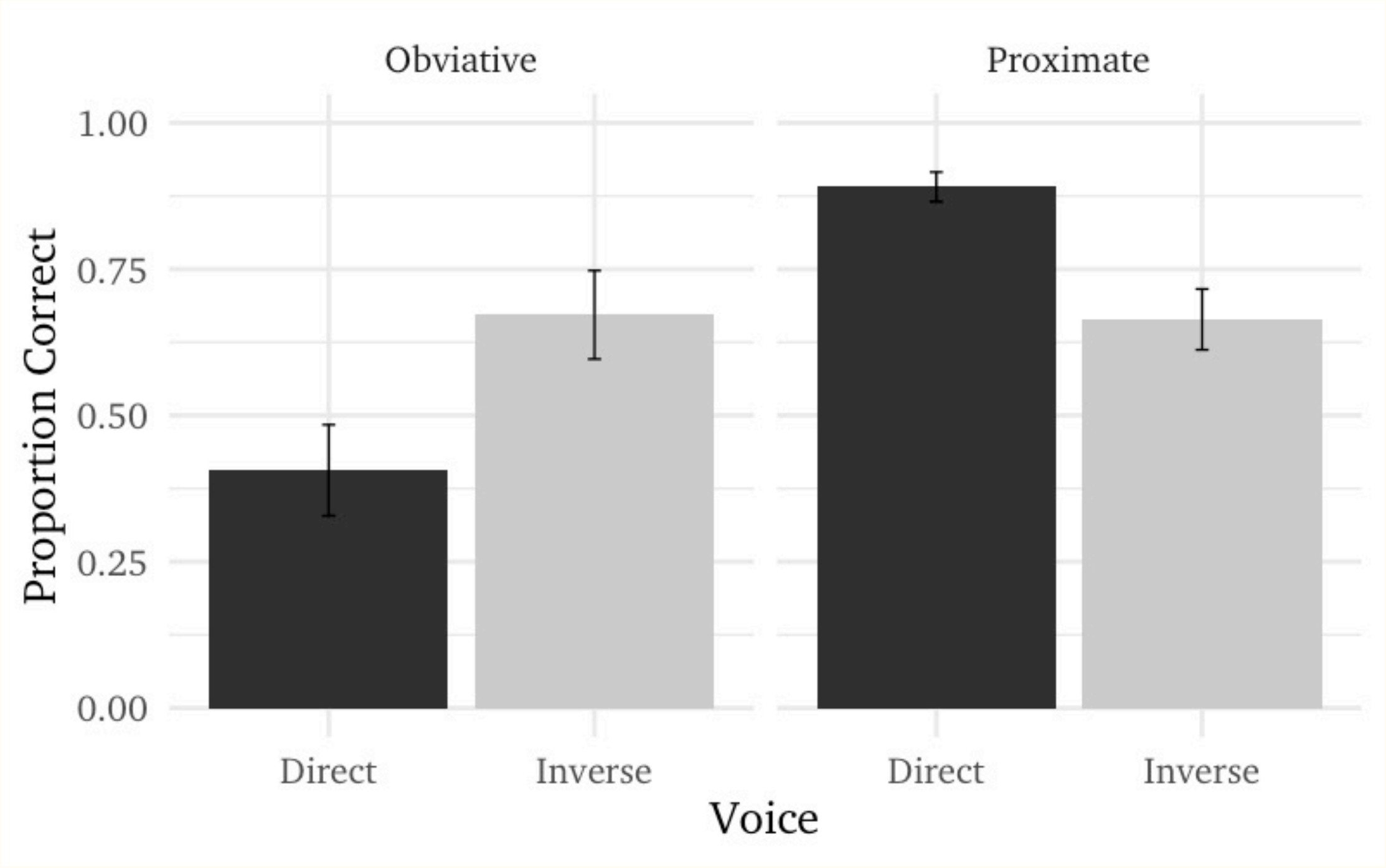
Ambiguous Region Looks



Ambiguous Region Looks



Accuracy (post-resolution interpretation)



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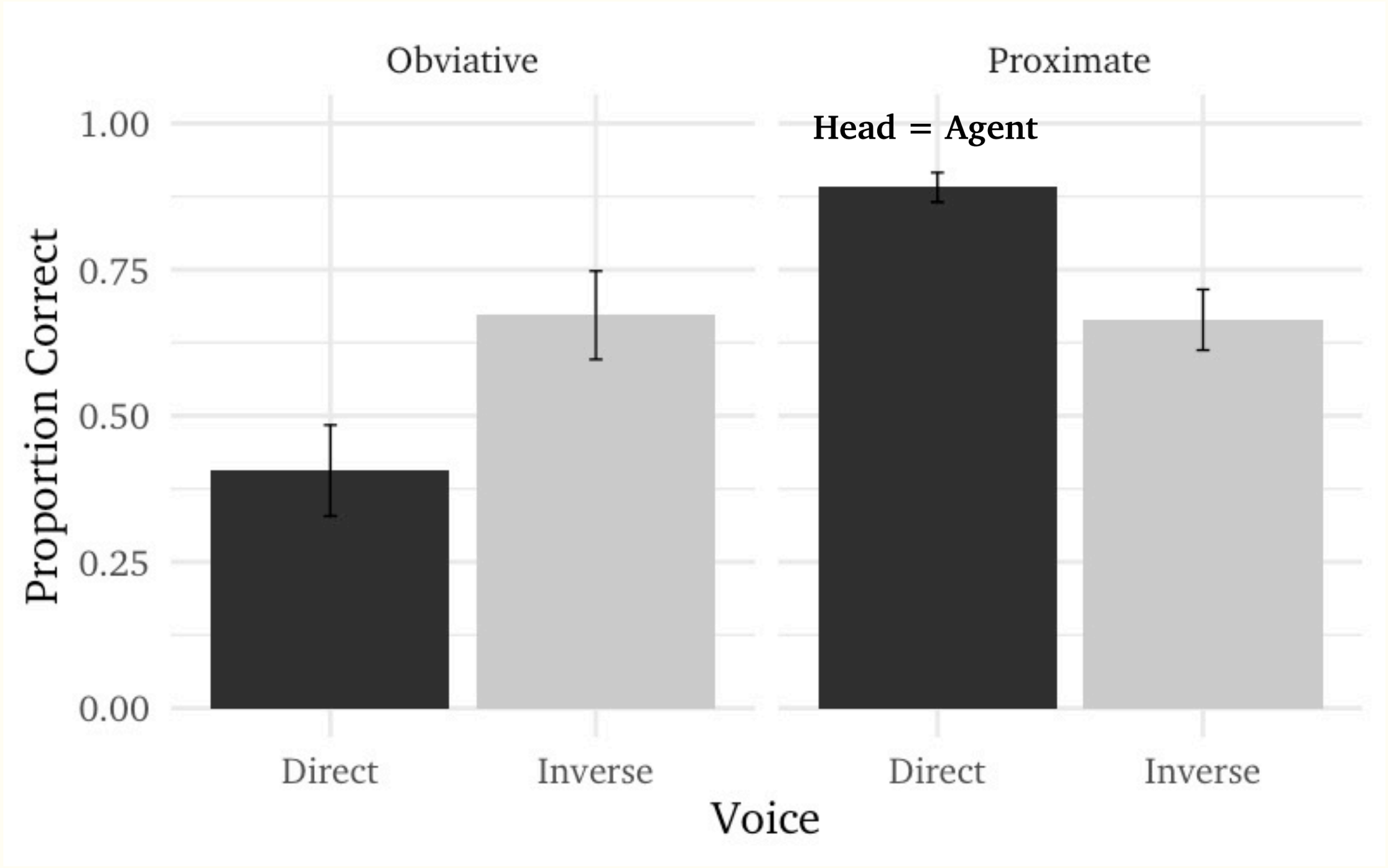

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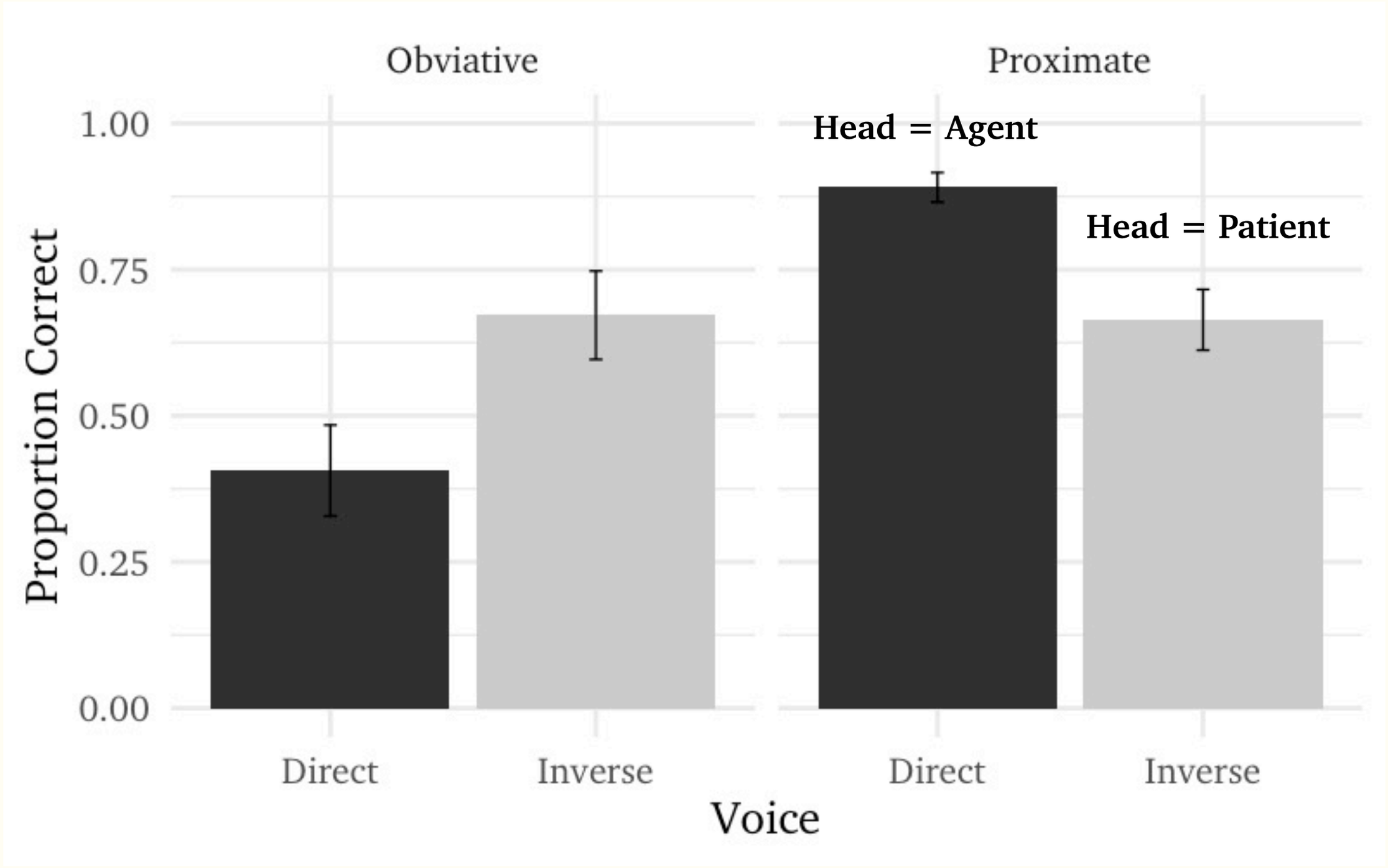

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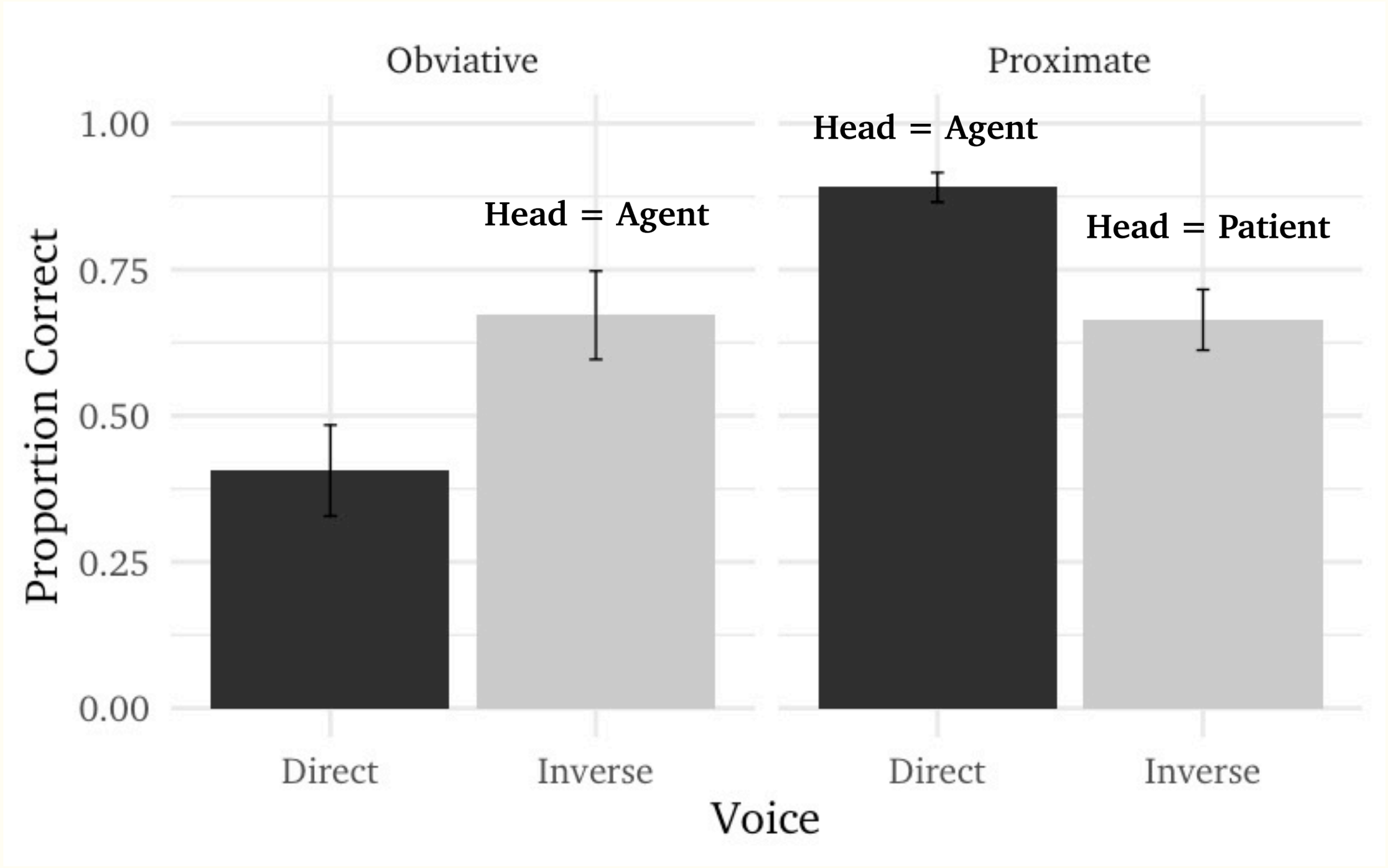

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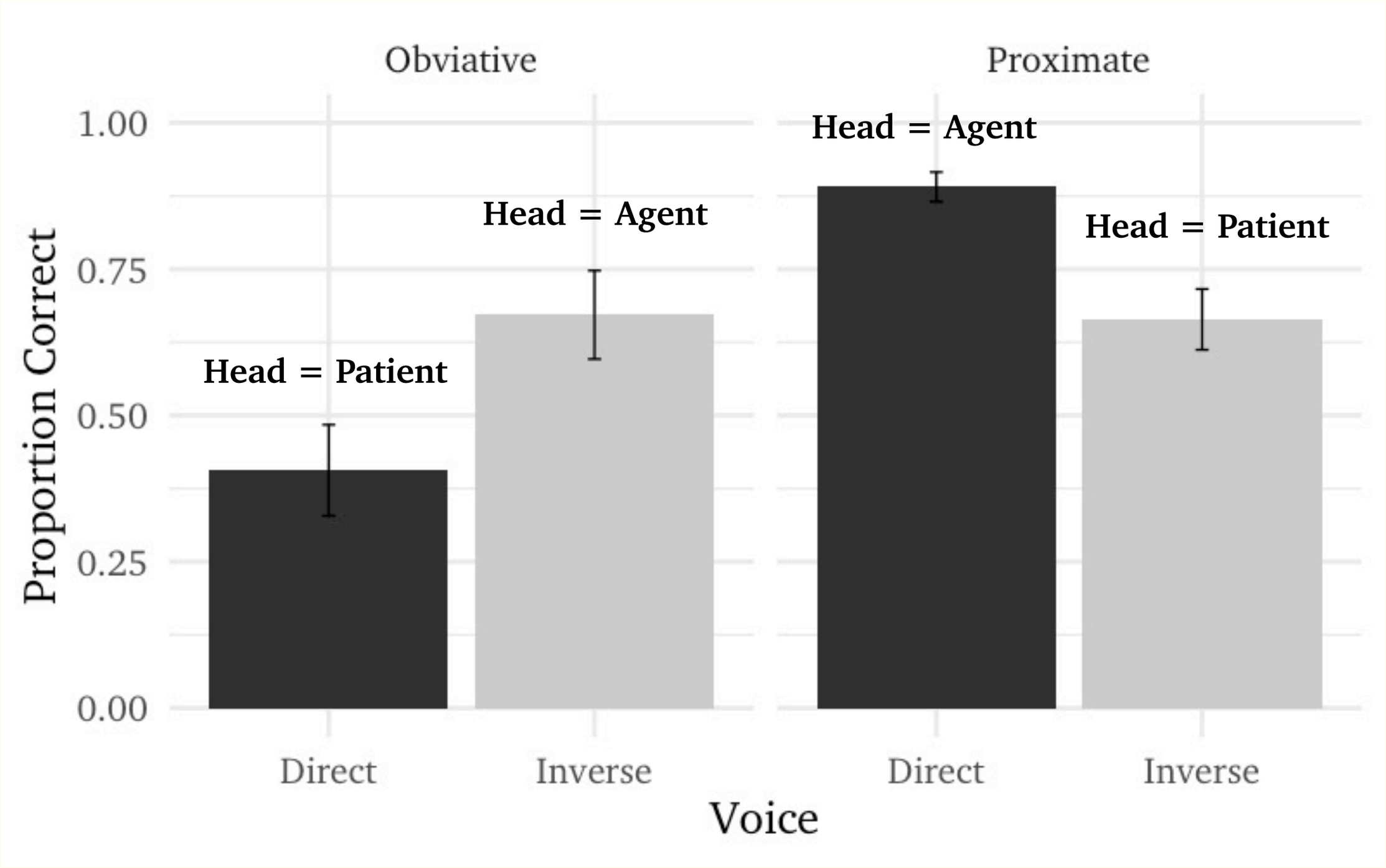

Summary of results

Under ambiguity (before Voice):

- Anticipatory looks towards the agent image with proximate heads
- No preference with obviative head nouns

Following disambiguation (after Voice):

- More accurate responses with proximate heads
- More accurate responses when the head is the agent (regardless of obviation)

The Proposal

The Revised Active Filler Strategy (Hammerly 2020)

A filler predictively and incrementally extends a comprehender's syntactic representation to include a movement chain such that:

a. The chain terminates in a theta-assigning position

b. Each link *minimizes* syntactic distance

c. Each link *maximizes* (expected) well-formedness

Chain Termination

Two possible argument positions in a transitive clause

FILLER … [$_{IP}$ __$_{SUBJ}$ … [$_{vP}$ __$_{EA}$ [$_{√P}$ __$_{IA}$]] **EA = Agent**

FILLER … [$_{IP}$ __$_{SUBJ}$ … [$_{vP}$ __$_{EA}$ [$_{√P}$ __$_{IA}$]] **IA = Patient**

Minimize syntactic distance

There are two *effects* that follow from distance minimization.

Subject Gap Advantage

FILLER … [IP ___SUBJ … [vP ___EA [√P ___IA]]

FILLER … [IP ___SUBJ … [vP ___EA [√P ___IA]]

Multiple small links
>
Fewer long links

***Agent First Preference*:**

FILLER … [IP ___SUBJ … [vP ___EA [√P ___IA]]

FILLER … [IP ___SUBJ … [vP ___EA [√P ___IA]]

Shorter chains
>
Longer chains

Maximize (incremental) well-formedness

Idea: Incremental predictions are generated based on what syntactic representations are *most likely to be* well-formed given the available (incomplete) information

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I. **(Partial) Person-Animacy Hierarchy:** PROXIMATE > OBVIATIVE

II. **General Syntactic Hierarchy:** HIGH > LOW

  a. *Argument Position*: EA (AGENT) > IA (PATIENT)

  b. *Derived Position*: SUBJECT > NON-SUBJECT

Prefer/Require Direct over Inverse!

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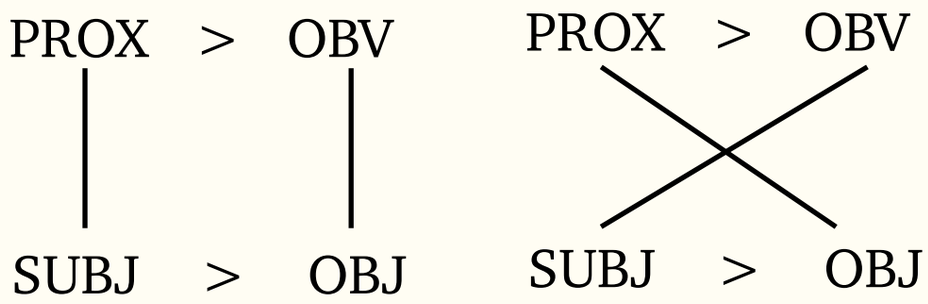
Proximate-Subject Alignment Condition



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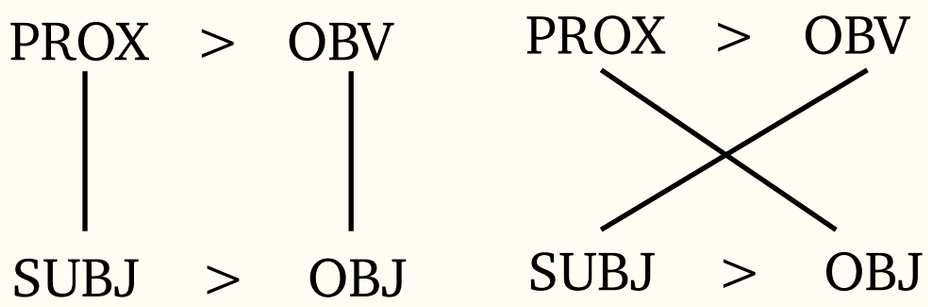

Proximate Subjects

>

Obviative Subjects

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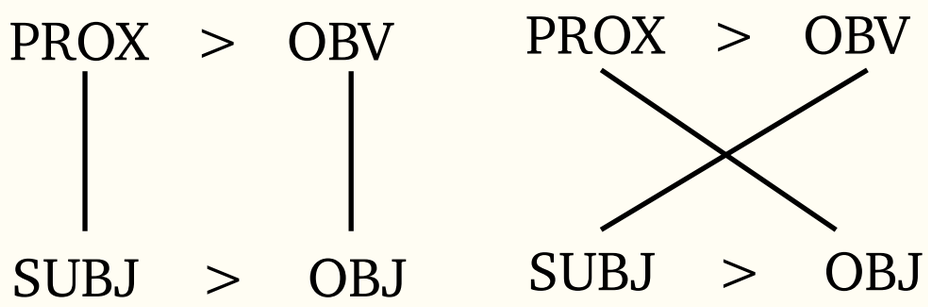
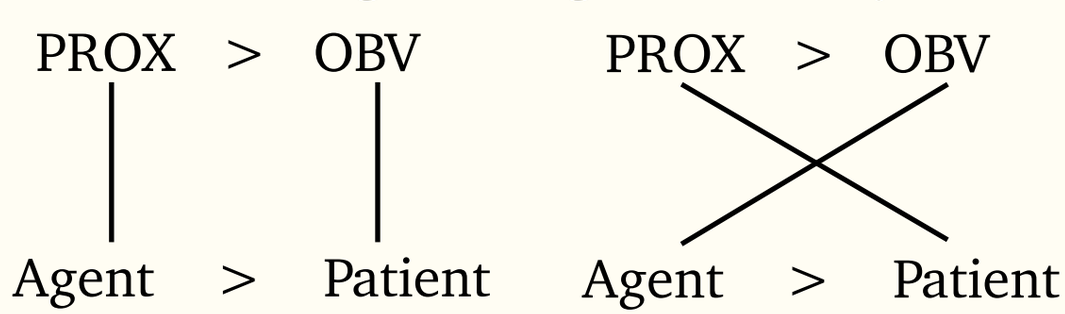


Proximate Subjects
>
Obviative Subjects

Proximate-Agent Alignment Preference



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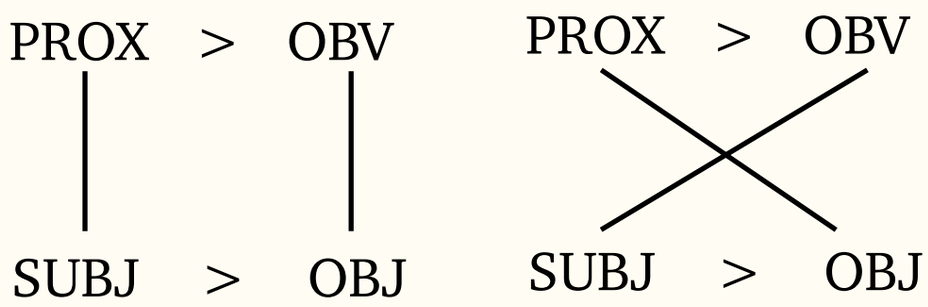

Proximate Subjects
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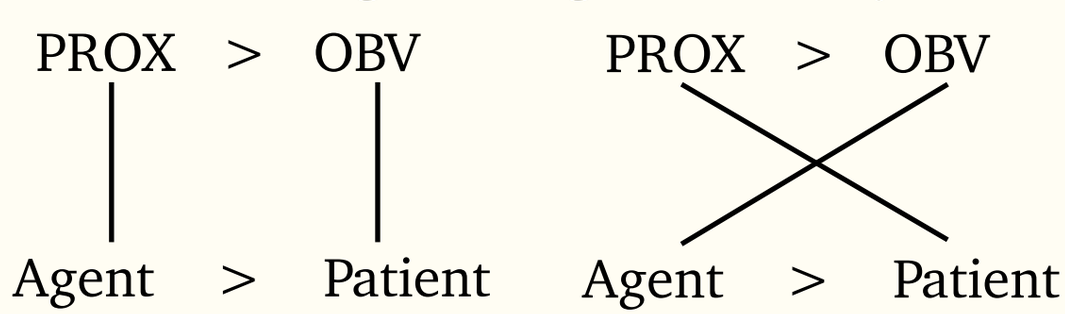
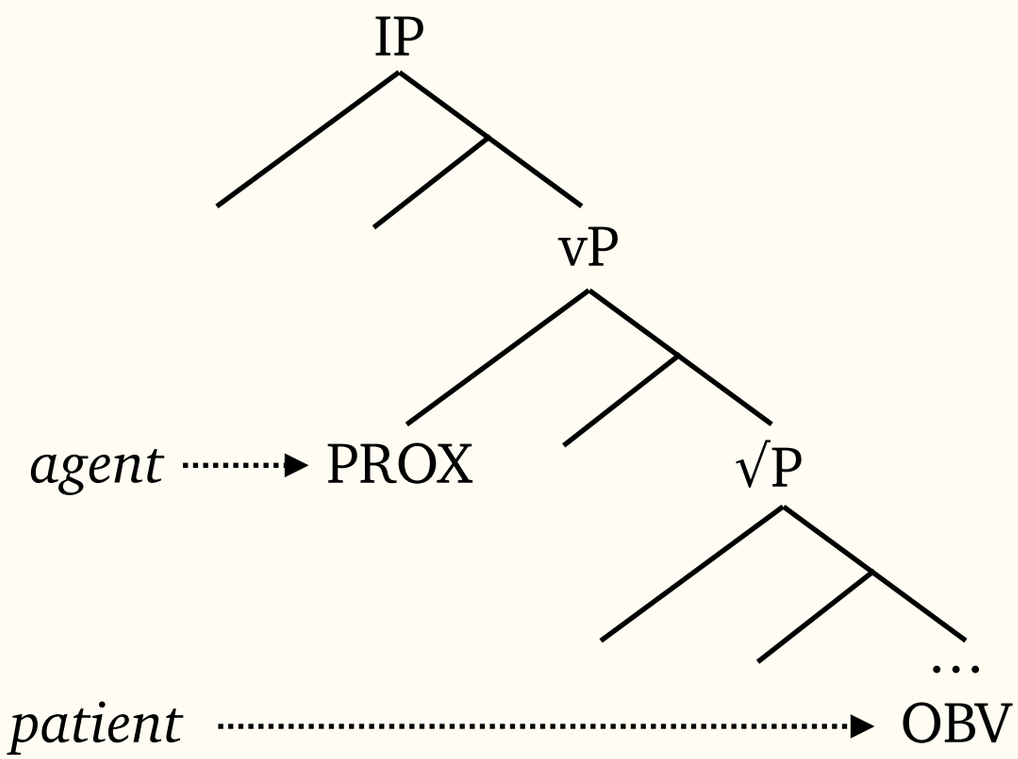


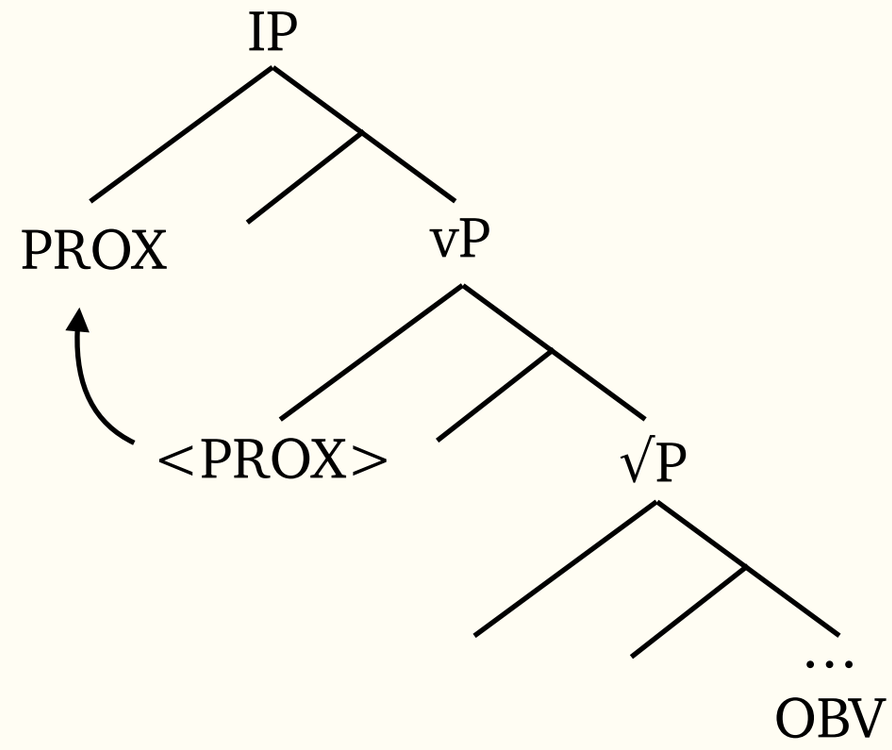
Proximate Agents
>
Obviative Agents

Direct alignments: Syntactic consequences

Recall: With "direct" alignments, the proximate <u>agent</u> is promoted to subject position



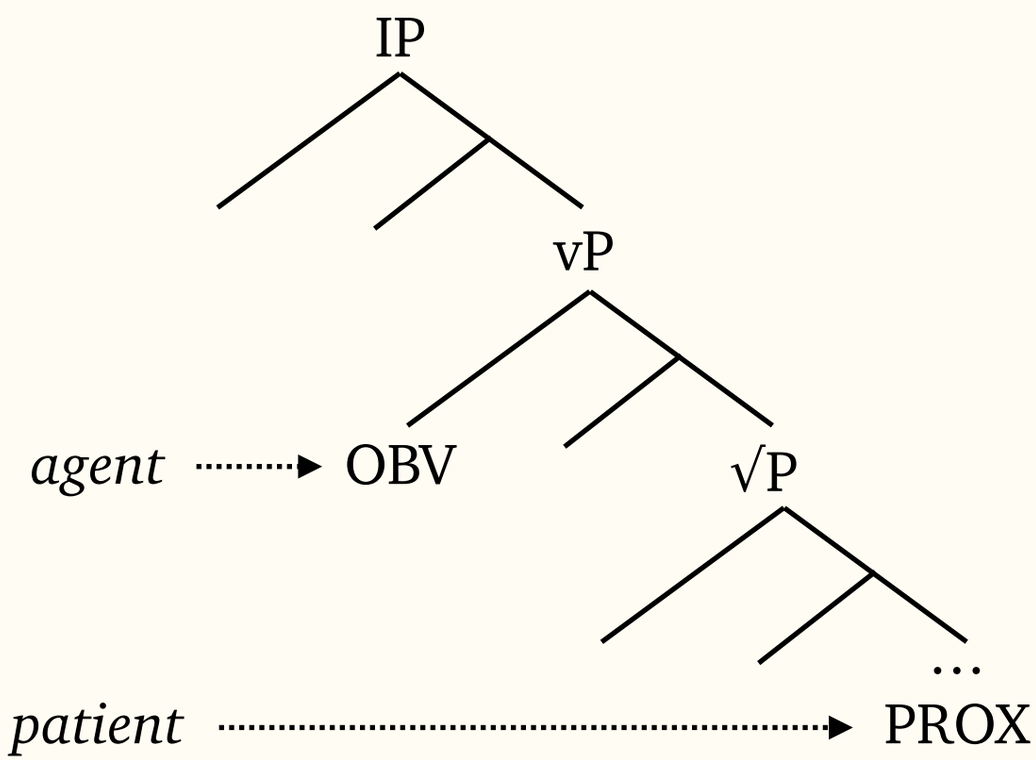
Proximate-Agent Preference <u>obeyed</u>



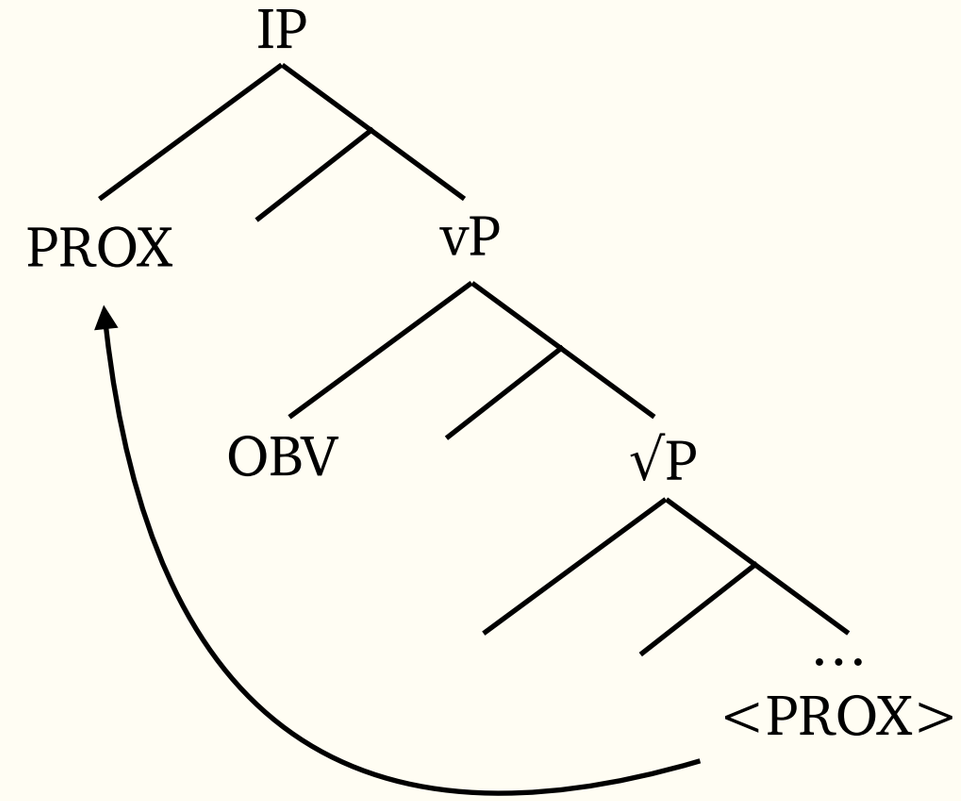
Proximate-Subject Condition <u>obeyed</u>

Inverse alignments: Syntactic consequences

Recall: With "inverse" alignments, the proximate <u>patient</u> is promoted to subject position



Proximate-Agent Preference <u>violated</u>



Proximate-Subject Condition <u>obeyed</u>

Returning to the results

Under ambiguity (before Voice):

- Anticipatory looks towards the agent image with proximate heads
  - ➡ Alignment of pressures underlying Agent-First (Filler = EA) and Proximate-Agent (Proximate = EA) Preferences.
- No preference with obviative head nouns
  - ➡ Conflict between pressures underlying Agent-First (Filler = EA) and Proximate-Agent (Obviative = IA) preferences.

Following disambiguation (after Voice):

- More accurate responses with proximate heads
  - ➡ The emergence of the Subject Gap Advantage
- More accurate responses when the head is the agent (regardless of obviation)
  - ➡ The emergence of the Agent-First Preference

Lessons

- There are four pressures, and they often compete, leading to complex interactions. These pressures are very general, and are not unique to Ojibwe.
- Ojibwe speakers make *active us*e of obviation information as a sentence unfolds.
- Direct versus inverse is not *just* a direction marker—there are syntactic differences (as has been noted for some time), which can be seen in the processing differences between the two.
- Learners and linguists alike can make use of these findings to understand what it means to speak and understand Ojibwe

An abbreviated *miigwech*!

The communities at *Seine River* and *Nigigoonsiminikaaning*, particularly Nancy Jones, Don Jones, and Andrew Johnson for recruitment, stimuli help, and support. Also, Elijah Forbes for the amazing art for the study.

My dissertation committee, **Brian Dillon, Rajesh Bhatt, and Adrian Staub**, as well as the whole psycholinguistic and syntax community as UMass. Thanks also to Claire Halpert and the UMN colloquium audience, and audiences at UBC, the University of Toronto, and the 52nd Algonquian Conference for previous feedback.

The *National Science Foundation* for financial support via a *Doctoral Dissertation Research Improvement Grant* and the *Graduate Research Fellowship Program*. Also, *The Graduate School* for supporting the work with a *Dissertation Fieldwork Grant*.