How Much Prosody is Needed? - Perception of Prosodic Grouping in Gated Ambiguous Name Sequences

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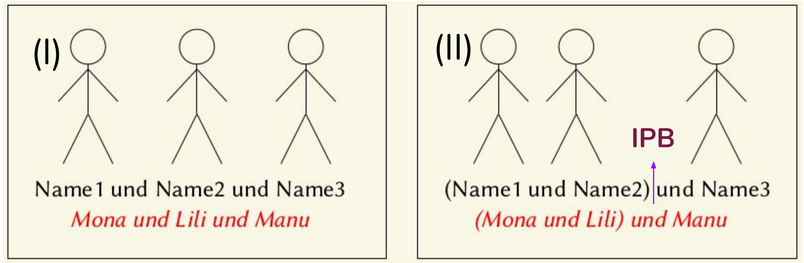
BACKGROUND

- in structurally ambiguous **coordinate structures**, such as (I) and (II), prosodic cues aid ambiguity resolution [1, 3]
- **intonation phrase boundaries** (IPB, see (II)) can indicate intended grouping [2, 4]
- speakers also modulate prosodic cues located before the IPB (i.e., at Name1) [2, 4]

leng = syllable duration
pau = pause
f0 = f0 rise



RESEARCH GOALS

Is a reliable detection of intended grouping possible already before the IPB?

➤ Test successive exploitation of prosodic cues in human population experimentally and through diffusion modeling

➤ Compare results to performance of machine learning (ML) models

METHODS

Human listeners (n=43):

- Gating Paradigm: 192 stimuli split into seven parts ("**gates**") each
- Gated stimuli presented successively with increasing length & amount of prosodic information
- Two alternative forced choice decision task: **grouping or no grouping**?

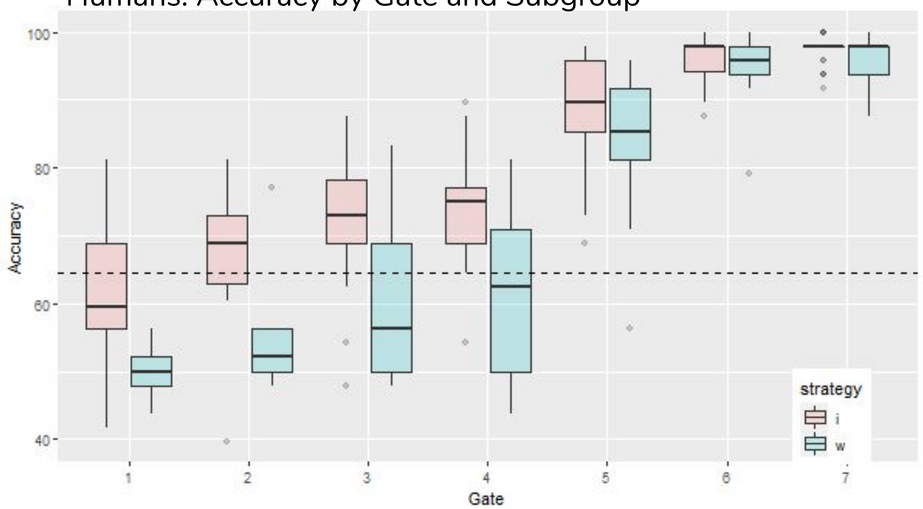
ML models:

- Linear classification models with increasing number of variables (prosodic cues), 6 models in total
- Logistic regression [6]
- Repeated *k*-fold cross-validation

Stimulus	Le	ni			und	Mim	mi			und	Ma	nu
Prosodic cues	leng	f0	leng	pau		leng	f0	leng	pau			
Gates	1	2			3	4	5			6	7	
ML models	1	2		3		4	5		6			

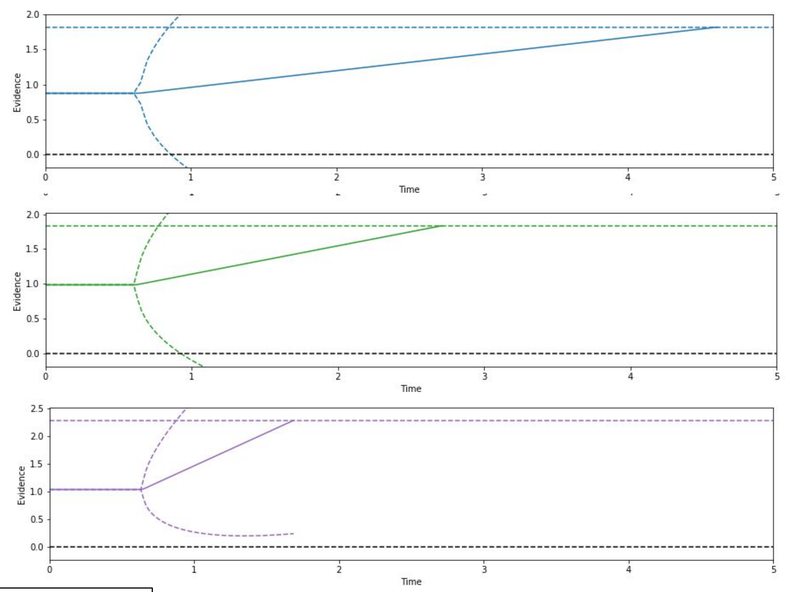
RESULTS & DISCUSSION

Humans: Accuracy by Gate and Subgroup

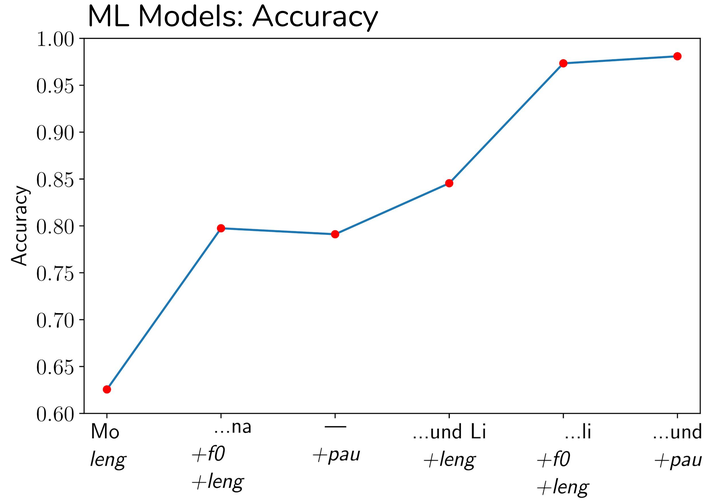


Two **subgroups** (Interrater Agreement) with different performance: Identification Strategy (i) > Waiting Strategy (w); Group level: **accuracy > chance** in gate 3; major increase in gate 5; some high accuracy scores (79%) already in gate 1, especially in i.

Humans: Drift rates over time (gate 1, gate 3, gate 5) from **Diffusion Models** [5]: higher drift = more correct & faster decisions



ML Models: Accuracy



Results from ML models: The last model, which uses all the available cues, achieved 98% accuracy in the classification task. This corresponds to gate 5 in the human study.

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