Studying the position of Discourse Relational Devices in signed languages: adapting the Basic Discourse Units Model to the signed modality?

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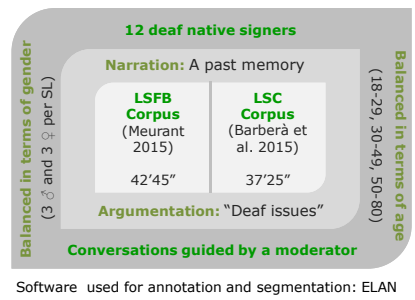silvia.gabarro@unamur.be   laurence.meurant@unamur.be

Sign languages (SLs):

- **Natural languages**, so not universal and not linked to a spoken language
- Visual-gestural modality: use of the **manual and non-manual articulators** (eyes, eyebrows, mouth, head and body movements)
- Linguistic research on them starts in the 1960s
- SL video corpora appear in the 2000, so discourse studies are very recent
- **French Belgian Sign Language (LSFB)**: 6 000 signers, used in Wallonia (southern region of Belgium) and Brussels
- **Catalan Sign Language (LSC)**: 12 000 signers, used in Catalonia (north-eastern Spanish region)
- Two under-studied minority and minorized languages

Background: no existing model for the segmentation of SL discourse

Our need: a segmentation model for SL data that allows the study of discourse markers (DMs)

How? Adapting the **Basic Discourse Units (BDU) Model** (Degand & Simon 2005, 2009ab) to the signed modality

1. Delimit syntactic units (i.e. clauses) on the basis of the Dependency Grammar.
2. Delimit prosodic units according to a set of acoustic cues: a silent pause (longer than 250 ms), lengthening of the syllable (three times longer than the syllables in context) or a sharp rise of f0 (intra-syllabic f0 superior to ten semi-tones).
3. Establish BDUs where syntactic and prosodic boundaries coincide.

→ The first and second steps are independent

	12 deaf native signers	
	Narration: A past memory	
Balanced in terms of gender (3 ♂ and 3 ♀ per SL)	**LSFB Corpus** (Meurant 2015) / **LSC Corpus** (Barberà et al. 2015)	**Balanced in terms of age** (18-29, 30-49, 50-80)
	42'45" / 37'25"	
	Argumentation: "Deaf issues"	
	Conversations guided by a moderator	

Software used for annotation and segmentation: ELAN

1 Delimiting syntactic units (SyU)

Following the principles of the DEPENDENCY GRAMMAR for spoken French as conceived by Blanche-Benveniste et al. (1990)

- **Verbal dependency clauses** → the verb is the nucleus

  [I STUDY COLLEGE BEFORE PROFESSIONAL TRAINING IN]   *LSC*
  'I took professional training courses at college]'

- **Averbal dependency clauses** → another element (pronoun, noun or adjective) is the nucleus

  [BANK DIFFICULT MONEY RECEIVE]   *LSFB*
  '[it was difficult to get money from the bank]'

- **Elliptical dependency clauses** → incomplete clauses that can be interpreted as averbal dependency clauses when referring to the context

  S045: [IRSA WOLUWE TEAM AGAIN PLAY AGAIN] §[FOOTBALL PLAY AGAIN] [LESS]   *LSFB*
  S044: § [THAT EVERYDAY] [LESS]
  S045: '[the teams at IRSA and Woluwe still play] [they still play] §[they still play football] [less (yes)]'
  S044: '§[not everyday] [less often]'

- **Interrupted clauses** → an obligatory element is missing or the clause is not finished

  S056: [FEEL]⁻ᴵ
  S055: [FEEL MORE DEAF] §<PALM-UP> [BECAUSE PERSON-BLOW]⁻ᴵ [YES] [THAT-S-IT]   *LSFB*
  S056: §[YES] <PALM-UP> [GIVE] [YES] <PALM-UP>
  S056: '[I feel]⁻ᴵ'
  S055: '[you feel more deaf] §<don't you> [because I realised]⁻ᴵ [yes] [that's it]'
  S056: '§[yes] <erm> [it makes me feel] <yeah>'

- **Clauses with a nondependent element** → the clause contains an adjunct

  [THROW WINDOW OUTSIDE] <BUT> [SMELL SMOKE THERE-IS]   *LSC*
  '[(they) threw it outside the window] <but> [you could still smell the cigarette smoke]'

Hide the SyU tier before starting prosodic segmentation

2 Delimiting prosodic units (PrU)

Adapting the acoustic cues to visual cues, i.e. "boundary markers" that segment discourse into rhythmic units because they are punctual in nature (Pfau & Quer 2010)

- **Pauses** (= pauses) → periods of no signing at all with the hands along the body, crossed or in the neutral space as in Figure 1

- **Sign holds or lengthened signs with respect to the context** (= lengthening of a syllable) → a sign hold appears when the handshape of a sign is frozen, and a lengthened sign appears when the movement of the sign is repeated, slowed or exaggerated

- **Eye blinks layered with another prosodic cue** (head nod, a change in gaze, a shrug, etc.) (= sharp rise in f0) → widely acknowledged a prosodic function of marking boundaries (Wilbur 1994, Brentari & Crossley 2002, Crasborn et al. 2004, Sze 2008, Herrmann 2010)

(Watch the videos)

Figure 1. Types of pauses

When prosodic segmentation is finished, display the SyU tier

3 Establishing BDUs

Finding the convergence point between syntactic and prosodic units

Different types of BDUs as in the original model:

- **Congruent** → syntactic and prosodic boundaries coincide (cf. second BDU in Figure 2)
- **Syntax-bound** → a syntactic unit contains several prosodic units

  SyU [   ]
  PrU [   ] [   ]

- **Intonation-bound** → a prosodic unit contains several syntactic units (cf. third BDU in Figure 2)

- **Regulatory** → the BDU is an adjunct or a DM

  DM
  SyU [   ]
  PrU [   ]

- **Mixed** → there are several syntactic and prosodic units within the BDU before the boundaries coincide (cf. first BDU in Figure 2)

Figure 2. A mixed BDU, a congruent BDU and an intonation-bound BDU

Case study: SAME in LSFB

- Articulation: the indexes of both hands extended get in contact with an inward movement as in Figure 3
- Core meaning of resemblance or similarity, but very productive in natural discourse as a DM
- Same position for the most common functions: addition (adding information to the same topic as in example 1) and specification (introducing an example as in example 2)

  1. [HEARING I GO BICYCLE LEARN] [BICYCLE THERE GO] /// <SAME> [GO HORSE] [I GO HORSE]
     '[the Hearing taught me how to cycle] [I went cycling] /// <and> [I went to ride horses] [I rode horses]'
     → SAME: out of the dependency structure of the third clause containing the verb GO (i.e. clausal left periphery), but prosodically integrated at the beginning of the second BDU (i.e. syntactic left periphery)

  2. [YES] <SAME> [REMEMBER BEFORE LITTLE ALWAYS I] [TODAY SECOND MEMORY CHILD]
     '[yes] <for instance> [I remember when I was young] [this is my second childhood memory today]'
     → SAME: out of the dependency structure of the verb REMEMBER (i.e. clausal left periphery), but prosodically integrated in the middle of the BDU (i.e. BDU medial position)

Figure 3. SAME

Conclusions

- Segmenting with this adaptation of the BDU Model is a time consuming, but allows a more fine-grained study of the position of DMs in the signed modality
- The coupling of position and function of SAME is regular across different examples of our corpus, so the position can be used to identify the function of a polysemous DM such as SAME, whose annotation strongly depends on the annotator's interpretation
- The study of the left periphery could give insight on (among others):
  → the assumption that SLs prefer constructions of topicalization
  → whether SLs prefer implicit discourse relations over explicit discourse relations
  → the discourse features that define a formal vs. an informal speech
  → the devices preferred in a monologue over a dialogue

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