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The marking of aspect in French Sign Language: an Open Face study of non-manual parameters

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Poster presented by Marie-Anne Sallandre

BACKGROUND

WHAT THE DIFFERENCE BETWEEN TENSE AND ASPECT ?

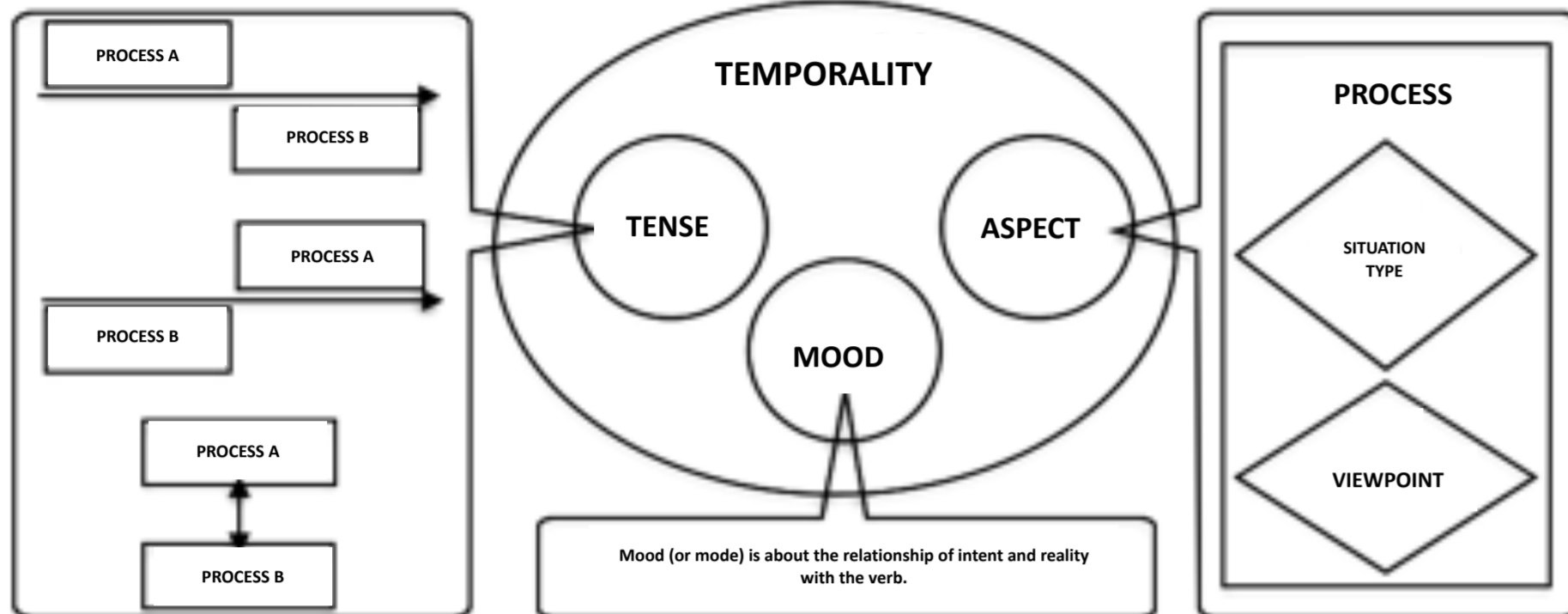


Figure 1. Diagram representing temporality and its constituents.

TENSE : locates a situation in relation to some other time (Comrie, 1976:3). Present, past, future are represented by time markers (adjectives, days of the week, dates, simultaneity, anteriority, posteriority).
ASPECT : different ways of viewing the internal temporal constituency of a situation (Comrie, 1976:3). We focus in this study on two situation types: achievement and activity.

Activity¹ is a situation type that representing an event by the its period duration. SMITH C.S. (1997)

Achievement² is a situation type that representing an event by its endpoint. SMITH C.S. (1997)

As in this sunset process diagrams the sunset beginning to the sunset fulfilled.

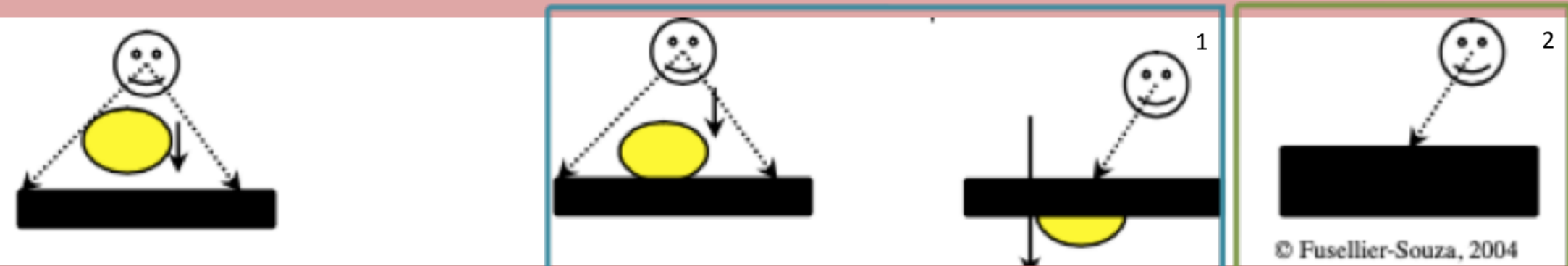
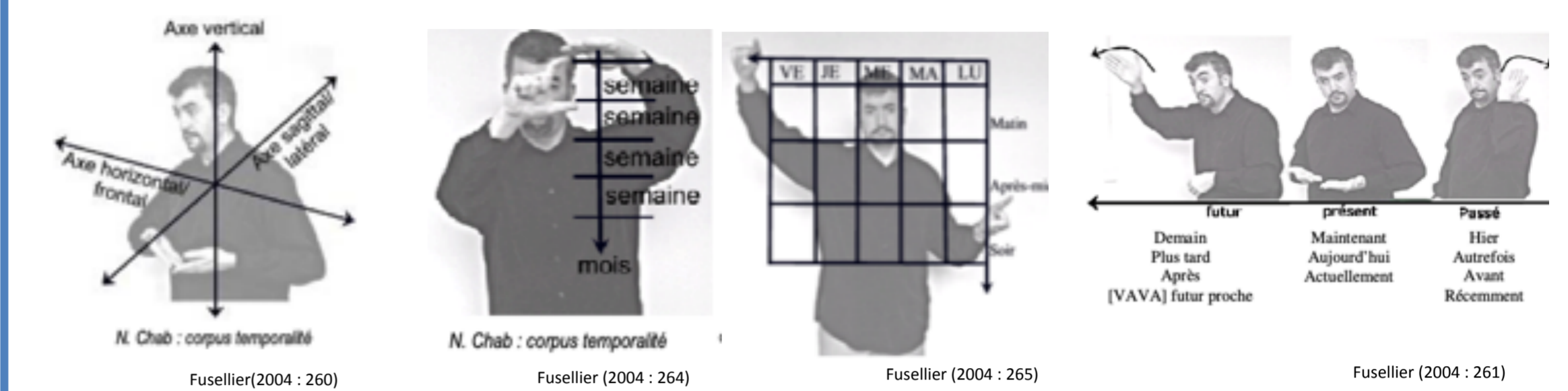


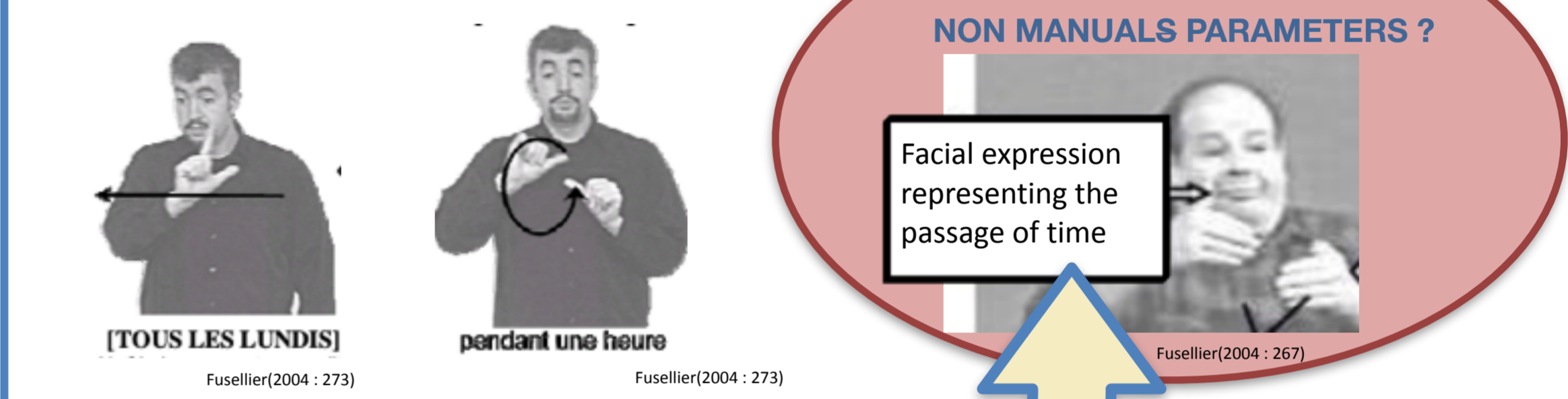
Figure 2. Sunset process diagrams (Fusellier, 2004:269)

TENSE IN FRENCH SIGN LANGUAGE (LSF)



ASPECT IN FRENCH SIGN LANGUAGES

ACTIVITY : LINEAR AND CYCLIC MOVEMENTS



HYPOTHESIS : non-manuals parameters could be aspects markers

Hypothetical deductive approach:

We started from a global hypothesis following former studies by **Cuxac (2000)**, Fusellier (2004), Chételat (2010) : facial expression has linguistics functions and could express linguistic aspect (Cuxac, 2000 : 223)

PURPOSE
 Pilot study searching to automatize the identification of achievement and activity in a narrative production in LSF by a deaf adult (*La lanterne magique* - Nasreddine Chab)

METHODS

At the first stage of this study currently in progress, we adopted a qualitative approach and later a quantitative approach. On the first part we utilized **ELAN** as software transcription to identify every occurrence of achievement and activity in our corpus. After, we used **OpenFace** as facial recognize software to identify every moment that Actions Units (AU's) corresponding achievement and activity facials expression are activated. OpenFace works by computer vision algorithms to quantify data about eye-gaze estimation, facial landmarks detection, head pose estimation and facial Action Unit recognition.



Figure 6. Occurrence identification of achievement and activity in our corpus at ELAN.

RESULTS

QUALITATIVE ANALYSIS - FACIAL EXPRESSIONS for ASPECT

Achievement



Figure 4. Achievement facial expression : small explosion of the lips and the folding of the eyes. Images from Nasreddine Chab - title tale : *Thomas et la lanterne magique*. Production CNAM (Musée des arts et métiers Paris).

Activity



Figure 3. Activity facial expression extracted from pilot corpus Nasreddine Chab - title tale *Thomas et la lanterne magique*. Production CNAM (Conservatoire National des arts et métiers Paris).

QUANTITATIVE ANALYSIS - FACIAL EXPRESSIONS for ASPECT

frame	face_id	timestamp	AU05_r	AU26_r	AU05_c	AU26_c	AU28_c
54	0	1.06	0	0	0	0	0
55	0	1.08	0	0,05	0	0	0
65	0	1.28	0	0,04	0	0	0
66	0	1,3	0	0	0	0	0
227	0	4,52	0	0,78	0	0	0
228	0	4,54	0	0,59	0	0	0
229	0	4,56	0	0,4	0	0	0
230	0	4,58	0	0,29	0	0	0
231	0	4,6	0	0,2	0	0	0
232	0	4,62	0	0,17	0	0	0
233	0	4,64	0	0,29	0	0	0
234	0	4,66	0	0,35	0	0	0

Figure 5. Example of database extraction by OpenFace indicating Action Units activation.

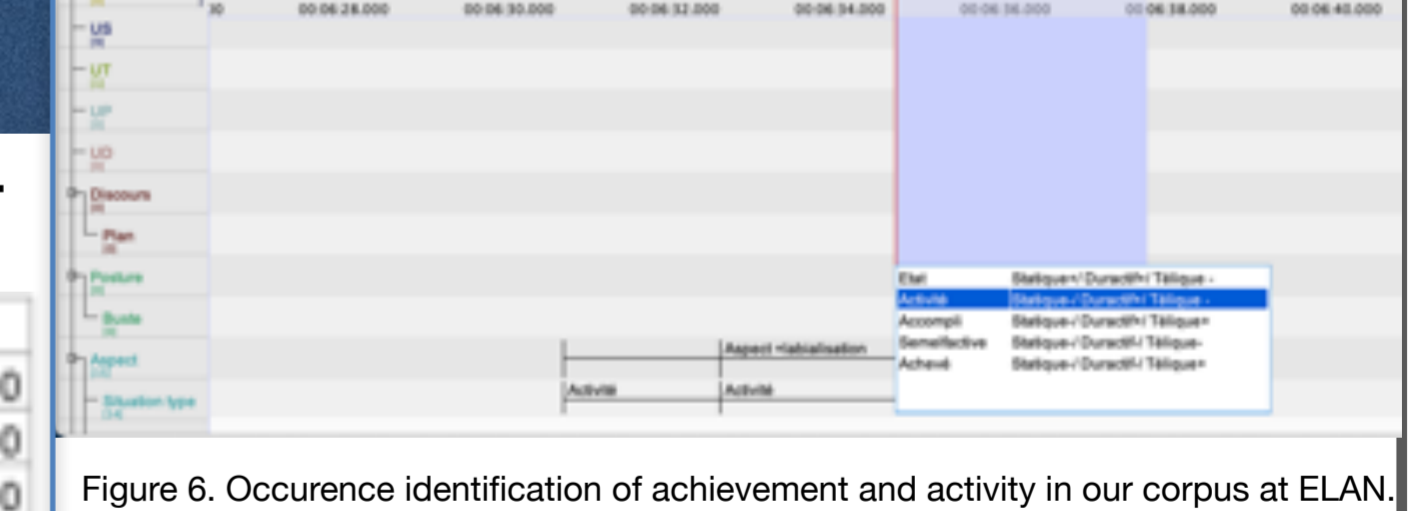


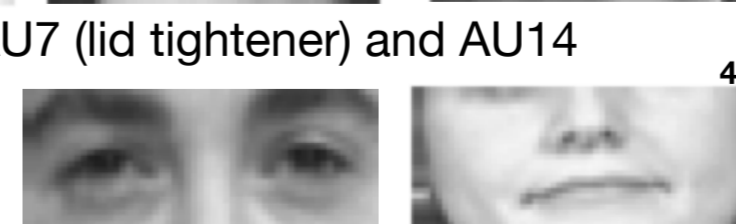
Figure 7. Example of landmark detection by OpenFace. This software detect landmarks based on Action Units (AU's). That is a facial muscles transcription in numbering points.

CONCLUSION

At the end of the qualitative analysis we were expecting for achievement facial expression an intensive activation of the AU5 (upper lid raiser), AU28 (lip suck) and AU26 (lip drop) as pictures below.



For activity we were expecting AU7 (lid tightener) and AU14 (dimpler) as following pictures.



By analyzing the first datas extracts from OpenFace of this study currently in progress we realized that some landmarks detections for achievement were not accurate because of the quality of the video recording and the three-quarter shot filming. We are working on this issue by analyzing others productions in LSF recorded in closed shot. With regard to activity, we found that the facial expression is maintained over a longer period of time than for the achievement. Through this elements we were able to identify some occurrences in the corpus using data from ELAN and OF. We collected ELAN data on maintenance duration time of activity facial expression and detections of each of the relevant AU's from OpenFace data.

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³ Pictures from T. Baltusaitis, A. Zadeh, Y. C. Lim and L. -P. Morency. "OpenFace 2.0: Facial Behavior Analysis Toolkit," 2018 13th IEEE International Conference on Automatic Face & Gesture Recognition (FG 2018), 2018, pp. 59-66, doi: 10.1109/FG.2018.00019.