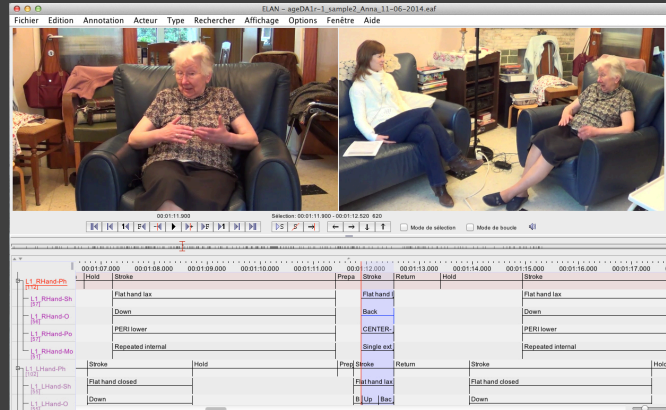


ON THE MEANING POTENTIALS OF PRAGMATIC (MICRO-) GESTURES



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MaMuD 2 - Mapping Multimodal Dialogue
Leuven, 21-22 November 2014

Research questions

- ① How can we decide which nonverbal units must be accounted for to reach a better understanding of pragmatic competence in human-human interaction?
- ② To what extent is it possible (or even, necessary) to integrate non-representational gestures into a consistent model for the annotation of multimodal communication?



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Outline

1. Key notions
2. Data and method
 - The CorpAGEst corpus
 - Multimodal approach to H-H interaction
 - From identification to annotation of Multimodal Pragmatic Constructions
3. Form-based gestural annotation
 - Facial displays
 - Hand gestures
 - Head moves
4. Annotation of pragmatic functions
 - Functions of gestures: a pilot study
 - Towards a multimodal model for pragmatic functions



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1. Key notions



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Pragmatics and context

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⊙ Pragmatics as the study of meaning in use

“Pragmatics is the study of language from the point of view of users, especially of the choices they make, the constraints they encounter in using language in social interaction and the effects their use of language has on other participants in the act of communication” (Crystal 1985: 240)

- Interests in **context-dependent aspects of meaning** based on available evidence provided by the context within which the utterance/interaction takes place

⊙ Context is three-fold (Cutting 2008)

- ① Situational: “what speakers know about what they can see around them”
- ② Background knowledge: “what they know about each other (interpersonal knowledge) and the world (cultural knowledge)”
- ③ Co-textual: “what they know about what they have been saying”

Pragmatic Markers (PMs) in speech

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⊙ Definition of PMs

“A pragmatic marker is defined as a phonologically short item that is not syntactically connected to the rest of the clause (i.e., is parenthetical), and has little or no referential meaning but serves pragmatic or procedural purposes” (Brinton 2008: 1)

Jeanne – ...**et** anorexique je ne parvenais pas à le retenir / j'ai / **alors** je pense à quelque ch/ je pensais à anus (rires) / **comme** c'est **quand même** le tube digestif **hein** qui est en bas (rires) **et ça va** depuis lors je n'oublie plus (rires) **et encore** l'autre jour aussi un mot / **tiens** je ne sais p/ **tu vois** / si / j'ai / j'oublie certains mots / **'fin** / je retombe dessus après **hein**...



... **and** anorexic I couldn't memorize it / I / **so** I think of someth/ I thought of anus (laughing) / **since** it's **still** the digestive tube **right** which is at the bottom (laughing) **and it's ok** since then I don't forget anymore (laughing) **and again** the other day **too** a word / **see** I don't kn/ **you see** / yes / I / I forget certain words / **well** / I remember them afterwards **right**...

Corpage corpus; speaker: Jeanne, ageJM1; age: 90; 2012

Pragmatic Markers (PMs) in speech

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⊙ Procedural meaning

PMs “provide instructions to the hearer on how to integrate their host utterance into a developing mental model of the discourse in such a way as to make that utterance appear optimally coherent” (Hansen 2006: 25)

- ★ Co-building of a mental representation
- ★ Multifunctionality within their “meaning potentials” in context
- ★ Metalinguistic comments on the content/form of the linguistic utterance

(Bolly *et al.* 2014)

[UCLouvain - Valibel – Discours et variation]



Pragmatic Gestures (PGs) in interaction

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⊙ Some background notions (more or less consensual)

- Gestures are visible bodily actions that are intentional and meaningful in a communicative context (Kendon 2004)
- Spontaneous gesticulation, as visible unintentional and idiosyncratic bodily actions (not conventionalized, ad hoc phenomena in use)
- Conversational and interactive gestures, focusing on the interpersonal dimension of language communication (see Bavelas and colleagues)

⊙ The traditional view distinguishes between two types of gestures

- Representational gestures, which may be deictic, iconic or metaphoric
- Non-representational gestures that act as emphasizing, mitigating or punctuating devices in language communication (called *batons* by Ekman & Friesen 1972, *beats* by McNeill 1992, and *motor movements* by Krauss *et al.* 2000)

⊙ Pragmatic Gestures (PGs) close to Pragmatic Markers (PMs)

as (i) they are metalinguistic indicators (see Aijmer 2013) of the speaker's mental processes and (ii) help the addressee to build a meaningful holistic representation of the information conveyed (incl. (self)adaptors, beats)

Meaning Potentials of pragmatic units

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◎ A contextual definition of word/construction meaning

‘Meaning potential’ as a set of linguistic, co-textual and situational features that “make possible all the usages and interpretations of the word or construction that language users find reasonably correct, or plainly reasonable in the actual situations of use.” (Nóren & Linell 2007: 389)

- ✦ Every linguistic expression is associated with meaning potentials
- ✦ In use, partial activation of the meaning potentials through cognitive operations
- ✦ Compatibility of the meaning activated with co-text, background knowledge and situational context (see Allwood 2003: 52)

◎ What interests in studying the meaning potentials of pragmatic units?

- Dynamic sense-making in use: “The theory of meaning potentials accounts for the fact that pragmatic markers get their meaning through ‘dynamic sense-making’ in local, situated contexts” as they “have no strictly delimited meanings but develop meanings in situated use.” (Aijmer 2013: 13)
- Conventionalized and less conventionalized (or ad hoc) PMs: “We can use [Meaning Potentials] to explain both established or conventionalised meanings and innovative or ad hoc meanings characteristics of special activities.” (Aijmer 2013: 13)

Towards Multimodal Pragmatic Constructions

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◎ Multimodal Pragmatic Constructions (MPCs) in speech and gesture

MPCs are “formally heterogeneous, multifunctional items, (mostly) non-representational and oriented towards interpretation processes as cues to create a shared representation of the on-going language interaction” (Crible & Bolly, ICLC 2015)

- ✦ Formally heterogeneous (e.g., adverbs, parenthetical clauses, hand gestures, facial expressions, etc.)
- ✦ Multifunctional (e.g., emphasis, punctuating, etc.)
- ✦ Continuum: Non-representational --- Metadiscursive dimension
- ✦ Co-building of meaning in situated use > Meaning potentials

→ **Clusters of multi-level and multi-modal parameters** (see Jokinen *et al.* 2008; Dael, Mortillaro & Scherer 2012; Debras 2013)

2. Data and method

<http://corpagemt.org>



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The CorpAGEst corpus



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◎ Marie Curie project (2013-2015)

- CorpAGEst “A corpus-based multimodal approach to the pragmatic competence of the elderly” (EU Action: [PIEF-GA-2012-328282](#))
- Main investigator: C. Bolly / Supervisor: D. Boutet ([CNRS & SFL, Paris](#))

◎ Aim and hypothesis

- Establishing the gestural and verbal profile of very old people in normal aging, looking at their pragmatic competence from a naturalistic perspective
> Focus on the (inter)subjective functions of PMs and PGs (Du Bois 2007; Kleinsmith & Bianchi-Berthouze 2013)

◎ Transversal data

- 18 face to face, semi-directed interviews: 250.000 words; 16.8 hrs. audio-video
 - 9 very old people (mean age: 85; L1: French); no major injury or cognitive impairment
 - To date: 1.25 hrs (at least partly) annotated; 4 people with a normal cognitive score
- + longitudinal data collection in progress

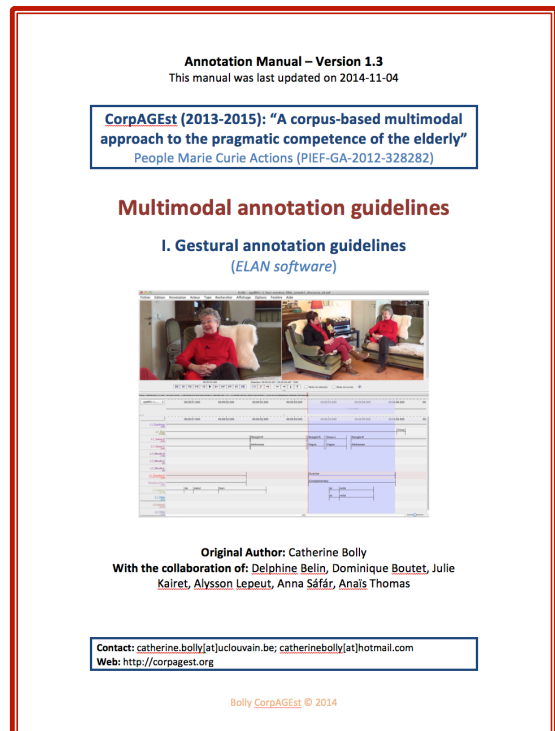
Multimodal approach to H-H interaction

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⊙ Underlying principles

- Understanding language interaction in real-world settings (embodied vs. logocentric) (Mondada 2006, 2007)
- Holistic and integrative view of language: multi-level and multimodal approach

Modality: nonverbal/gesture	Articulators	FORM-BASED: PARAMETER ANALYSIS
1. Facial displays		
	Eyebrows	
	Eyes	
	Gaze	
	Mouth	
2. Hand gestures		
	Hands	
3. Body gestures		
	Head	
	Shoulders	
	Trunk	
	Arms	
	Legs	
	Feet	
Modality: verbal/speech	Levels of analysis	
	Pragmatic markers	
FUNCTION-BASED ANALYSIS		
- Multimodal annotation of emotions		
- Multimodal annotation of pragmatic functions		



From identification to annotation of MPCs

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⊙ Annotation procedure and chronological steps

- ① Form-based approach to PMs (MDMA) and PGs (Müller *et al.* 2013)
 - Mono-modal > audio, video
 - Horizontal > Focus on one group of articulators at a time
 - Context-independent (without the sound for PGs; without the sound and video for PMs)
- ② Functional annotation of MPCs (Bolly & Crible, in progress)
 - Mono- and multimodal > text + audio + video
 - Horizontal (by articulator) then vertical (clusters of functions)
 - Context-sensitive: co-textual (transcript) and situational context (audiovisual)

“There is a **double “distinctiveness” principle** (...) according to which **a visible action could be considered as a gesture unit** in the ongoing flow of interaction: (i) from the **formal perspective**, there must be at least one change in formal/physiological parameters (e.g. shape for the hand, direction of the head, etc.), by comparison with the preceding and following moves; (ii) from the **semantic-pragmatic perspective**, every gesture must be considered as potentially conveying one meaning in the particular context of its realization”

See *CorpAGEst Annotation Manual* (Version 1.3)

3. Form-based gestural annotation

<http://corpagest.org>



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Facial displays

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⊙ Parameter annotation

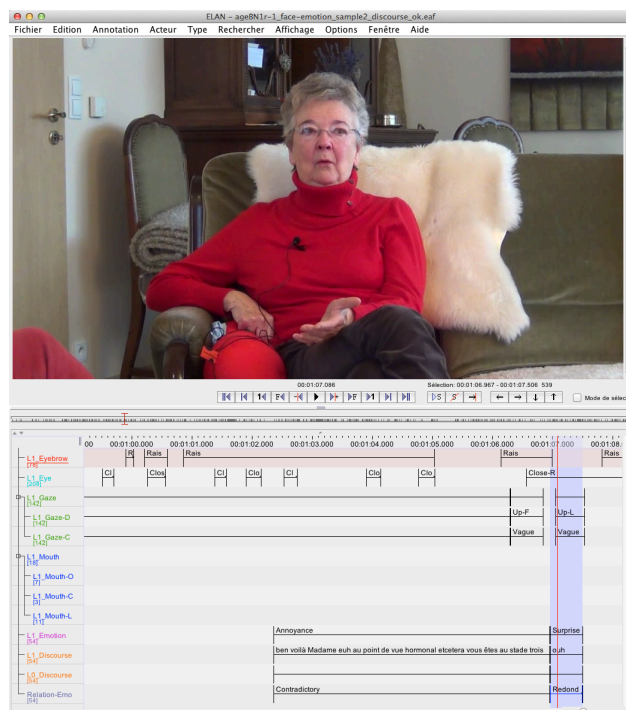
- ELAN template > 9 Tiers in relation to 4 physiological parameters (*viz.* eyebrow, eye, gaze, and mouth)

⊙ Emotions as meaning potentials?

- Emotions perceived from the face annotated according to their emotion category (Plutchik 1980, 2001), and to their interaction with contextual and discursive cues

→ To date, 12 samples annotated (61 min. from 8 recordings/4 people)

Bolly (Tartu 2014); Bolly & Thomas (to app.)



Hand gestures

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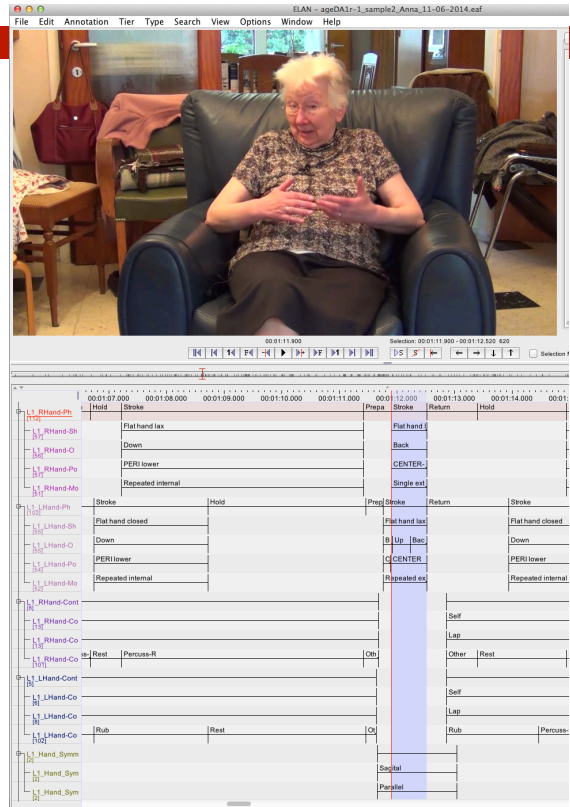
🎯 Parameter annotation

- ELAN template > 21 Tiers (two hands)
 - ✦ segmentation into phases
 - ✦ formal features (shape, orientation, position, movement)
 - ✦ contact possibly involved (target, body/object, activity type)
 - ✦ type of symmetry for the hands (type of plane, parallel/alternate)

🎯 Strokes as meaning potentials?

“[McNeill (1992)] defines the stroke both on the formal and functional grounds. Functionally, the stroke is the **‘content-bearing part of the gesture’**” (Kita *et al.* 1998)

→ To date, 7 samples annotated (40 min. from 4 recordings/4 people)



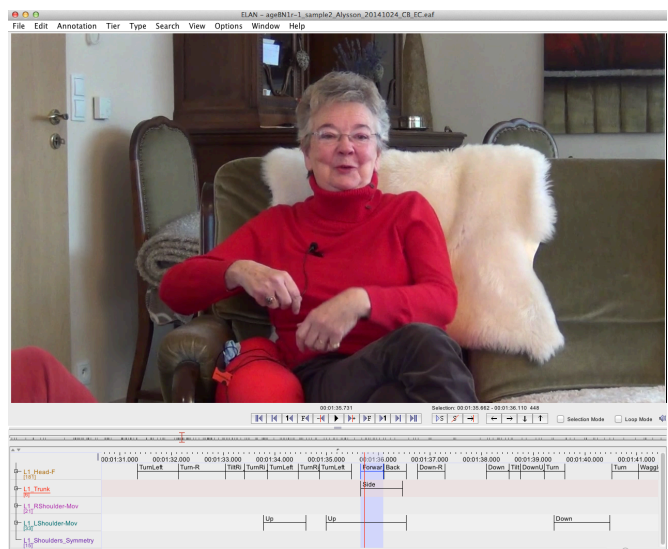
Head moves

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🎯 Parameter annotation

- ELAN template > 1 Tier
 - ✦ formal description on the basis of the position and direction in space (body planes: frontal, sagittal, horizontal)
 - ✦ segmentation into phases (no strokes)
 - ✦ complex labels with a maximum of 2 values per move/phase

→ To date, 4 samples annotated (20 min. from 4 recordings/4 people)



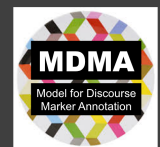
🎯 What about their meaning potentials?

- Identification of potentially meaningful spans for head moves would be made a posteriori (vs. simultaneous to the segmentation in hand phases)

4. Annotation of pragmatic functions

<http://corpagest.org>

Bolly & Crible (in progress)



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Pilot study: Nadine and Anne-Marie's hands

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◎ Classification of functions for every visible action in interaction (e.g., activities, beats, pointing gestures, etc.)

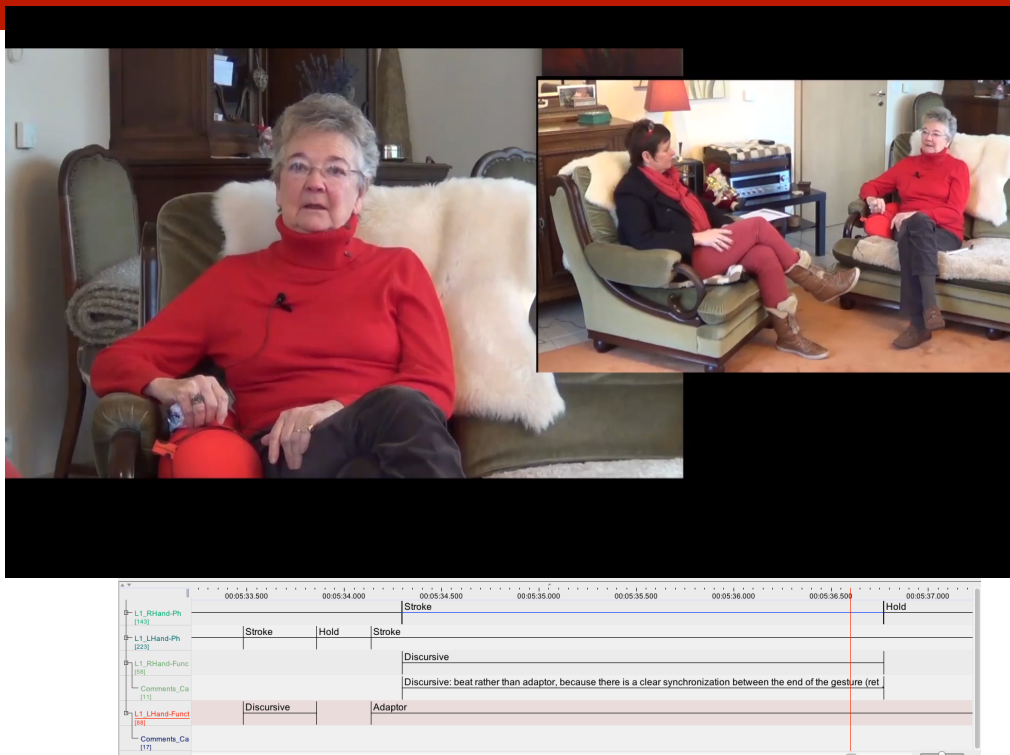
- **ACT** Activity: *Instrumental meaningless physical actions*
- **ADAP*** Adaptor: *Self- or object-oriented action*
- **REF** Reference: *Concrete deictic and representational item (incl. abstract representation of verbalized referents)*
- **STR** Structuring or Discursive: *Stressing of or demarcation between verbal units (e.g., a brief hand gesture accompanying a connector)*
- **EXPR** Expressive: *Performative (e.g., nodding the head to support a positive answer) and framing (e.g., opening the eyes wide to indicate surprise)*
- **INTER** Interactive: *Regulation and synchronization of verbal activities (e.g., the gestures accompanying a gaze towards the interlocutor)*

(inspired from Colletta *et al.* 2009)

*Adaptors are recognized to increase or decrease the perceived emotional stability of the communicating person (Waxer 1977) (e.g., nose-picking or scratching on the body)

Example of Structuring (Right Hand) and Adaptor (Left Hand)

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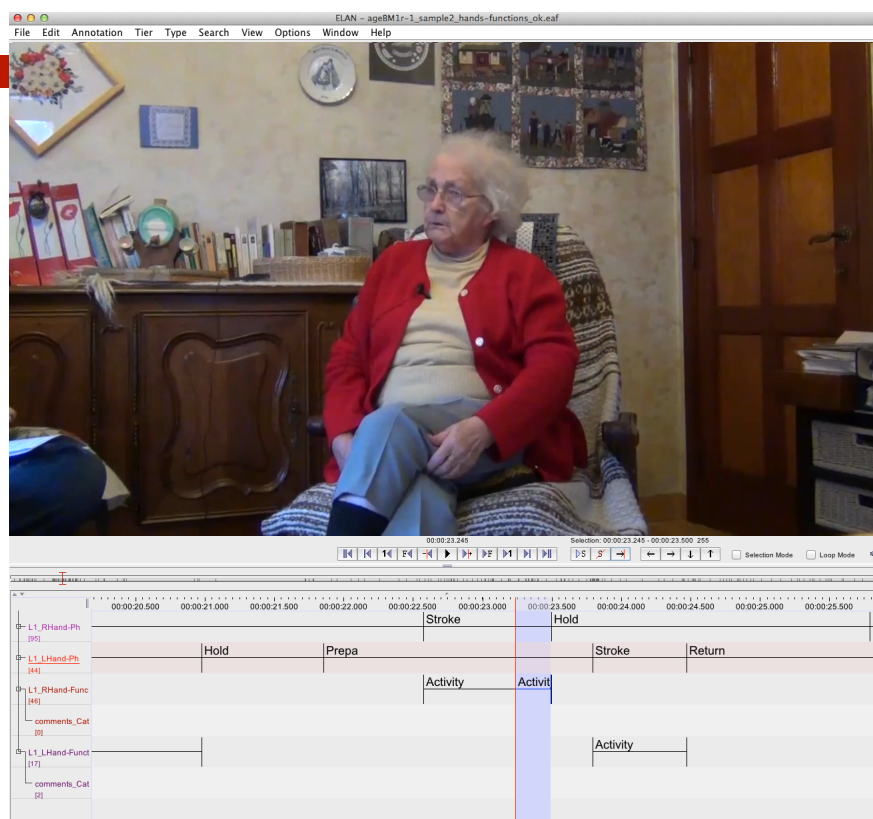


The top part of the slide shows a woman in a red turtleneck sitting in a green armchair. An inset video in the top right shows her interacting with another person in a similar setting. Below the video is a timeline interface with a horizontal axis showing time from 00:05:33.500 to 00:05:37.000. The timeline has several tracks:

- L1_RHand-Ph** [143]: Stroke, Hold, Stroke, Hold
- L1_LHand-Ph** [224]: Stroke, Hold, Stroke
- L1_RHand-Func** [194]: Discursive
- Comments_Ca** [171]: Discursive: beat rather than adaptor, because there is a clear synchronization between the end of the gesture (ret
- L1_LHand-Funct** [184]: Discursive, Adaptor
- Comments_Ca** [171]:

Example of Activity (Right Hand)

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The top part of the slide shows a woman in a red jacket sitting in a green armchair. Below the video is a timeline interface with a horizontal axis showing time from 00:00:20.500 to 00:00:25.500. The timeline has several tracks:

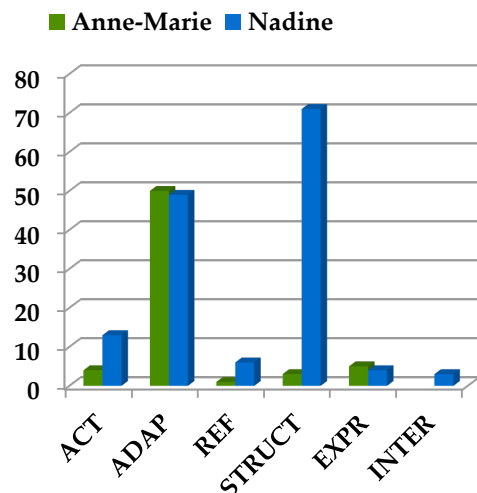
- L1_RHand-Ph** [191]: Stroke, Hold, Stroke, Return
- L1_LHand-Ph** [141]: Hold, Prepa, Activity, Activity
- L1_RHand-Func** [141]: Activity, Activity
- comments_Cat** [141]:
- L1_LHand-Funct** [171]: Activity
- comments_Cat** [171]:

Pilot study: Nadine and Anne-Marie's hands

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Results

- Distribution among the two subjects
 - ✦ 209 annotated strokes
 - Nadine: 146 strokes
 - Anne-Marie: 63 strokes
 - ✦ Nadine:
 - 1/2 strokes: "Structuring" devices (48%)
 - 1/3 strokes: "Adaptors" (33%)
 - Less than 1/10: "Activities" (9%)
 - ✦ Anne-Marie:
 - More than 3/4 strokes: "Adaptors" (79%)
 - Other strokes less than 10%



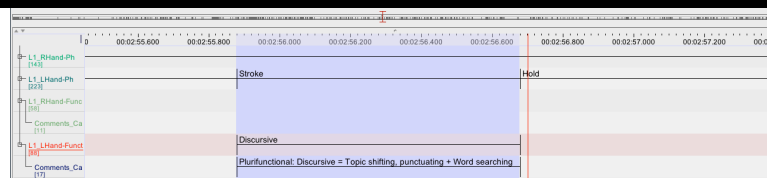
Some problems raised by this exploratory classification

- Lack in precision, need for more fine-grained categories (e.g. the Structuring/ Discursive > too much vague!)
- Simultaneous functions often available for one single stroke (multifunctionality)

Example of multifunctional stroke

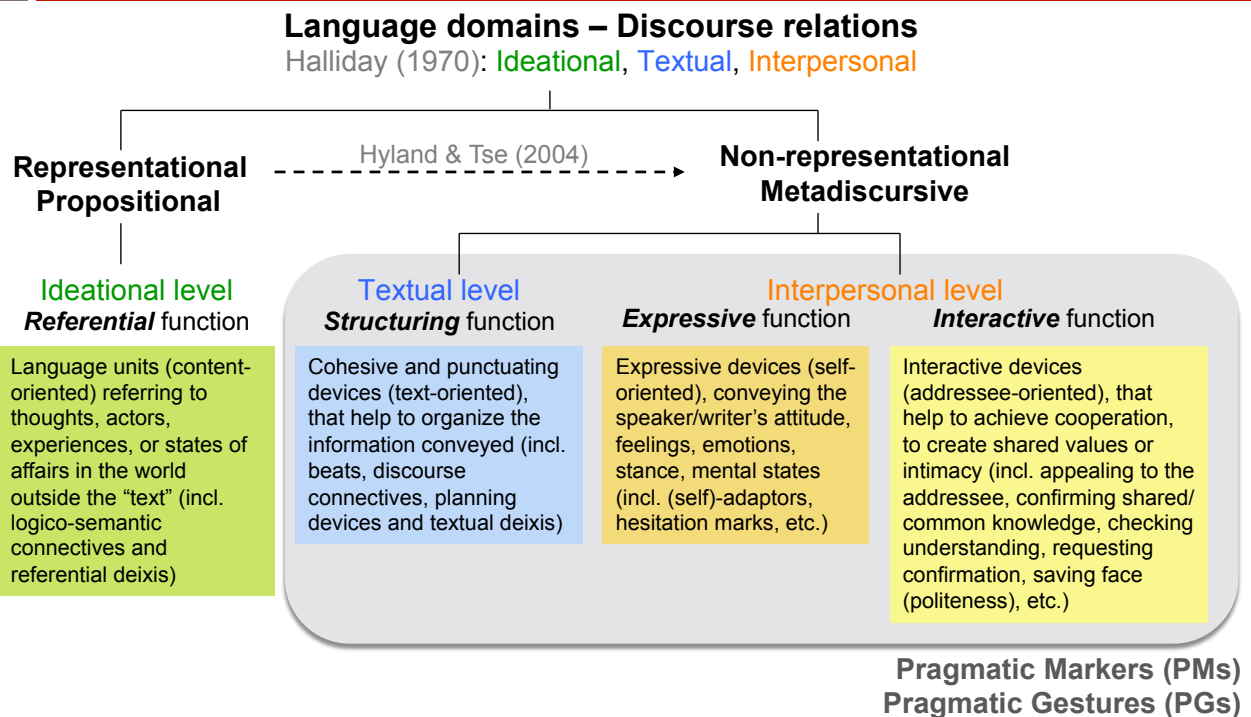
(Structuring/Discursive: Topic shifting, Punctuating + Word Searching)

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Towards a new multimodal model for annotating PMs/PGs in use (Bolly & Crible)

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Conclusion

Perspective in language and aging studies

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⊙ Pragmatic markers and the linguistic perspective

>>> Clinical and Discursive Pragmatics

- Increase and repeated use of [pragmatic] markers (e.g., *so, oh, well*) in the aging subject (at early stage of dementia already), as a compensatory strategy to remain involved in the interaction (Davis et al., 2013; Davis and MacLagan, 2014)

⊙ Gestures and the nonverbal perspective

>>> Psychology and Multimodal Pragmatics

- Decrease in the frequency of use of representational gestures (Feyereisen & Havard, 1999) coinciding with an increase in beats among older people (vs. young people)
 - Task-sensitive (under various imagery conditions: visual, motor, and mental)
 - Weakened forms of representational gestures > Functional specialization of beats in later life, mainly when a greater mastery of verbal competence was observed at earlier periods of life

Ongoing work and future prospect (CorpAGEst)

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⊙ Pragmatic markers and the multimodal perspective

>>> Multimodal Pragmatics

- Longitudinal data (mild-cognitively impaired persons: $23 < n < 26/30$ at the MoCA test) in Belgian-French and French-French (CorpAGEst and G. Duboisdindien PhD. Thesis)
- Function categories for (non)verbal pragmatic markers (Crible & Bolly, submitted ICLC2015; Bolly & Crible, submitted IPrA2015)
- Cognition and pragmatic gestures/markers (Bolly 2014 MAMUD, Bolly submitted ICLC2015)
- Prosodic information to be explored > Prosodic and gestural repetition (Gerstenberg & Bolly submitted IPrA2015)



Thanks to them all



<http://corpagest.org>

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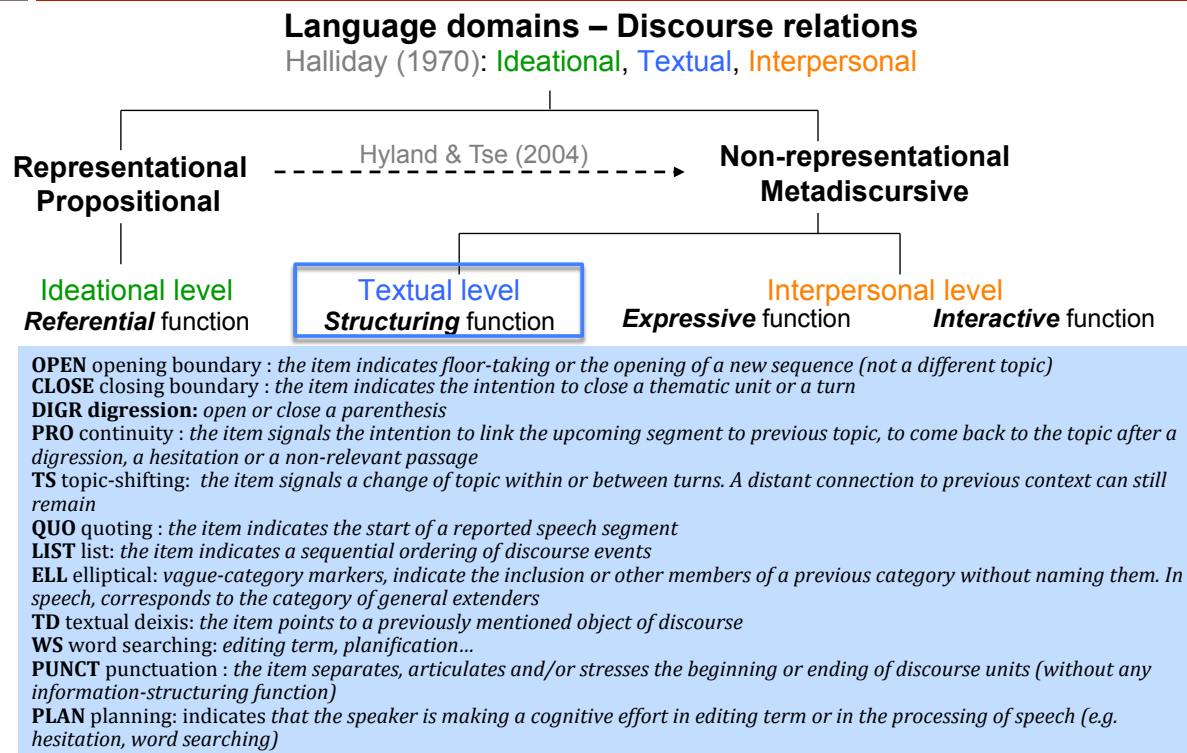
Functions of co-verbal gestures

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- ◎ Co-verbal gestures > Colletta *et al.* (2009) attribute 4 functions to coverbal gestures (hand gestures and head movements, facial mimics, posture changes, body movements, eye contact)
 - ① **Reference function:** 'deictic' (e.g., pointing to an object with the hand) or 'representational' (e.g., the abstract representation of verbalized referents)
 - ② **Expressive function:** 'performative' (e.g., nodding the head to support a positive answer) or 'framing' (e.g., opening the eyes wide to indicate surprise)
 - ③ **Structuring function:** 'stressing' of verbal units (syllable, word, breath group) (e.g., repeated beats on a stressed syllable) or 'demarcation' between verbal units (clause, utterance, turn in speaking, discussion) (e.g., a brief hand gesture accompanying a connector)
 - ④ **Interactive function** (see also Bavelas & Gerwing, 2011): regulation and synchronization of verbal activities (e.g., the gestures accompanying a gaze towards the interlocutor)

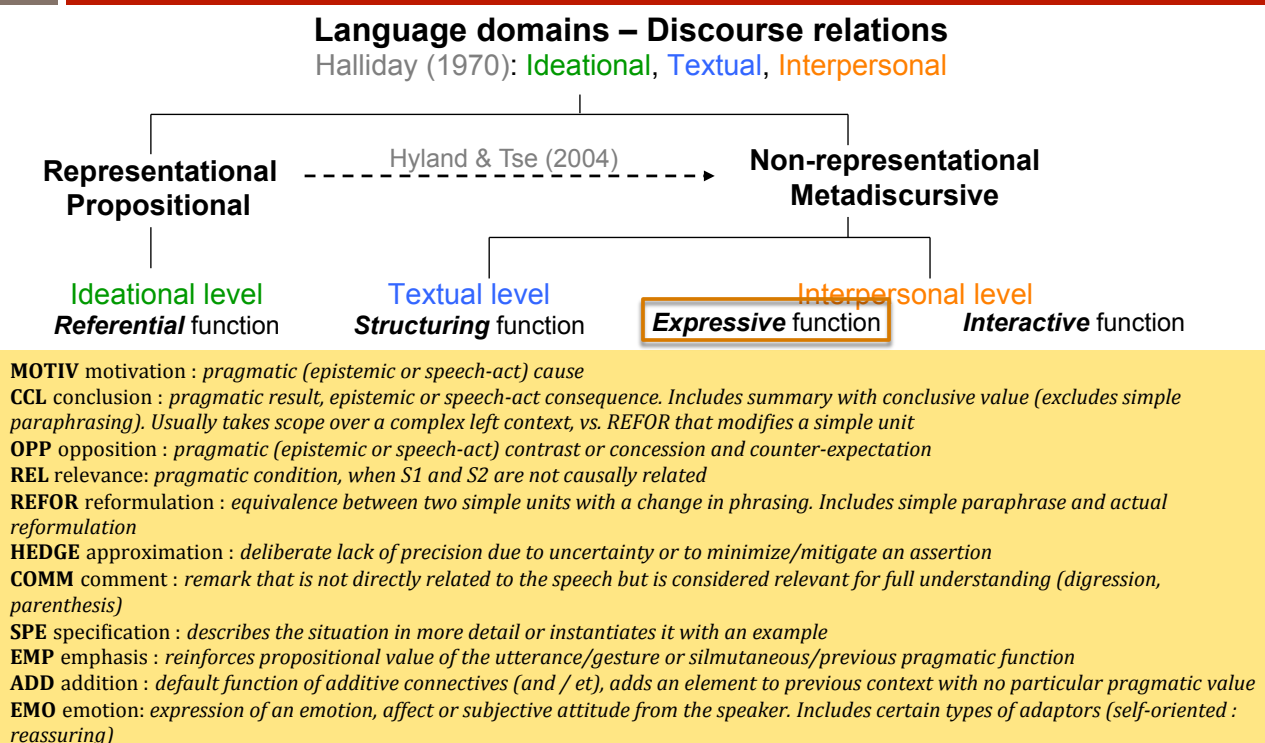
Functions of PMs and PGs

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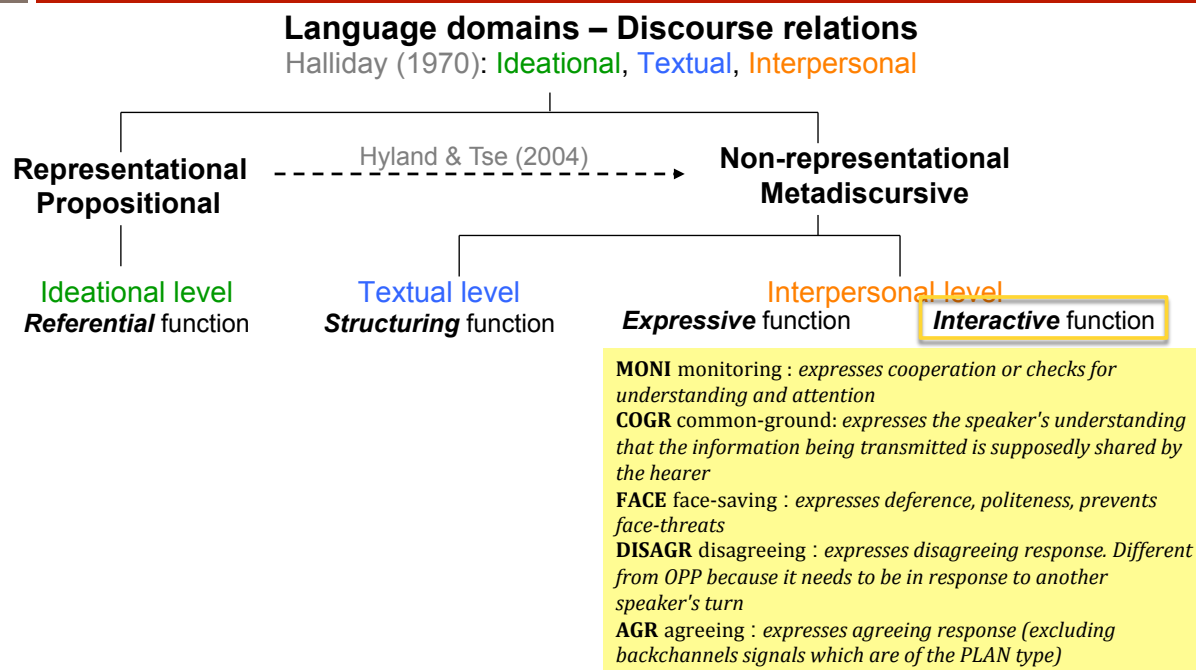
Functions of PMs and PGs

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Functions of PMs and PGs

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Meaning Potentials and context

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☉ Contextual requirements of sense-making

- “The meaning potential is all the information that the word has been used to convey either by a single individual or, on the social level, by the language community. [...] Meaning potentials contain both kinds of information – information deriving from use of language and information deriving from experience with the world” (Allwood 2003: 43)
- “[W]e are not concerned with activation of information through the use of single words but through the use of words constrained by other words and by extralinguistic context in such a way that the expression as a whole must make relevant sense in the situation at hand.” (Allwood, 2003: 44)
- “[T]he traces of activation [of a meaning potential] often involve storage of collocational relationships to other morphemes or words as well as to stored information about extralinguistic context. **It is the complex of all this information which constitutes the meaning potential of a word.**” (Allwood 2003: 56)