

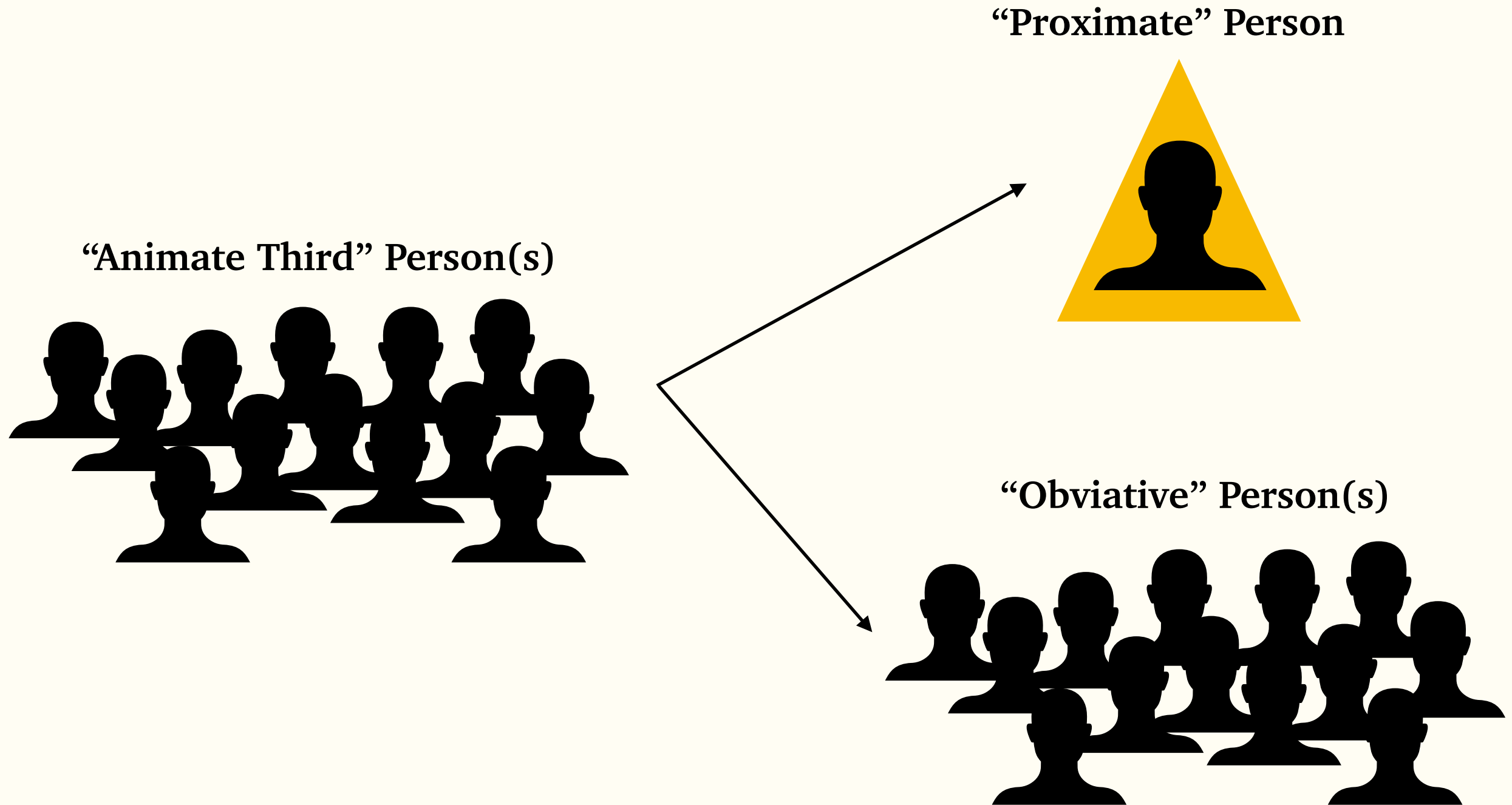
Processing obviation and voice in Border Lakes Ojibwe

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A starting point: person-based prominence

- **Person-based prominence** is the observation that certain *categories* of “person” are privileged by the grammar (e.g. Silverstein 1976; Lockwood & Macaulay 2012).
- LOCAL (1/2) > PROXIMATE (3) > OBVIATIVE (3') > INANIMATE (0)
- The question: **How is this information used in processing (by speakers of Ojibwe)?**
- But first: **What are the grammatical effects of prominence (in Ojibwe)?**

Obviation



The effect of PROX > OBV

PROX → OBV = DIR

o-waabam-**aa**-n

3-see-3-3'

“S/he (PROX) sees h/ (OBV)”

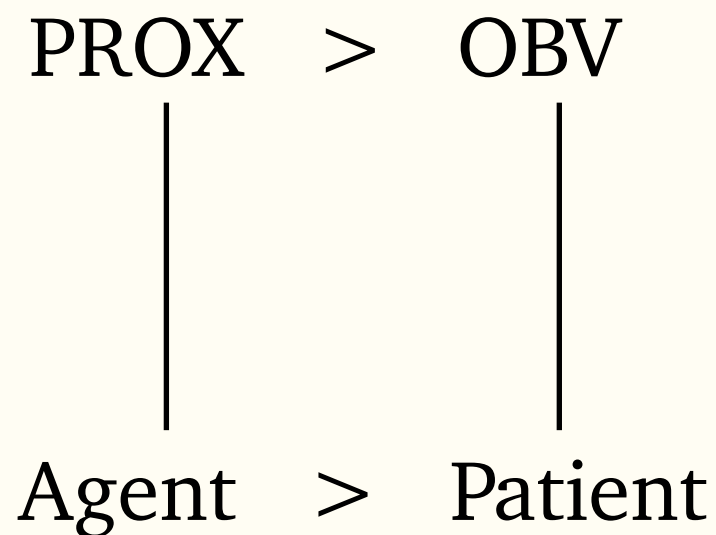
OBV → PROX = INV

o-waabam-**igoo**-n

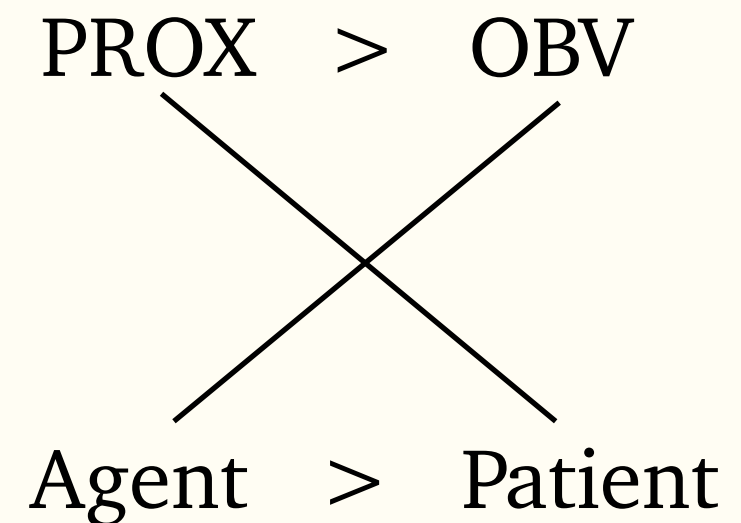
1-see-INV-3'

“S/he (OBV) sees h/ (PROX)”

“Direct Alignment”



“Inverse Alignment”



From the grammar to the parser

Theories of Grammar:

What are the representations that underly well-formed utterances?

Theories of Parsing:

How are well-formed representations constructed in real-time?

The challenge of incrementality:

How do we make parsing commitments with incomplete information?

(How) do comprehenders use prominence information (e.g. animacy, obviation) to generate expectations about upcoming structures/meanings?

i.e., predictions about will be subject/object or agent/patient

Subject Gap Advantage

It has long been observed that *subject relative clauses* (and indeed 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 reporter** who ____ quoted the journalist.*

Animate ORC: *There's **the reporter** who the journalist quoted ____.*

Theory: When a **filler** is identified, a subject gap or agent role is expected.

- ➔ When this turns out to be correct (with SRCs) processing is easy
- ➔ When this is not correct (with ORCs) processing is hard due to reanalysis or the general violation of expectations.

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).

In predictive terms, we can say that the predicted probability of a subject gap is modulated by the animacy of the filler:

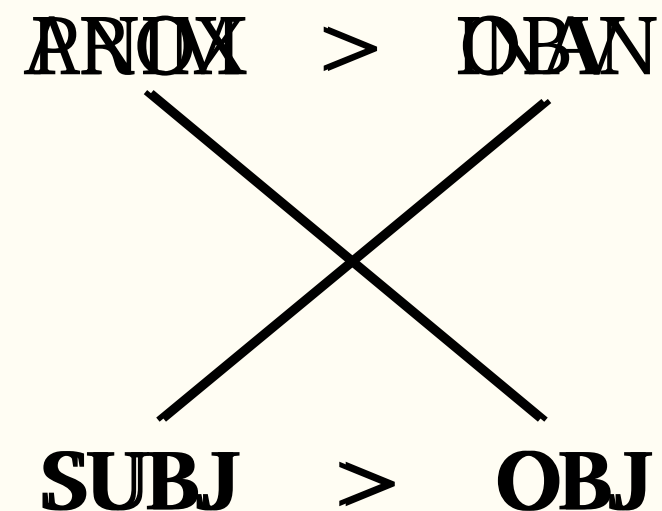
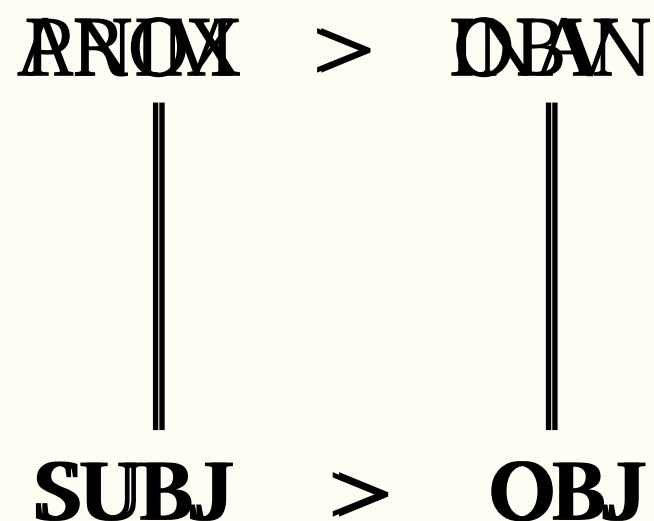
- **Animate** nouns lead to a **strong** subject-gap or agent prediction
- **Inanimate** nouns **weaken** or **erase** the subject-gap or agent prediction

Proposal: The PAH guides incremental commitments

A generalization: Higher ranked categories engender strong subject gap predictions than lower ranked ones

In other words: “Direct” alignments are *expected* over “Inverse”

PAH: LOCAL > PROXIMATE > OBVIATIVE > INANIMATE



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

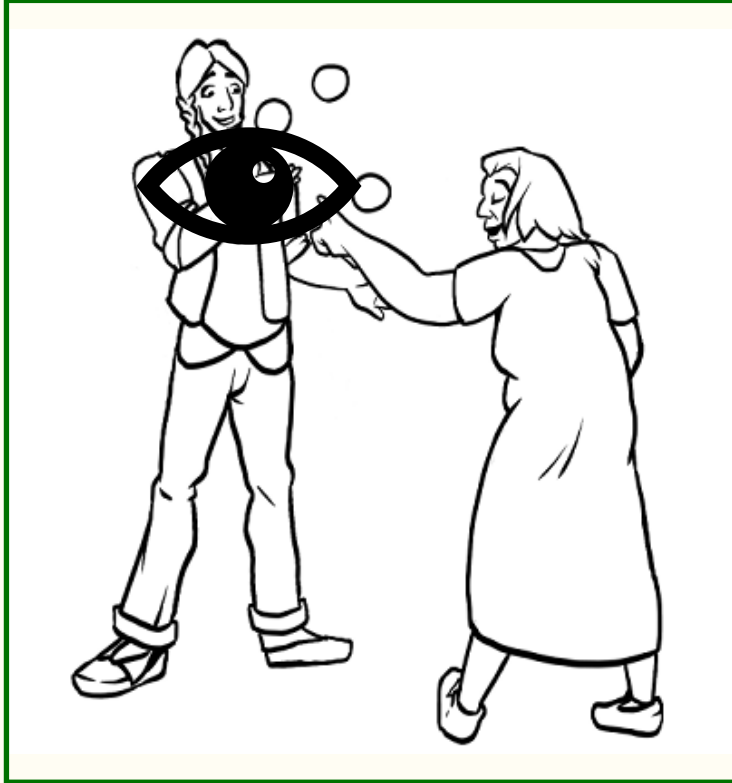


The current study



Outline of the task

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



Stimuli Design

Onaabandan mazinaakizon ...

choose 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 __”

Head = Obviative
Voice = Direct

Stimuli Design

Onaabandan mazinaakizon ...

choose picture

“Choose the picture with...”

Head = Proximate

Voice = Direct

... **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)”



"Elder laughing at man"



"Man laughing at elder"

Stimuli Design

Onaabandan mazinaakizon ...

chooose picture

“Choose the picture with...”

Head = Proximate

Voice = Inverse

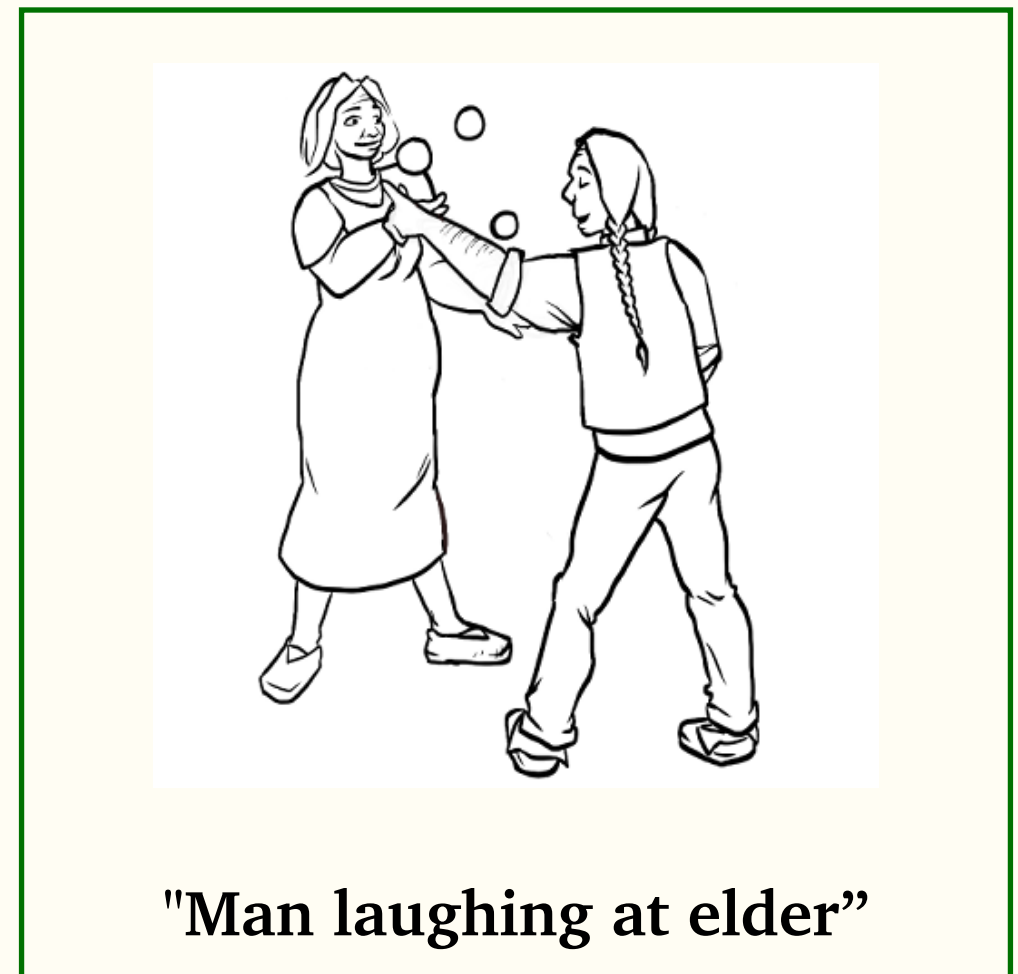
... **gichi-aya'aa** gaa-baapi'-igo-d inini-wan

... **elder.PROX** REL-laugh-INVERSE-3 man-OBV

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



"Elder laughing at man"



"Man laughing at elder"

Stimuli Design

Onaabandan mazinaakizon ...

choose picture

“Choose the picture with...”

... **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



"Elder laughing at man"



"Man laughing at elder"

Stimuli Design

Onaabandan mazinaakizon ...

choose picture

“Choose the picture with...”

... **gichi-aya’aa-n** gaa-baapi’-aa-d inini
... elder-OBV REL-laugh-DIRECT-3 man.PROX

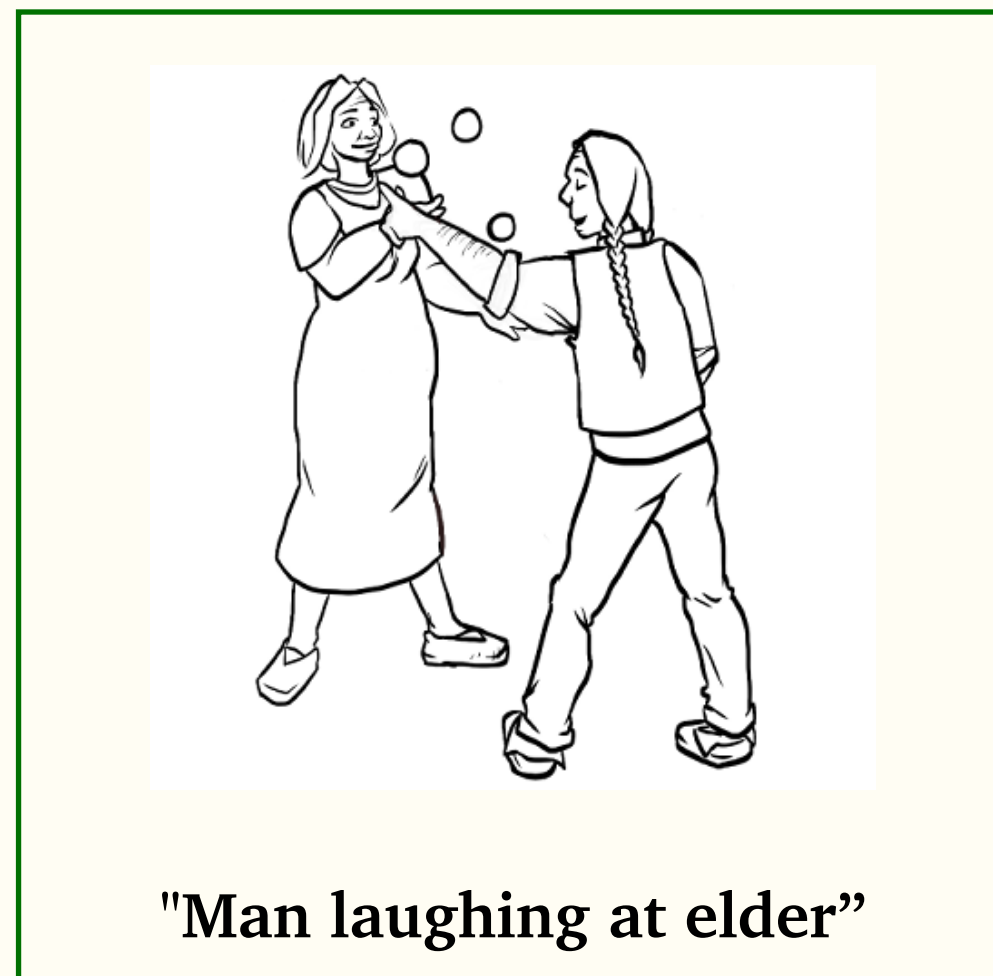
“... the elder (OBV) who the man (PROX) is laughing at”

Head = Obviative

Voice = Direct



"Elder laughing at man"



"Man laughing at elder"

Stimuli Design: Analysis Regions

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

The main questions

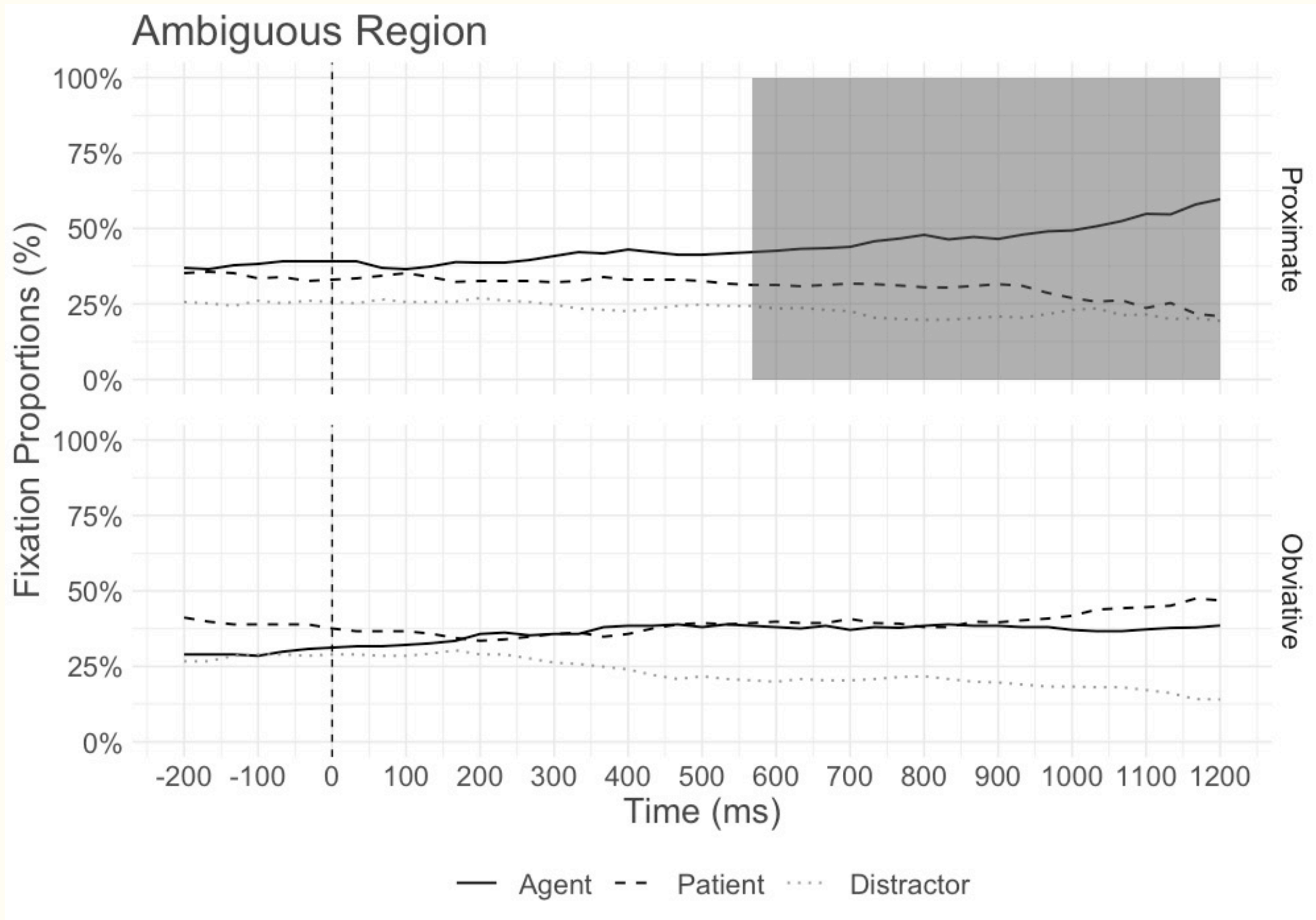
During the ambiguous region, where it is not yet known *for sure* whether the head noun is the agent or patient, do Ojibwe listeners make an assumption based on obviation?

- 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*?
- This provides the first *incontrovertible* test for prediction.

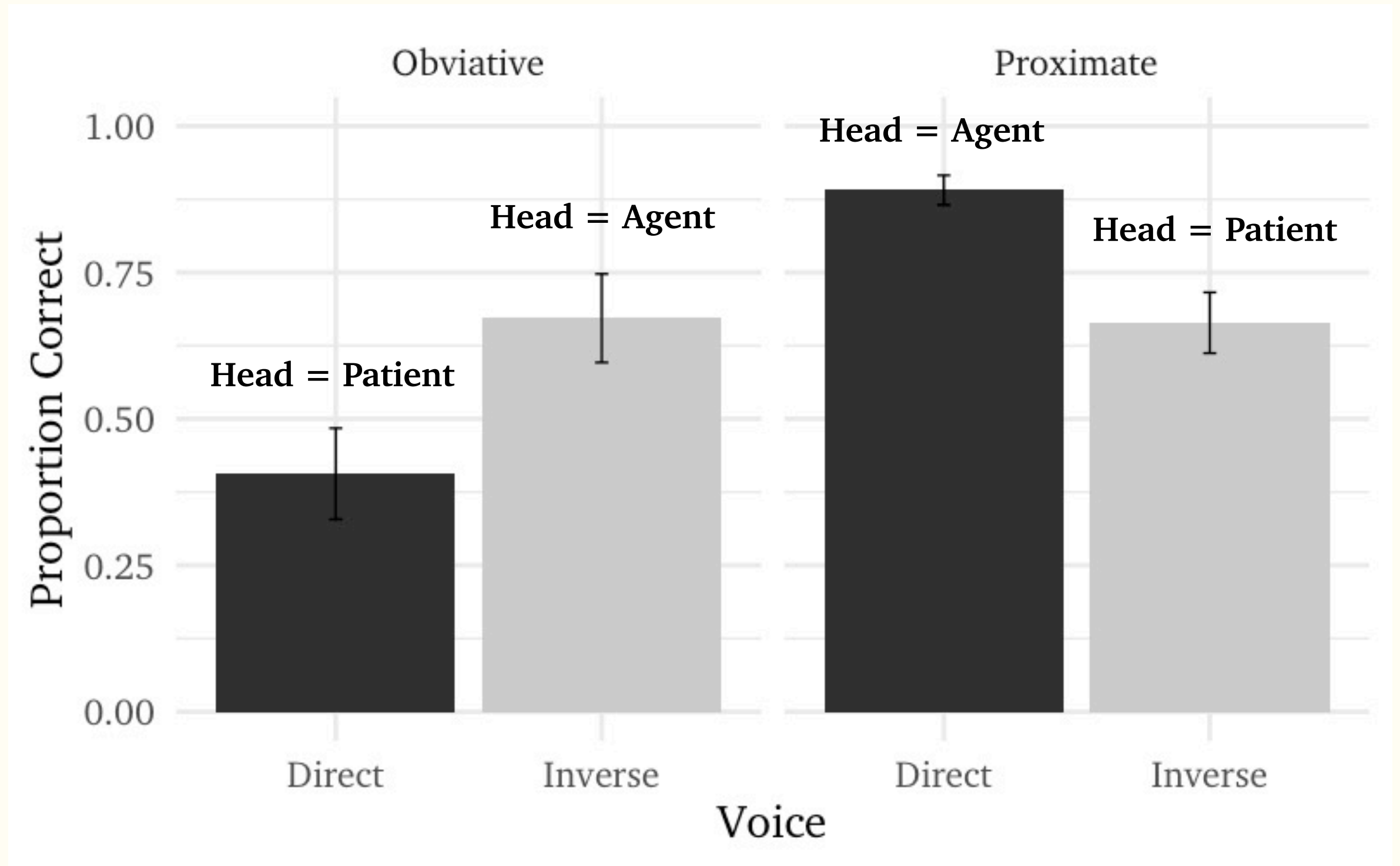
How accurate is interpretation after disambiguation?

- We can measure this by examining picture selections.

Ambiguous Region (all responses)



Accuracy (post-resolution interpretation)



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

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 [vP ____ IA]]]
 → →

FILLER ... [IP ____ SUBJ ... [vP ____ EA [vP ____ IA]]]
 →

Multiple small links

>

Fewer long links

Agent First Preference:

FILLER ... [IP ____ SUBJ ... [vP ____ EA [vP ____ IA]]]
 →

FILLER ... [IP ____ SUBJ ... [vP ____ EA [vP ____ 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

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

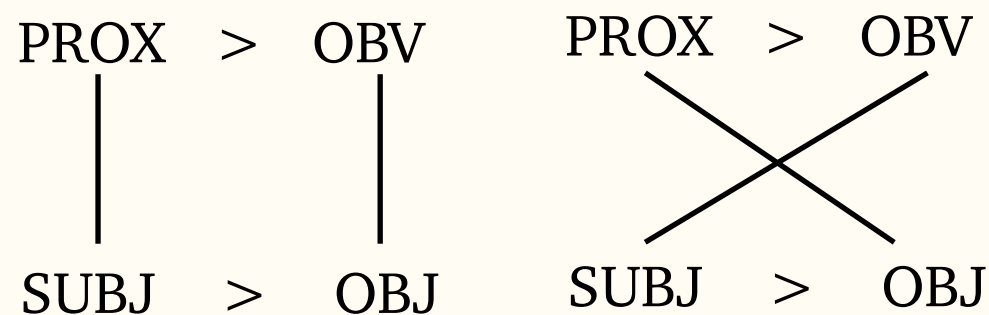
II. General Syntactic Hierarchy: HIGH > LOW

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

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

Prefer/Require Direct over Inverse!

Proximate-Subject Alignment Condition

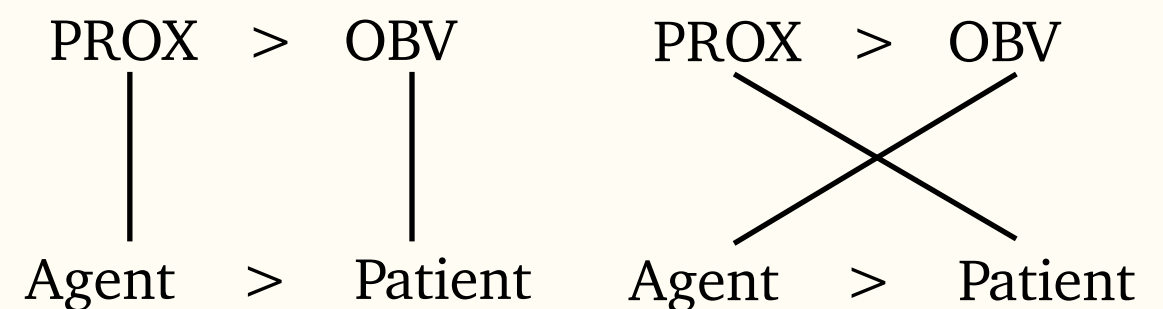


Proximate Subjects

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Obviative Subjects

Proximate-Agent Alignment Preference



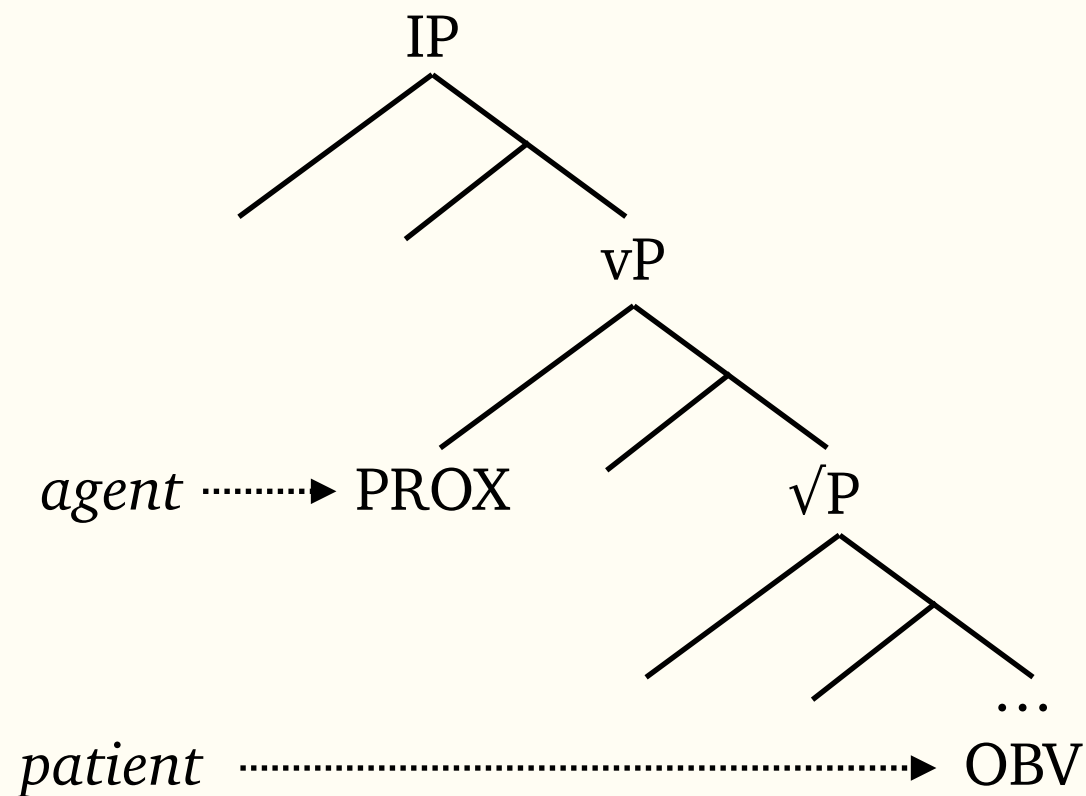
Proximate Agents

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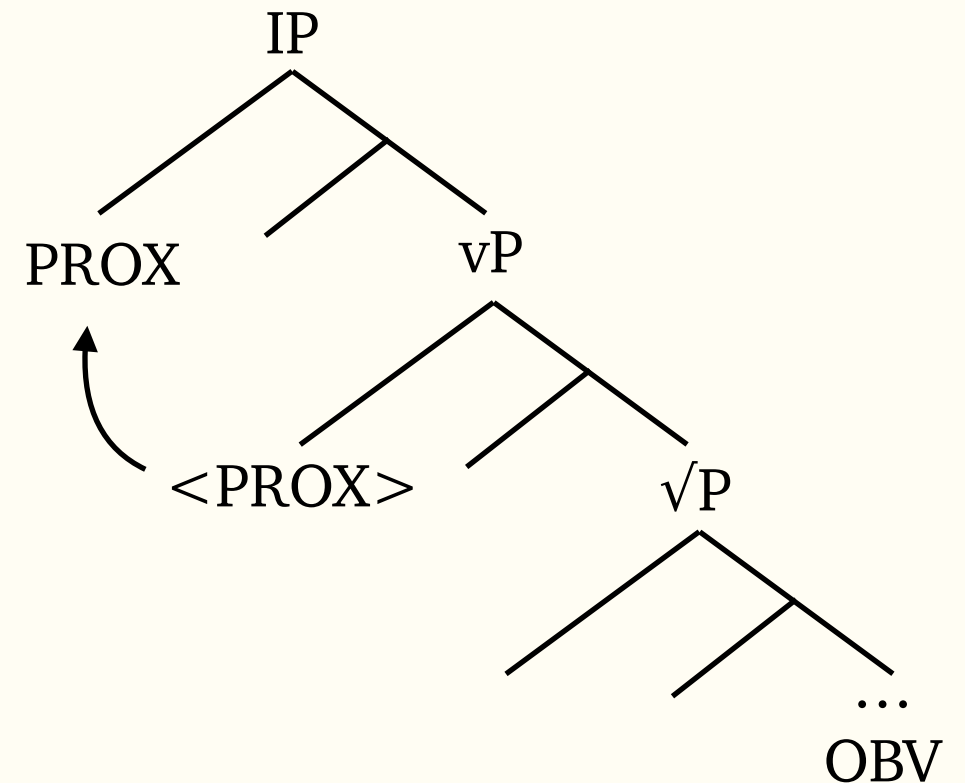
Obviative Agents

Direct alignments: Syntactic consequences

With “direct” alignments, the proximate agent is promoted to subject position



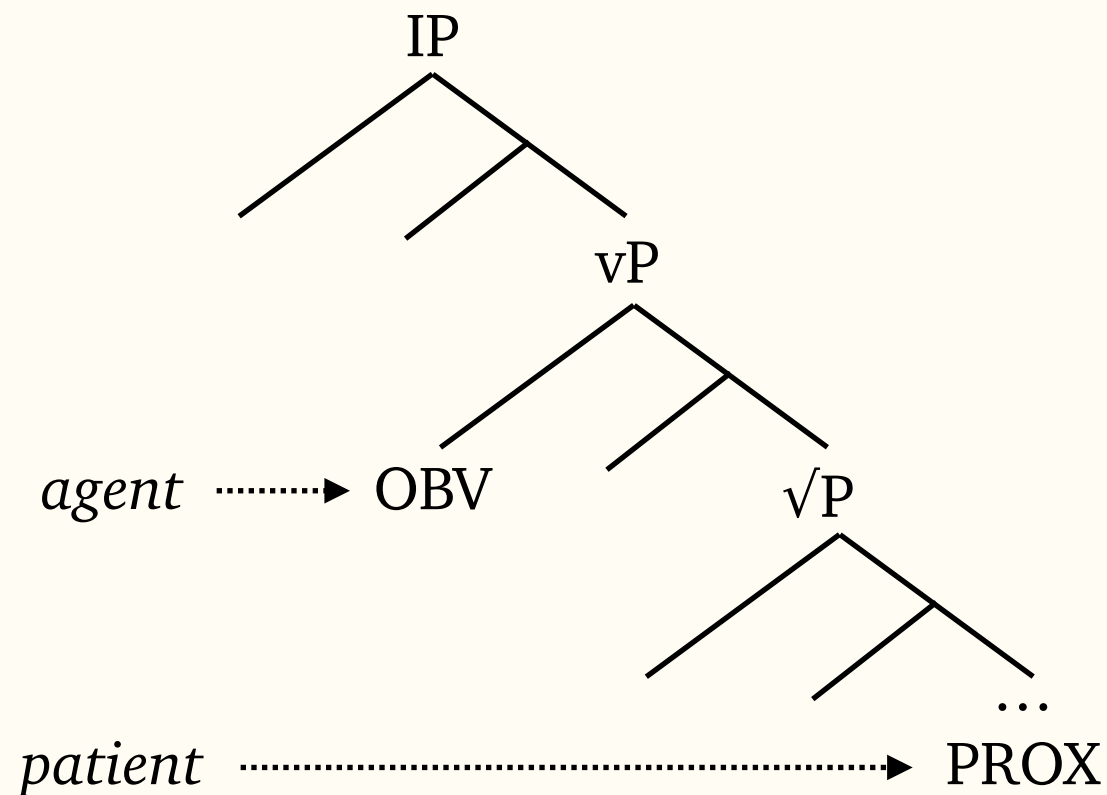
Proximate-Agent Preference obeyed



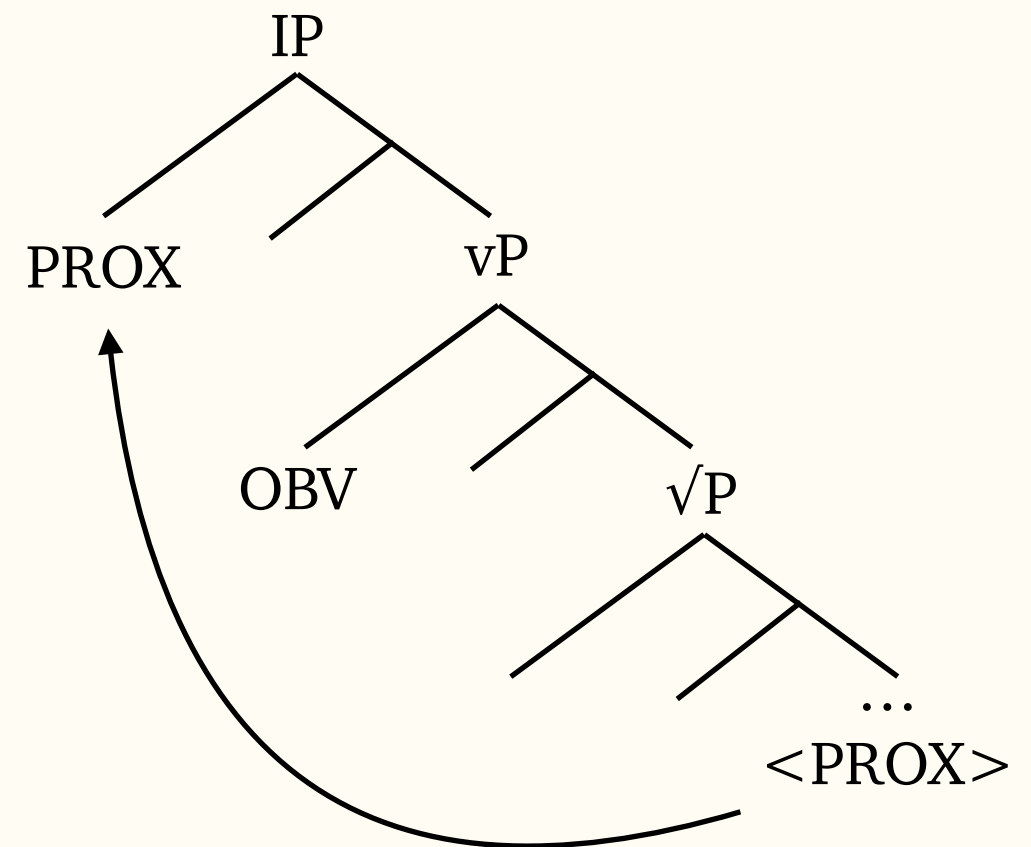
Proximate-Subject Condition obeyed

Inverse alignments: Syntactic consequences

With “inverse” alignments, the proximate patient is promoted to subject position



Proximate-Agent Preference violated



Proximate-Subject Condition obeyed

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 use* of obviation information as a sentence unfolds.
- Direct versus inverse is not *just* a direction marker—there are syntactic differences, which can be seen in the processing differences between the two.
- Learners and linguists alike can make use of this information to understand what it means to speak and understand Ojibwe

Future directions

- Run the task with learners (children or adults) to understand where there may be gaps between L1 and L2 speakers
- Understand how things like context and discourse factors affect these preferences. Inverse is not really a “neutral” sentence frame.
- Record sentences in different dialects and languages and work with different communities — the images can be used by anyone who is interested, and the code is open source! It could be you!
- Adapt the task to provide feedback, making it more of a game where learners have to comprehend and select the correct image.

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.

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