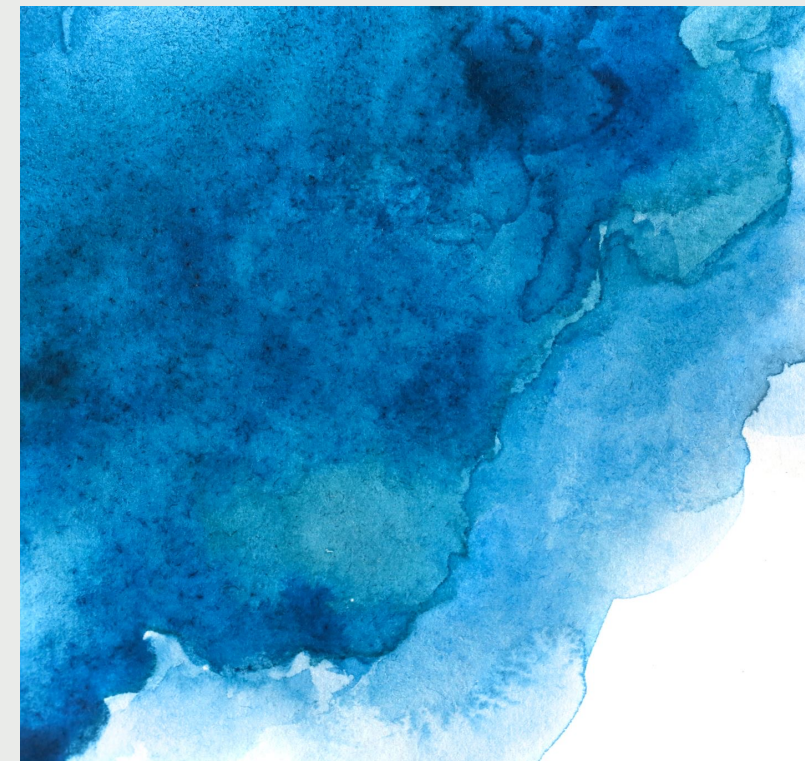


DINLANG - Multidimensional Coding of **Multimodal** **Languaging** in Multi- Party Settings



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Analysing language interactions in spontaneous situations and ecological settings

The goal of our project is to study all the semiotic resources used in language interaction, including:

- **speech/sign**
- **actions**
- **object manipulations**
- **non-lexical sounds**
- **prosodic patterns**
- **facial expressions**
- **gestures**

Anything that can acquire symbolic or communicative value according to the affordances of the context.



Objectives of the project

The goal of the project is to analyze the importance of the context and of other semiotic resources than speech or sign, such as body posture, gesture, gaze, in situated activities.

Our basic theoretical assumption is that communication is a multimodal activity and making sense in everyday situations involves all the body parts. Vocal and signed content play a large role but do not have preeminence above other communicative features.

Our assumption is rooted in our work in sign language communication and in language acquisition, and we will apply our expertise in sign language, gesture, and language acquisition to the present project.



A corpus to test our hypotheses

We want to record unrestricted communication in a situation where there is

- a rich imbrication of spontaneous language use and in multispeaker interaction
- children as well as adults in interaction

We want to compare:

- families using a vocal language (French) and families using a visual language (French Sign Language)
- adults and children

We choose to record dinners because:

- It contains all the situations that we need
- It is an everyday setting full of cultural information
- It is not a too much private situation that makes public recording difficult to obtain



Recording the dinners

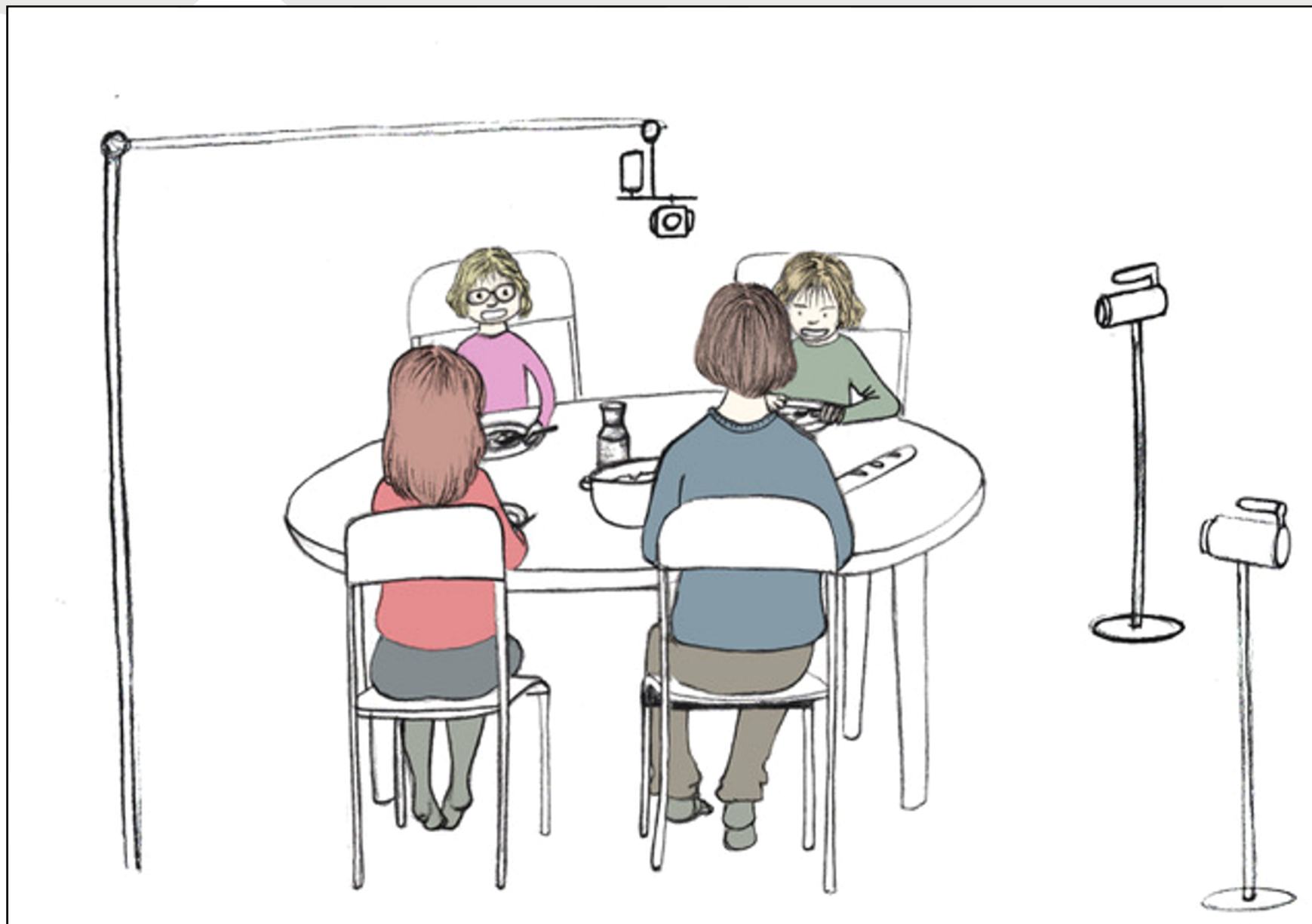
Situation: a dinner that includes all the members of the family in a daily setting (the meal should be an everyday occurrence, not an exceptional one). We want to capture a situation which is as light as possible for the family, but as rich in information as possible. We need:

- To see all participants from the front so as to be able to analyse their facial expressions and hand/arm movements.
- To have a general view of the situation so as to describe the relations between the participants.
- To have a good image and sound quality to be able to code all the interactions.

Our filmic apparatus thus includes:

- A 360° camera situated at the center of the table so as to see everybody
- Two cameras on the side to see the participants with a natural angle
- As many good quality microphones as possible for a clear sound





Drawing by Claire Carpentier



How to code and analyse the data ?

We use ELAN, an annotation tool, which has many useful features:

- Fine-grained temporal coding with video recordings.
- Import of annotations from other tools (CLAN, Praat) is possible.
- It is possible to display more than one video and to choose between several sound sources.

Some problems stem from our research goal and issues, and the diversity and independence of all multimodal resources:

1. We manipulate a lot of data with very diverse and variable relationships.
2. The diversity and unpredictability does not allow to take advantage of the structural properties that ELAN can integrate.

Solution: Use the structured query functions of ELAN to analyse the data



ELAN Template

The template is a fundamental tool for collective coding in a large size project (with many different coders).

All the members of the project will use the same template so as to be able to compare any data with another.

Some relations will be coded in the template. For example:

- Ing-aud-M → The mother's vocal languaging: which language does she use? In our case FRENCH.
 - interloc-aud-M → to whom does she speak?
 - script-Ing-aud-M → what does she say?
- Ing-vis-M → The mother's visual languaging: which language does she use? In our case GESTURE/LSF
 - interloc-vis-M → whom does she sign or gesture for?
 - script-Ing-vis-M → what does she sign? ID-Gloss (including codes for non or semi-lexical units)

"interloc" and "script-Ing" are constrained by the duration of "Ing-aud-M", so they can be dependent tiers



ELAN Template

A large part of the data cannot be constrained by a structural template because they have independent time limits

- "Ing-aud-M" and "Ing-vis-M" are independent
- reg-M → who someone is gazing at (here the mother)
 - All participants are independent (reg-M, reg-F, reg-Ca, reg-Cb, etc.)
- theme1 → theme of the conversation
 - (use theme2, theme3, ... if more than one theme at a time)
- part1 → participation framework
 - (use part2, part3, ... if more than one framework at a time)



How do we analyse the data?

Coding relations between elements of the data is difficult because they have different timings and ELAN cannot express relationships with unrelated timing (only inclusion is possible)

- It is possible to use specific tags to express symbolic relationships
- It is possible to check timing characteristics to look for relationships of any type

In both cases, the data has to be exported to be used for statistical analysis (descriptive or inferential).



Exporting to a spreadsheet or a statistical tool – for analysis or further coding

The basic function of exporting to a spreadsheet is insufficient. Specific tools are necessary to study time or symbolic relations if we don't use ELAN structured query.

7	act-vis-M	mère	58.394	60.48	2.086	-- (suspend posture écoute)
8	Ing-vis-M	mère	17.018	18.054	1.036	GP(EF)
9	Ing-vis-M	mère	18.054	20.121	2.067	GP(EF)
10	Ing-vis-M	mère	30.486	32.035	1.549	GP
11	Ing-vis-M	mère	40.229	42.992	2.763	GP
12	Ing-vis-M	mère	54.432	57.824	3.392	GP(sourire)
13	Ing-vis-M	mère	58.394	60.48	2.086	-- (suspend posture écoute)
14	interloc-Ing-aud-M	mère	1.972	3.697	1.725	2-Ea+Eb
15	interloc-Ing-aud-M	mère	7.486	8.513	1.027	2-P+Ea
16	interloc-Ing-aud-M	mère	8.945	9.905	0.96	2-P+Ea
17	interloc-Ing-aud-M	mère	15.797	17.295	1.498	1-P
18	interloc-Ing-aud-M	mère	20.027	23.229	3.202	1-P
19	interloc-Ing-aud-M	mère	23.229	25.322	2.093	1-Ea
20	interloc-Ing-aud-M	mère	29.143	32.481	3.338	1-Eb
21	interloc-Ing-aud-M	mère	39.136	43.934	4.798	1-Eb
22	interloc-Ing-aud-M	mère	53.608	56.359	2.751	1-P
23	interloc-Ing-vis-M	mère	17.018	18.054	1.036	0-NOBODY
24	interloc-Ing-vis-M	mère	18.054	20.121	2.067	0-NOBODY
25	interloc-Ing-vis-M	mère	30.486	32.035	1.549	1-Eb
26	interloc-Ing-vis-M	mère	40.229	42.992	2.763	1-Eb
27	interloc-Ing-vis-M	mère	54.432	57.824	3.392	1-P
28	interloc-Ing-vis-M	mère	58.394	60.48	2.086	1-Eb
29	reg-M	mère	0.0	1.04	1.04	self en action
30	reg-M	mère	1.04	2.256	1.216	P en action
31	reg-M	mère	2.31	4.689	2.379	self en action
32	reg-M	mère	4.702	10.512	5.81	nona



Principles of structured data query with ELAN

ELAN has a query tool that allows:

- To memorize queries (so that they can be reproduced systematically).
- To choose the exact set of data files that will be queried (and to memorize this set).
- To search for any combination of patterns:
 - **a pattern is a query on a single transcription value including: content (regular expression), ELAN type, participant, time begin, time end, time length, coder**
- A combination can be:
 - **a succession (pattern1 followed by pattern2 ...)**
 - **a relation (same time, different time, overlap, before, after, structural relation)**
 - **or both**

Any number of combinations can be used.

- For each hit, a single line is produced which contains all the information from the transcription values found in the hit.
- The set of result lines produces tabular data suited for spreadsheet or statistical use.



Using the structured query of ELAN

Query for a relation between who the mother is **talk**ing to (interloc-Ing-aud-M tier) and the target of her gaze (reg-M tier).

Results of the query can be saved in spreadsheet format and analysed.

It is also possible to go back and look at the data.

A query can be saved.

The screenshot shows the 'Search eaf files' window in ELAN. The 'Multiple Layer Search' tab is selected. The 'Domain' is set to '1 eaf files'. The 'Query History' shows a sequence of queries with navigation buttons. The 'Mode' is set to 'case insensitive' and 'regular expression'. The search criteria are defined by four rows of input fields: 'Minimal Duration', 'Maximal Duration', 'Begin After', and 'End Before'. The first row has a text input with '.*', a green dropdown menu, and a text input. The second row has a green dropdown menu with 'Overlap', a green dropdown menu, and a text input. The third row has a text input with '.*', a green dropdown menu, and a text input. The fourth row has a green dropdown menu, a green dropdown menu, and a text input. To the right of these fields are four green dropdown menus: 'Tier Name: interloc-Ing-aud-M', 'Must be in same file', 'Tier Name: reg-M', and 'Must be in same file'. At the bottom right, there is a green dropdown menu with 'All Tiers'. Below the search criteria are buttons for 'Find', 'Hide query', 'Fewer Columns', 'More Columns', 'Fewer Layers', and 'More Layers'. A progress bar indicates 'Found 17 hits in 17 annotations (of 180)' with a blue bar and the word 'Ready'. A 'Cancel' button is also present. At the bottom, there are navigation buttons for '<', '>', 'Hit 1 - 10 of 17', and 'Save hits'. The results are displayed in a table with two columns: '#1' and '#2'. The results are as follows:

#1 2-Ea+Eb	#2 P en action
#1 2-Ea+Eb	#2 self en action
#1 2-P+Ea	#2 nona
#1 2-P+Ea	#2 nona
#1 1-P	#2 self en action
#1 1-P	#2 self en action
#1 1-Ea	#2 self en action
#1 1-Ea	#2 Ea
#1 1-Eb	#2 Eb
#1 1-Eb	#2 table

A speaker icon is located in the bottom right corner of the window.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Annotation1-1	HitPo	BeginTime	EndTime	Duration	TierName	TierType	TierParticipant	Annotation2-1	HitPo	BeginTime	EndTime	Duration	TierName	TierType	TierParticipant	TranscriptionName
	2-Ea+Eb	2	1.972	3.697	1.725	interloc-Ing-aud-M	INTERLOC	mère	P en action	3	1.04	2.256	1.216	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
	2-Ea+Eb	2	1.972	3.697	1.725	interloc-Ing-aud-M	INTERLOC	mère	self en action	4	2.31	4.689	2.379	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
	2-P+Ea	3	7.486	8.513	1.027	interloc-Ing-aud-M	INTERLOC	mère	nona	5	4.702	10.512	5.81	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
	2-P+Ea	4	8.945	9.905	0.96	interloc-Ing-aud-M	INTERLOC	mère	nona	5	4.702	10.512	5.81	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
	1-P	5	15.797	17.295	1.498	interloc-Ing-aud-M	INTERLOC	mère	self en action	10	15.363	23.243	7.88	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
	1-P	6	20.027	23.229	3.202	interloc-Ing-aud-M	INTERLOC	mère	self en action	10	15.363	23.243	7.88	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
	1-Ea	7	23.229	25.322	2.093	interloc-Ing-aud-M	INTERLOC	mère	self en action	10	15.363	23.243	7.88	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
0	1-Ea	7	23.229	25.322	2.093	interloc-Ing-aud-M	INTERLOC	mère	Ea	11	23.243	27.262	4.019	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
1	1-Eb	8	29.143	32.481	3.338	interloc-Ing-aud-M	INTERLOC	mère	Eb	14	28.551	30.031	1.48	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
2	1-Eb	8	29.143	32.481	3.338	interloc-Ing-aud-M	INTERLOC	mère	table	15	30.031	31.017	0.986	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
3	1-Eb	8	29.143	32.481	3.338	interloc-Ing-aud-M	INTERLOC	mère	Eb	16	31.017	32.436	1.419	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
4	1-Eb	8	29.143	32.481	3.338	interloc-Ing-aud-M	INTERLOC	mère	self en action	17	32.442	33.067	0.625	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
5	1-Eb	9	39.136	43.934	4.798	interloc-Ing-aud-M	INTERLOC	mère	self en action	23	39.007	40.088	1.081	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
6	1-Eb	9	39.136	43.934	4.798	interloc-Ing-aud-M	INTERLOC	mère	self en action	24	40.101	52.486	12.385	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
7	1-P	10	53.608	56.359	2.751	interloc-Ing-aud-M	INTERLOC	mère	P	25	52.486	54.472	1.986	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
8	1-P	10	53.608	56.359	2.751	interloc-Ing-aud-M	INTERLOC	mère	Eb	26	54.472	55.794	1.322	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
9	1-P	10	53.608	56.359	2.751	interloc-Ing-aud-M	INTERLOC	mère	self en action	27	55.794	57.747	1.953	reg-M	regard	mère	FR4-1min-tpt-mars2022.eaf
0																	
1																	
2																	
3																	
4																	
5																	



Multimodal queries about dinners

Examples of queries that can be (hopefully) answered by our approach?

- Are there crucial differences between coordinating speaking vs. signing, and eating?
 - Codes for speaking, signing/gesture, eating
- Will children become increasingly expert at coordinating semiotic resources and at navigating between activities?
 - Coding resources, activity (and their timing) according to child's age
- Will regularities be identifiable despite individual and family variation?
 - Queries can be done through as large a set of data as required

