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# When nonmanuals meet semantics and syntax: a practical guide for the segmentation of sign language discourse

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## Introduction

Previous studies about the segmentation of signed productions (Crasborn, 2007; Fenlon et al., 2007; Hansen & Heßmann, 2007; Herrmann, 2009; Hochgesang, 2009; Jantunen, 2007; Nicodemus, 2006; 2009) take a prosodic perspective to work out how manual and non-manual cues participate in the syntactic organisation of SLs.

**Our question:** Is there a steady set of cues that can be taken and shared as boundary indicators of discourse segments?

**Our goal:** Create a set of guidelines for discourse segmentation that can be shared among researchers of different SLs, among different SL corpora and within the same SL corpus.

**How? Check if a steady set of criteria can be extracted from the spontaneous segmentation performed by LSFB signers.**

## Methodology

- 1-hour corpus of 1 signer containing 2 argumentative (A1 & A2), 2 explicative (E1 & E2), 2 metalinguistic (M1 & M2) and 2 narrative (N1 & N2) discourses.
- 3 deaf (2 natives and 1 non-native) and 2 hearing non-native LSFB signers involved in the study as segmenters
- Two-stage process:
  - 1. Copy test:** a 3-minute sample of each genre that the 3 deaf had to watch and repeat stopping the clip whenever they wanted to an experimenter who did not see the video and who coded their fragments in ELAN.
  - 2. Cut test:** the 1-hour corpus segmented into discourse units using ELAN by both hearing and deaf segmenters according to their intuitions.

## Copy test

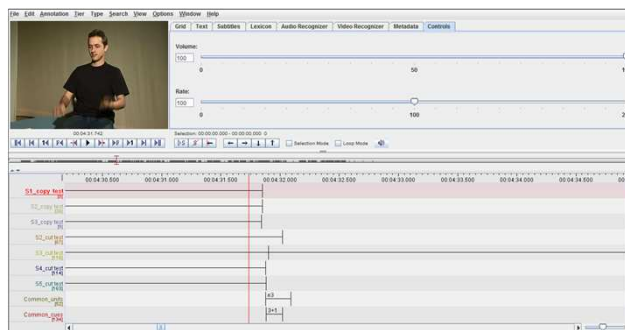
Manual & non-manual cues at discourse units' boundaries spotted by any of the 3 deaf segmenters

Cue	Number of appearances	%
Pause (1)	64	67
Eye blink layered with head nod (3)	38	40
Sign hold (2)	23	24
Change in head position layered with a change in eye gaze (4)	19	20
Eye blink (8)	17	18
Role shift (5)	14	15
Palm-up (9)	11	12
Head nod (10)	5	5
Bracketing repetition (6)	4	4
Head movement (11)	4	4
Change in eyebrow position (13)	3	3
Buoy (14)	3	3
Rhetorical question (7)	2	2
Change in eye gaze (12)	1	1

- Cue 1 and 2: very common and similar in their function.
- Cue 3: the most usual non-manual boundary marker in line with Herrmann (2010).
- Cue 5: commonplace in narratives and indicator of boundaries.
- Cue 9: found in all discourses, even if not so common as a boundary.

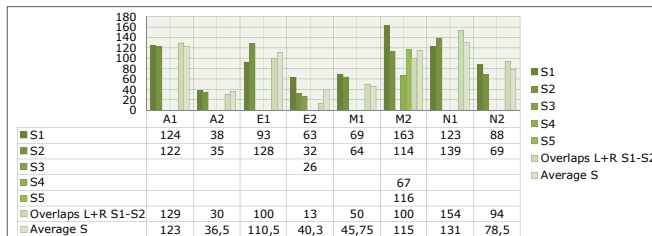
## Inter-segmenter agreement and distribution of boundary cues (copy test)

- 3 segmenters (32.63%): 31 boundaries (30 pauses and 1 sign hold).
- 2 segmenters (59.47 %): 9 boundaries (8 pauses and 1 role shift).
- 1 segmenter (57.89%): 55 boundaries but 33 boundaries were also found by at least 2 segmenters in the cut test, i.e. 60%.
- These 33 boundaries include 18 pauses, 12 role shifts and 5 combinations of cues including blinking.



Extract of the annotation scheme in ELAN. One tier per segmenter for each test. Common units: the common boundaries for the copy test. Common\_cues: the cues spotted by at least two segmenters in the cut test.

## Inter-segmenter agreement (cut test)



- Different number of segments due to the length of the video and the situation (monologue vs dialogue).
- High agreement between at least 2 segmenters in all videos.

## Cut test

Manual & non-manual cues at discourse units' boundaries spotted by at least 2 segmenters

Cue	Number of appearances	%
Pause (1)	304	51.4
Eye blink layered with head nod (3)	266	45
Change in head position layered with a change in eye gaze (4)	187	31.6
Sign hold (2)	142	24
Role shift (5)	137	23.2
Eye blink (8)	81	13.7
Palm-up (9)	77	13
Head movement (11)	43	7.3
Head nod (10)	27	4.6
Change in eyebrow position (13)	21	3.6
Bracketing repetition (6)	18	3
Rhetorical question (7)	17	2.9
Change in eye gaze (12)	13	2.2
Buoy (14)	12	2
Repetition of a sign (AA or AAA) (15)	2	0.3

- Total: 591 segments
- Results are not divergent with the copy test table:
  1. Similar top seven
  2. Similar percentages

## Conclusions of both tests

- The same cues influence the segmentation regardless of the instruction given.
- Both tests are highly consistent.

## Proposed guidelines for discourse segmentation

- As a general rule, segment at every pause and at every sign hold.
- For narrative discourses, segment at the end of every constructed dialogue and role shift.
- Segment systematically at every eye blink layered with a head nod (or at every combination of a blink in the close context of a change in eye gaze and head position).
- Remove all the eye blinks layered with head nods acting as discourse unit linkers.

## Open issues

- We want to test these guidelines on a larger LSFB sample containing different discourses and signers.
- We would really appreciate if other SL researchers tested these guidelines with their data on other SLs, so please do it and give us feedback!



## Eye blinks layered with head nods: caution is needed!

- This cue can either mark a boundary or be a linker within a discourse unit in the middle of temporal syntactic structures or at the end of a parenthetical comment.
- As a non-boundary cue, it is easily isolable:
  1. It is close after a boundary
  2. There is no other associated cue
  3. The chin and the eyebrows go up (ce-up) in the first part of the segment before the eye blink layered with a head nod occurs (only in temporal structures as in the example below).



Even if communication-support workers sign badly, the public think they do a good job.

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