



# The Distribution of Non-referential Gestures, Information Structure and Prosody: A Corpus Study on Prominence Peak Alignment

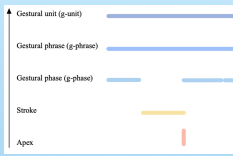
ALINA GREGORI & FRANK KÜGLER; Goethe University Frankfurt

## GESTURE

### Gesture Components

KENDON 1980, 2004

- Visible bodily action accompanying speech
- Hierarchically ordered
- Here: **stroke & apex**



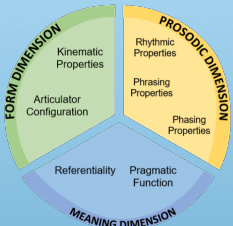
### Gesture Functionality

- Distinct gesture types McNEILL 1992 →

multiple dimensions ROHRER et al. 2023

- Semantic + structural contributions

- Here: **non-referential** → no semantic contribution to speech



## INFORMATION STRUCTURE (IS)

KRIFKA 2008, GÖTZE et al. 2007

Information Status - determined by context

**New**  
not previously mentioned

**Accessible**  
retrievable from discourse

**Given**  
explicitly mentioned

Focus - presence of alternatives in discourse

**Contrastive**  
overt presence of alternative

**Information**  
new sentence information

**Background**  
non-focused constituents

## PROSODY

Prominence GRICE & KÜGLER 2021:

'organizational principle' for linguistic structure

Pitch accent prominence scale (least → most):

∅ L\* IH\* H+L\* H\* L+H\*

BAUMANN & RÖHR 2015

### Interaction Prosody-IS

- Higher f0 → higher prosodic prominence
- Pitch accents & IS correlate with regard to prominence e.g., KÜGLER & CALHOUN 2020
- Greater newness/informativeness: higher prosodic prominence

### Interaction Prosody-Gesture

- Phonological synchrony rule McNEILL 1992
- Empirically: gesture & speech occur together e.g. LEONARD & CUMMINS 2011, LOEHR 2012

## RESEARCH QUESTIONS

Q1: Does IS influence the occurrence of non-referential gestures in spontaneous German speech?

Q2: Are pitch accents and gesture apexes aligned and is this alignment sensitive to IS?

## METHOD - CORPUS STUDY

German speech: Speech and Gesture Alignment corpus LÜCKING ET AL. 2010

Annotation: LISA GÖTZE et al. 2007; GToBI GRICE et al. 2005; M3D ROHRER et al. 2023

I. Distribution/Frequency analysis (Q1)

II. Temporal Synchronization analysis (Q2)

Apex

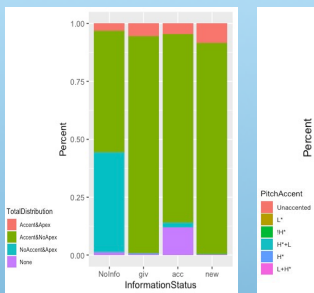
distance

Pitch accent

## Q1: Distribution/Frequency analysis

### Distribution

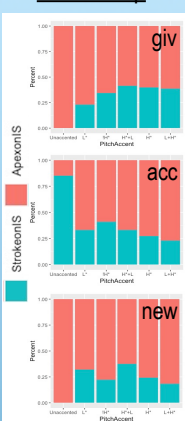
- Fewer gestures than pitch accents
- More gestures on prominent items
- Gestures without pitch accents on less prominent referents



## RESULTS

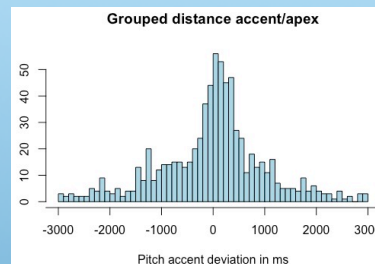
## Q2: Temporal Synchronization analysis

### PA Overlap



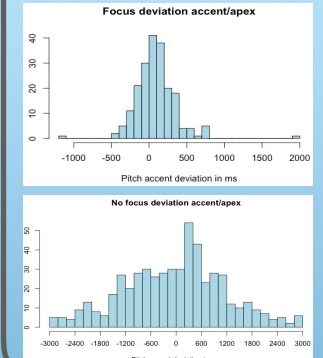
### General Alignment

- Mean deviation 38ms
- 54,5% PA after apex; 3,6% exactly aligned
- Standard deviation 385ms
- 66,8% within one second distance



### Split by Focus

- Narrow alignment in focus, broad in non-focus



## DISCUSSION

- Pitch accents and gestures are not completely synchronous; non-referential gestures occur with and without IS referents (Q1)
- When gestures and IS referents cooccur: apexes and pitch accents align on prominence scale
- Temporally: Gestures and prosody tend to occur simultaneously (Q2)
- Behavior sensitive to IS: closer aligned in Focus, bigger & wider spread distance in non-focus
- Acoustic prominence marking is supported by visual cues
- Phenomenon parallel to phonetics: **Multimodal Hyperarticulation** → steeper slopes in focus cf. LINDBLOM 1990, HANSSSEN et al. 2008 for phonetic hyperarticulation
- Prominence cues pitch accents & gestures are not mutually exclusive: **Cumulative Cue Hypothesis** AMBRAZAITIS & HOUSE 2022

## TAKE HOME MESSAGE

- (Pragmatic) prominence is marked multimodally
- IS mediates the relation of prosody and gesture
- Parallels between phonetic and multimodal behavior → phenomena work across modalities

## ACKNOWLEDGEMENTS

Thanks to the DFG (KU 2323/5-1, SPP 2392 "ViCom") and Goethe University Frankfurt for funding this research. Thanks to Andy Lücking for access to the SaGA corpus.