SFB Klausurtagung

Area A
Speech, Segmental and Prosodic Representations

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Overview of A-related projects

Key topics for phase 3
A1 Kamp/Dogil

- Incremental Specification of Focus and Givenness in a Discourse Context
  - prosodic phonology/discourse interface (Arndt Riester) will be continued in joint Reyle/Riester project (A6?)
  - phonetics of prosody work (with emphasis on database work, Kati Schweitzer) possibly continued in infrastructure project
• Exemplar Theory: Models and Experiments
  – refine/unify CSM and MLM models
    • integrate intonation (⇒ Kati Schweitzer)
    • extend to L2 production
  – category formation, and transfer of categories from L1 to L2
  – extend syntax acquisition with MLM to L2
  – model phase 2 results: convergence (⇒ A4), frequency effects on intonation (⇒ Kati Schweitzer)
• Phonetic Convergence in Spontaneous Speech
  – post-hoc finding from Natalie's diss: correlation between attention test and non-native convergence
  ⇒ add role of attention as a factor in convergence
    • record subjects in conversations first
    • test subjects for attention and memory
  – if confirmed, verify that attention is relevant in non-native convergence (⇒ A2, A5 & Kati Schweitzer, L2 data)
A5 Zerbian

• Cross-linguistic interactions in Second Language Prosody
  – phonological and phonetic properties of prosody in L2 where two algorithms for specification of prosody are in contact
  – German speakers of English and Black South African speakers of English
  – L1 differ in their prosodic systems
  – L1 influence or universals?
A6(?) Reyle/Riester

- **Room for interpretation**
  - prosodic variation can be triggered by non-deterministic semantic interpretation
    - Integrate into DRT representations
  - compare A1 results on discourse-prosody interface in German to French (⇒ B5, Fabienne Martin)
  - continue work on automatic annotation of discourse categories *focus, contrast* (⇒ D2, Sina Zarrieß)
Infrastructure project?

• some phonetic aspects relevant for inf. project
  – integration of speech data with other linguistic levels
  – continue collaboration with A projects
  – for instance explore how context and frequency of context affect pitch accent shape
    • DIRNDL database
    • i.e. extend A1 database work to other aspects of linguistic context
Key topics in the A area
Prosody specification

• A5, description of the prosodic system of Black South African English
  – Which aspects of the context are relevant? (phonological, syntactic, semantic factors)
  – Inventory: Which are the categories?
  – phonetic implementation (e.g., compression, truncation)
Prosody specification

• A6(?)
  – accounting for range of prosodic variation observed in (news) reading
  – influence of information structure on French prosody

• infrastructure project, Kati Schweitzer
  – influence of other contexts on prosody
  – specification of phonetic detail for prosodic events
Category acquisition/transfer

• A2
  – L1-L2 transfer in Exemplar Theory
  – category acquisition in E.T.

• A5, prosody in L2
  – different algorithm for L2 or reinterpretation of L2 system with L1 algorithm?
A-related projects and general SFB aims

Where do we contribute?
(see SFB sketch!)
Interactions across levels
Interactions across levels

- several A projects focus such interactions
- (note: mostly production effects)
Speech production, trad. view

from Levelt et al., 1999
Speech production, trad. view

conceptual preparation in terms of lexical concepts

- lexical concept
  - lexical selection
    - lemma
      - morphological encoding
        - morpheme
          - phonological encoding
            - syllabification
              - phonological word
                - phonetic encoding
                  - phonetic gestural score
                    - articulation
                      - sound wave

self-monitoring

lemmas
MENTAL LEXICON
word forms

SYLLABARY

from Levelt et al., 1999
Interactions across levels

- lexical concept selection
- lexical selection
- morphological encoding
- phonological encoding (syllabification)
- phonetic encoding
- articulation
Interactions across levels

- **Information structure**
- **Lexical selection**
- **Morphological encoding**
- **Phonological encoding (syllabification)**
- **Phonetic encoding**
- **Articulation**
Interactions across levels

- Information structure
- Lexical selection
  - Morphological encoding
    - A1 (type and shape of pitch accents)
  - Phonological encoding (syllabification)
- Articulation
  - Phonetic encoding

Interactions across morphological encoding, lexical selection, and phonological encoding.
Interactions across levels

- A1 (lexical properties influence shape and placement of pitch accents)
- Lexical selection
- Morphological encoding
- Phonological encoding (syllabification)
- Phonetic encoding
- Articulation
- Information structure
Interactions across levels

- **information structure**
- **lexical selection**
- **morphological encoding**
- **phonological encoding** (syllabification)
- **articulation**
- **phonetic encoding**

A2 (phonological context interacts with articulation)
Interactions across levels

- **Lexical selection**
- **Morphological encoding**
- **Phonological encoding (syllabification)**
- **Information structure**
- **Articulation**
- **Phonetic encoding**

A2 (CSM: lexicon interacts with articulation)
Interactions across levels

- **Information structure**
- **Lexical selection**
- **Morphological encoding**
- **Phonological encoding** (syllabification)
- **Articulation**
- **Phonetic encoding**

A2 (MLM: syllable frequencies from lexicon interact with articulation and/or phonetic encoding)
Interactions across levels

- Information structure
  - Lexical selection
    - Morphological encoding
      - Phonological encoding (syllabification)
  - Articulation
    - Phonetic encoding
      - A5 (cross-linguistic differences in implementation of identical accent categories)
Interactions across levels

- Information structure
- Lexical selection
- Morphological encoding
- Phonological encoding (syllabification)
- Articulation
- Phonetic encoding

A5 (accent placement)
Interactions across levels

- **Information structure**
- **Articulation**
- **Phonetic encoding**
- **Phonological encoding** (syllabification)
- **Morphological encoding**
- **Lexical selection**

A5 (accent implementation)
Interactions across levels

- **information structure**
- **articulation**
- **phonetic encoding**
- **morphological encoding**
- **phonological encoding (syllabification)**
- **lexical selection**

A4 (social factors influence phonetic detail)
Interactions across levels

Dogil: "polycentristic model" of linguistic processing? (cf. W. Dressler)

- Information structure
- Articulation
- Social factors
- Phonological encoding (syllabification)
- Morphological encoding
- Lexical selection
Underspecification and Exemplar Theory
The lexicon

- traditional view:
  - representations in the mental lexicon must be economical, no redundancies
  - perception is abstraction
  - perception: recode tokens (fully specified episodes) into types (abstract canonical representations)
  - filter out redundancies, such as phonetically irrelevant variability (cf. “speaker normalization”)
Lexicon in perception, trad. view

from Poeppel et al., 2007
ET: An episodic lexicon

- Goldinger*
  - every stimulus (e.g. word) leaves a unique trace in memory
  - when presented with a new stimulus, all traces activated in proportion to their similarity to the stimulus
  - most activated trace determines recognition
  - But how does abstraction occur?

* referring to Semon (1909, 1923)*
ET: An episodic lexicon

- Goldinger*:
  - blending many faces into a photographic composite creates image of a “generic” face
  - “Whenever a single cause throws different groups of brain elements simultaneously into excitement, the result must be a blended memory” (Galton)
  - in modern terms: “abstraction occurs at retrieval as countless partially redundant traces respond to an input” (Goldinger)

* referring to Galton (1883)
Underspecification in Exemplar Theory

- several A projects assume exemplar-theoretic models
- perceived speech is stored in memory in (almost) full detail including context
- underspecification:
  - activation of a large number of exemplars, possibly belonging to different categories
  - activated exemplars implicitly specify a range of (acoustic) variation
Search
Search in the A projects

• SFB sketch: two aspects of search
  – determination of model parameters
  – search for correct candidate among alternatives
Production in Exemplar Theory

- intended category activates exemplars of that category
- context activates exemplars from similar contexts (more similar \(\Rightarrow\) more activation)
- exemplars with highest activation level are selected as production targets
- \(\Rightarrow\) selection as search process, A2 & Kati Schweitzer
Activation in Exemplar Theory

• activation depends on
  – similarity to incoming stimulus and to its context
  – recency of the exemplar
  – attention aspect

• challenge in ET modeling: determining the weights for the activation function (⇒ search, A2)

• role of attention (⇒A4)
General SFB specification scheme

**COMPREHENSION**

Empirical Data:

\[ e + c \rightarrow m_j \]

Model:

\[ \{ a_1 \ldots a_n \} + c' \xrightarrow{f} a_j \]

Empirical Data:

\[ e_j \leftarrow \{ a_1 \ldots a_n \} + c' \]

**PRODUCTION**

Model:

\[ a_j \xleftarrow{f} \{ a_1 \ldots a_n \} + c' \]

Empirical Data:

\[ m + c \]
A6(?) data

- read news
- interested in two sources of variability in intonation
  - allowed variability, due to room for interpretation
  - pragmatic mistakes
- discourse-semantic theory should be able to distinguish between the two cases
More on the specification function

• A6(?)
  – Arndt: two meanings of interpretation
    1. giving meaning to a text
       (⇒ comprehension, upper part of figure)
    2. performing a text by reading it
       (⇒ production, lower part of figure)
  – specification in 1.: non-deterministic, allowed variability
  – specification in 2.: subject to errors
"Silver standard" data
Moving away from standard data

• moving from L1 data to L2 data (A2, A4, A5)
• spontaneous speech (A4)
• underspecification in gold standard annotations (⇒ Arndt, A6?)
Comments, questions?