Encoding versus decoding.
Why do language users make sentence structure explicit?

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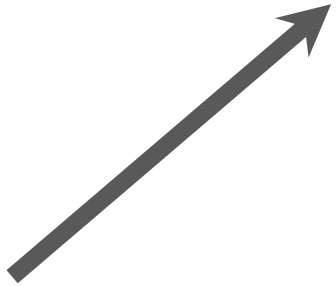
Cognitive Complexity Principle:

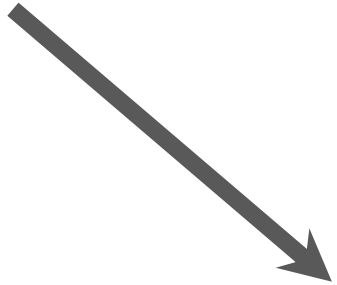
In case of more or less explicit grammatical options the **more explicit one(s)** will tend to be favored in cognitively **more complex environments**. (Rohdenburg 1996: 151)

(1) *Well, I'm not, because I understand **(that)** most of his girlfriends have either been, you know, like the hooker or porn star types.* (COCA, cited in Shank et al. 2016)

(2) *De Indiërs aarzelen **(om)** te investigeren in Uganda.* (Bouma 2017: 65)
The Indians hesitate (for) to invest in Uganda

Probabilistic Grammar





Complexity ~ Explicitness

Online processing:
spoken language

Processing constraints

Complexity ~ Explicitness

Offline processing:
written language & language tasks

Processing constraints **alleviated**

(Gries 2003: 48-66, Jaeger 2010)

Encoding or decoding?

- Implicit decoding-perspective (Hawkins 1990, 1992, 2004; Rohdenburg 1996, Bouma 2017,…)
  - Being explicit is burdersome for encoder
  - Encoder knows syntactic structure
  - Linguists decode
  - Training sessions

Encoding or decoding?

- Encoding-perspective
  - Bottleneck is encoding, not decoding (Levinson 2002: 28)
  - Encoder's altruism is evolutionarily implausible (Kirby 1999)

Encoding or decoding?

- Explicitness also has benefits for the encoder
  - Often allows for more flexible word order (Willems 2017)
  - Buys time (Ferreira & Dell 2000: 299)

(1) *Well, I'm not, because I understand* ***(that)*** *most of his girlfriends have either been, you know, like the hooker or porn star types.* (COCA, cited in Shank et al. 2016)

Encoding or decoding?

- Psycholinguistic experiments: **encoding** (overview in Ferreira & Dell 2000)

- Corpus research: **?** (Colleman 2006, Shank et al. 2016, Bouma 2017,…)
  - Hard to distinguish
  - Community level

Case study

(3) *We* ***zoeken*** *alternatieven*. (SoNaR corpus)

we search alternatives

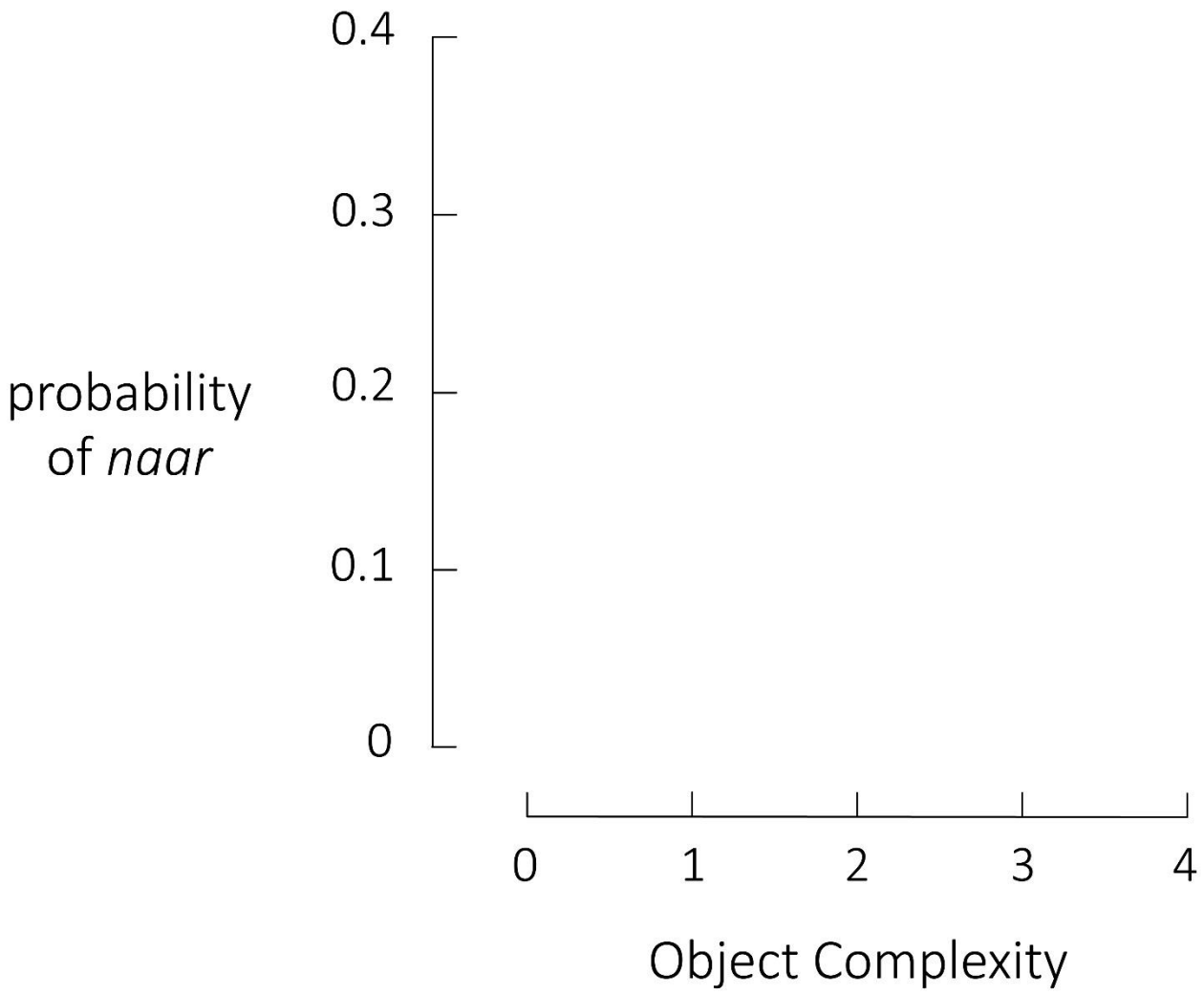
(4) *Wij* ***zoeken*** *dan wel* ***naar*** *alternatieven*. (SoNaR corpus)

we search then well to alternatives

SoNaR corpus (Oostdijk et al. 2010)

- Why **written** language? (Gries 2003: 48-66, Jaeger 2010)
  - Hyperconservative
  - Get enough data
- **Excluded** tweets, text messages, chats, discussion lists: quality of syntactic parses deemed too low
- Extracted all instances of ***zoeken*** **'to search'**, in which the object is overtly expressed: 61998 without *naar* vs. 17440 with *naar*

- Logistic regression model
- Response: presence of *naar*
- Add fixed effect: Object Complexity



Control for lectal factors

- 2 countries: Belgium, the Netherlands
- 20 components: newspapers, subtitles, wikipedia, blogs,…

	Belgium	The Netherlands	unknown
auto cues	4218	535	0
blogs	**0**	**0**	**36**
books	15	6685	0
brochures	162	15	7
e-magazines	1132	384	0
electronic newsletters	**0**	**0**	**1**
guides manuals	2	12	1
legal texts	2	7	85
newspapers	26465	10399	0
periodicals magazines	14898	2411	0
policy documents	29	6	679
printed newsletters	**0**	**7**	**0**
proceedings	23	1	0
reports	53	257	1
subtitles	**5967**	**0**	**2739**
teletext pages	**106**	**0**	**0**
texts for the visually impaired	**0**	**175**	**0**
web sites	143	87	0
wikipedia	**0**	**0**	**1673**

Control for lectal factors

- Added Text-type as random effect: Belgian subtitles, Netherlandic texts for the visually impaired, Belgian teletexts,…

Control for semantic factors

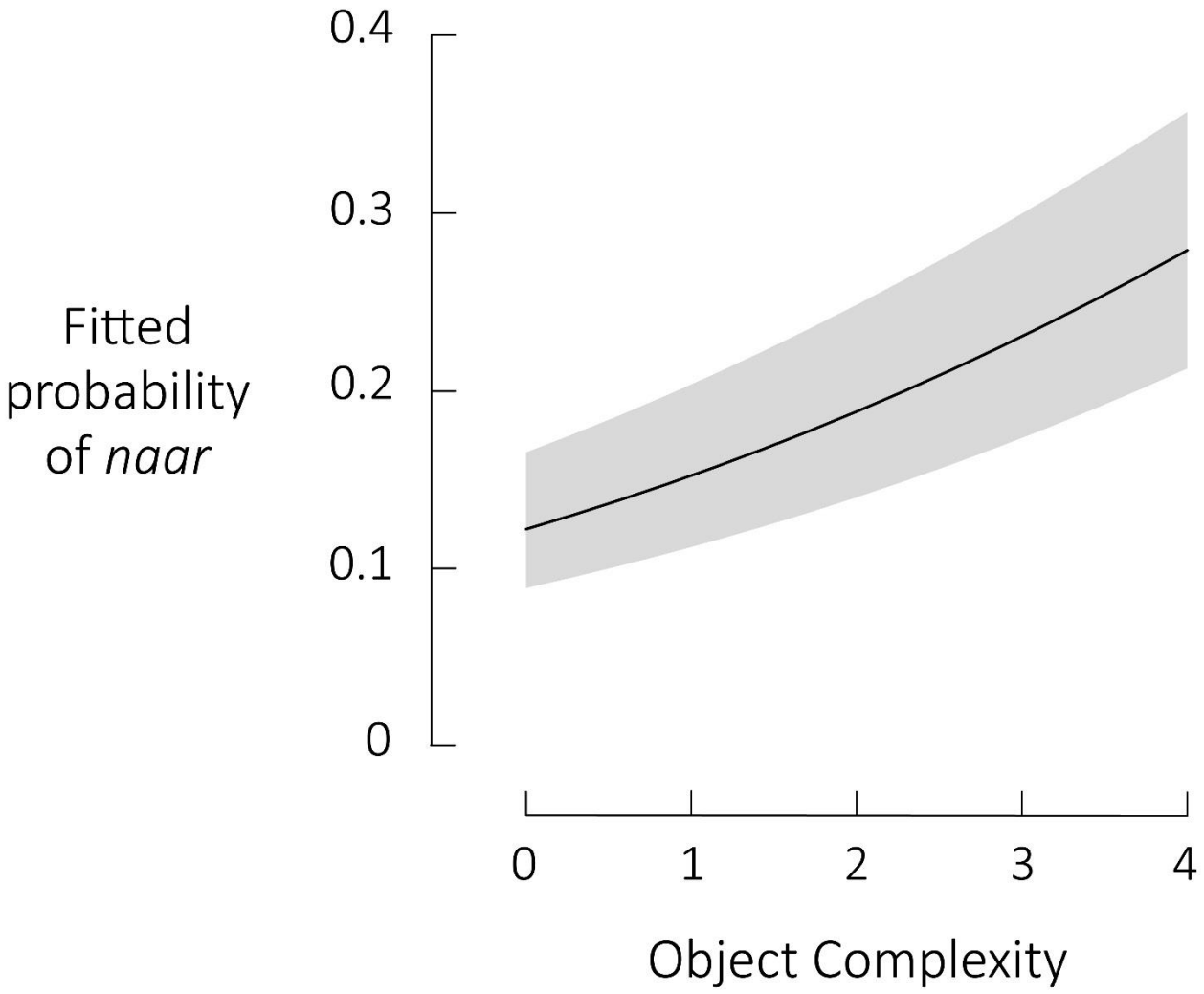
- Figurative 'seek to make/acquire': without *naar*
  - *contact* 'contact'
  - *aansluiting* 'association'
  - *bescherming* 'protection'
  - …
- Literal 'look for': with *naar*
  - *spoor* 'track'
  - *overlevende* 'survivor'
  - *slachtoffer* 'victim'
  - …

Control for semantic factors

- Added lemma of the syntactic head of the object as random effect
- Collapse levels if < 100 hits (Wolk et al. 2013) → 99 levels
- Removed *heil* 'salvation', *niets* 'nothing', *toenadering* 'overture', *toevlucht* 'refuge', *verkoeling* 'cooling': no variation

- 58444 without *naar* vs. 17439 with *naar*

- Coëfficient: 0.26, $p < 0.0001$



Encoding vs. decoding

- Encoding Hypothesis 1: *naar* allows for a more flexible word order

	Ik	***heb***	*gisteren een boek*	***gezocht***	
*	*Ik*	***heb***	*gisteren*	***gezocht***	*een boek*
	Ik	***heb***	*gisteren naar een boek*	***gezocht***	
	Ik	***heb***	*gisteren*	***gezocht***	*naar een boek*

Encoding vs. decoding

- Encoding Hypothesis 1: *naar* enables the encoder to extrapose complex objects to the postfield
- Encoding Hypothesis 2: *naar* buys time for the encoder to formulate a complex object
- Decoding Hypothesis: *naar* acts as a signpost in decoding, and marks "what follows now, is the object"

⇨ Remove all observations where the object is extraposed to the postfield

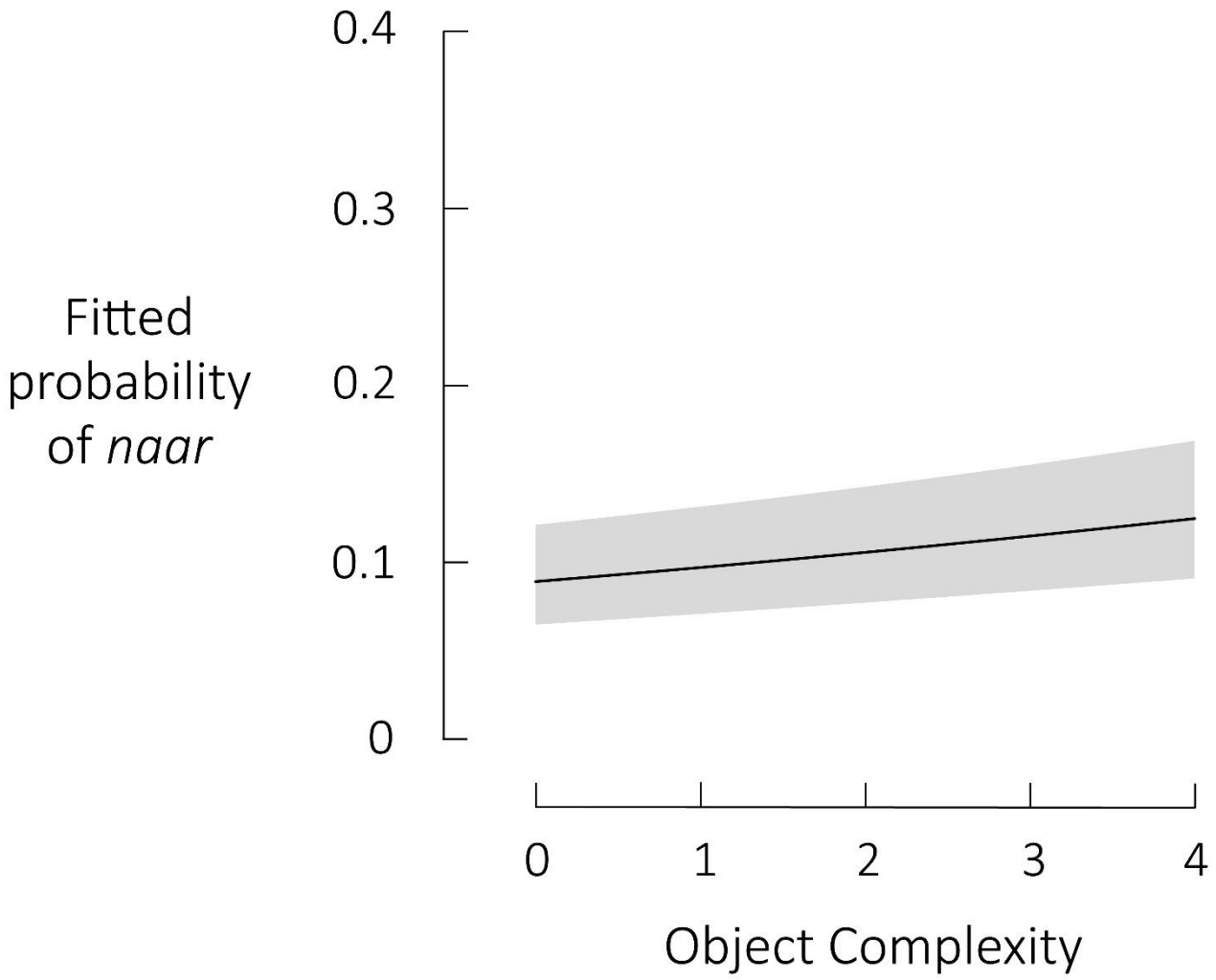
Encoding vs. decoding

- Encoding Hypothesis 1: word order, effect should disappear or reverse
- Encoding Hypothesis 2: buy time, effect should remain
- Decoding Hypothesis: signpost, effect should remain

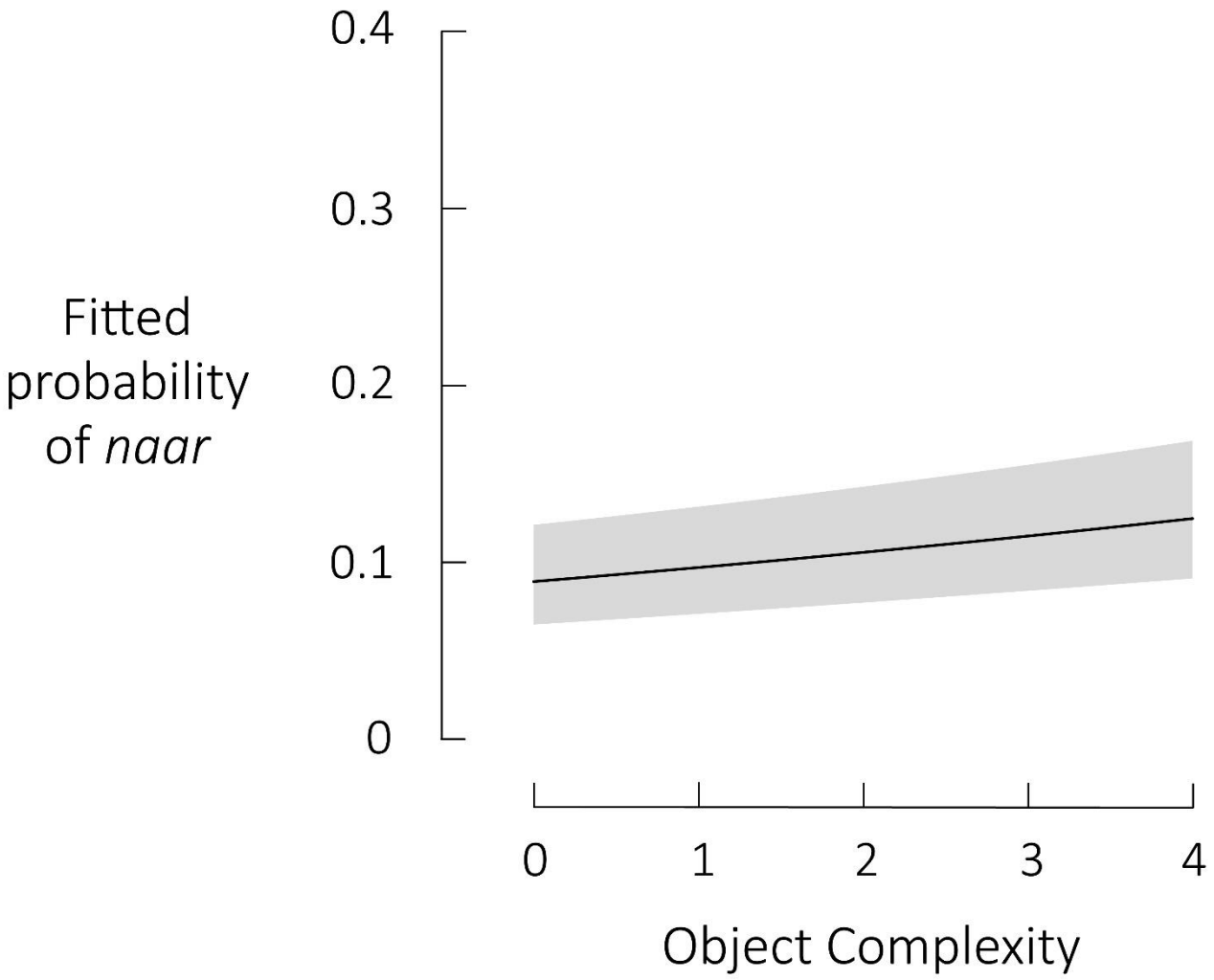
⇨ Remove all observations where the object is extraposed to the postfield

- 58444 without *naar* vs. 10959 with *naar*
- Coëfficient: 0.09, $p < 0.0001$

⇨ Effect greatly weakens



- Encoding Hypothesis 1: word order, effect should disappear CONFIRMED
- Encoding Hypothesis 2: buy time, effect should remain
- Decoding Hypothesis: signpost, effect should remain



Complex object preceeds the verb

(5) *<u>Naar politiek als roeping, of zelfs maar als ethos</u>,* ***zoekt*** *de lezer tevergeefs.*

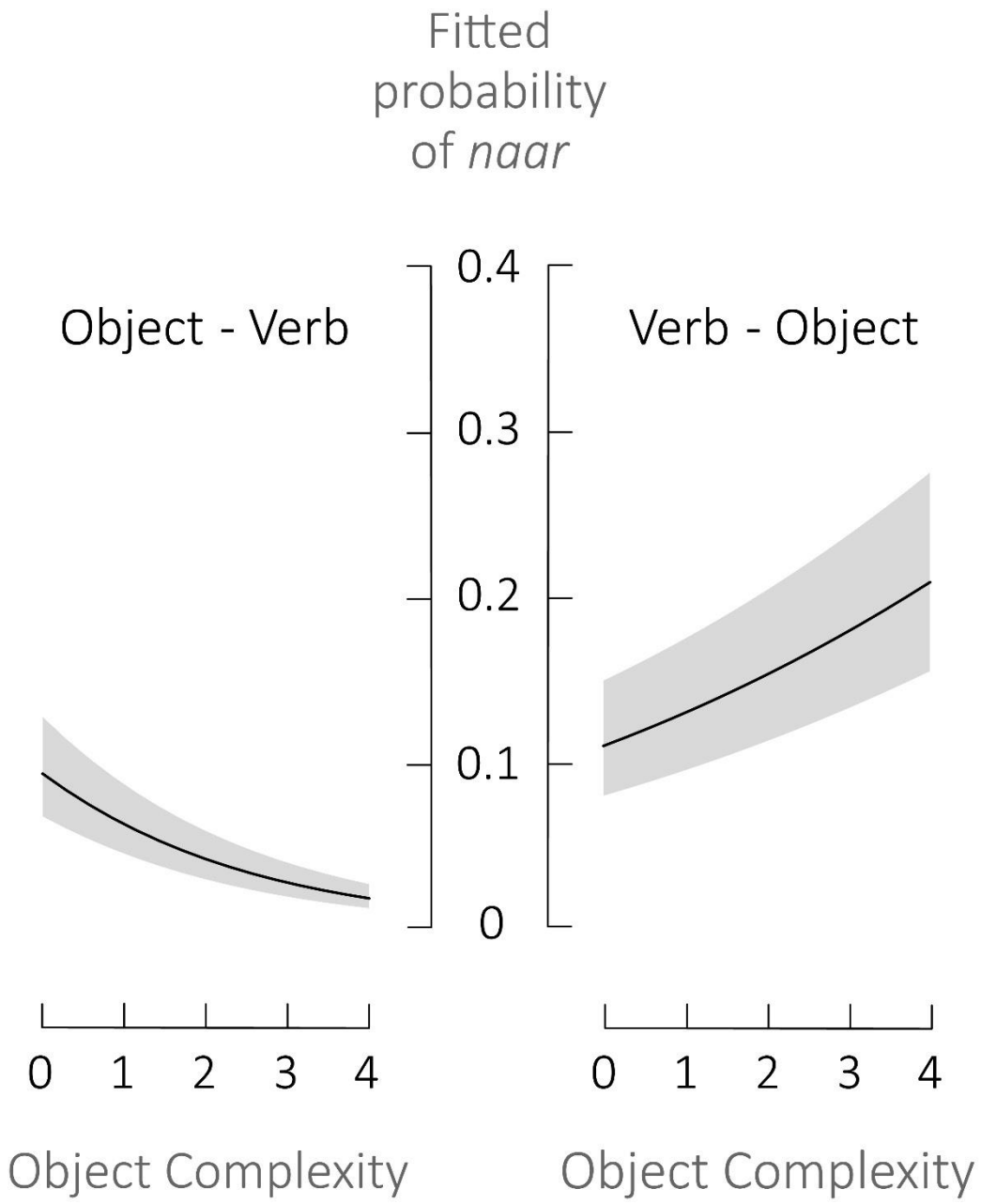
⇨ Encoder: *naar* 

⇨ Decoder: *naar* 

- Add interaction:
  Object Complexity & Object-Verb Order

- Encoding Hypothesis confirmed

- Decoding Hypothesis unconfirmed



Encoding versus decoding. Why do language users make sentence structure explicit?

To facilitate encoding

This dovetails with findings in psycholinguistic experiments, e.g. Ferreira & Dell's *that*-omission study (2000), and references cited therein.

Thanks!

Dirk Pijpops

Pijpops, Dirk and Dirk Speelman. 2017. **Alternating argument constructions of Dutch psychological verbs. A theory-driven corpus investigation.** *Folia Linguistica* 51(1): 207–251.

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