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Polyfocal classroom interactions and teaching gestures. An analysis of nonverbal orchestration

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Abstract

While a growing body of research suggests that gestures have an impact in the teaching/learning process, few have explored gestures produced by teachers to understand how instructors cope with the intrinsically polyfocal dimension of class interactions. This paper reports on an empirically grounded account of both how and in what circumstances teachers conduct multimodal orchestration, and the interactional issues it raises. Because it is based on video-recorded corpora of two instructors each teaching both French to native and to non-native students, my study also tackles the issue of the context-sensitivity of teaching gestures.

Index Terms: teaching gestures, two-handedness, co-enunciative ubiquity, context, nonverbal orchestration

1. Theoretical framework

1.1 Teaching gestures

A growing body of research has tackled the topic of teaching gestures in instructional and non-instructional contexts. These studies have mostly shown the impact of teaching gestures in different areas of the learning process. For example, we can consider the role of gesturing in the comprehension of math instructions or math problems ([1], [2], [3], [4]). Alibali et al. [3] for instance provided a math teacher with a tutorial about ways to use gestures in connecting ideas in instruction. The results demonstrate that students benefit more from the teacher who expresses linked ideas using both gestures and speech than from a teacher who does not. In language teaching contexts, a range of research has examined the impact of gestures in L1 or L2 teaching and learning ([5], [6], [7], [8], [9], [10], [11], [12]). In an empirical study Sime [10] sought to understand what learners made of their teachers' gestures. She showed that they made a distinction between relevant and irrelevant gestures among those that their teachers produced, and they were able to attribute the relevance of these nonverbal actions within the learning process as they enhanced comprehension and provide feedbacks. Others have considered more specific aspects, like the role of gestures in memorization ([13], [14], [15]) or error correction ([16],

[17]). For example, Tellier [13] experimentally examined the impact of gesture on second language memorization in teaching vocabulary to 5 year-old learners. She showed how the teacher's gestures, and especially their reproduction by the learners helped the latter remember the words they were taught. Muramoto [16] considered the role of gestures in providing error correction so as to contribute to students' successful self-correction. He analyzed the gestures of three instructors in a university Japanese second language classroom and distinguished two sorts of gestures in class: specific language error correction gestures and general foreign language classroom gestures.

Yet, despite this impressive body of research, it seems that few studies have been interested in considering the gestures as a way for teachers to organize class turn-taking and deal with overlapping talks ([18], [19], [20]) rather than a means to enhance learning. Azaoui's empirical study [20] is based on a mimo-gestural analysis of both a corpus of filmed classroom interactions led by the same teacher in two different instructional contexts (French to native students and to non-natives) and video-recordings of students confronted with extracts of lessons they participated in. He sought to understand how, when and why the teacher reacts to the students' disruption of the interactional norms, but also how and why the students break this conversational organization [21]. The results show that the teacher's motivations are twofold: the instructor's verbal and nonverbal actions contribute both to the progress of the lesson plan and the prevention of threats to the students' face [22].

1.2 Classroom polyfocal interactions

Coping with multiple simultaneous actions is the reality of many teachers in classroom. Thus, it seems more accurate to consider classroom interactions as typically "polylogal" [23] (i.e., more than three persons usually speak at the same time; consequently interventions may overlap) - rather than looking at them as if they followed a regular three-part pattern [24]. If "trilogues are potentially more conflicting organizations than dialogue" [25:6] because participants may struggle even more for the floor, one can easily imagine what the situation may be like during polylogues where intrusions and overlapping turns may occur more spontaneously and frequently. In addition, classroom

interactions can be said to be polyfocal as several foci of interaction may simultaneously take place [26:66]. Consequently, there is barely a moment when teachers do not produce several gestures at the same time (head/hand gestures, right hand/left hand gestures). So, as much as we can say that students have a polyfocal attention, to the extent that they very rarely "direct their attention in a focal, concentrated way to any single text or medium" (Scallon et al, cited in [27:28]), teachers' attention can also be qualified as being polyfocal. Since they have to manage various actions at the same time, Kress proposed the term "orchestration" to name the "process of assembling/organizing/designing a plurality of signs in different modes into a particular configuration to form a coherent arrangement" [28:162]. If we pay attention to the way this orchestration is conducted, we can notice that it takes various forms and has implications for the interactional process.

These are the issues this paper proposes to tackle. It sets out to provide an empirically grounded account of both how and in what circumstances teachers conduct this orchestration, and what the interactional issues are.

I will first present the methodology of this research. Then, I will examine the results in two separate but complementary sections: I will explore the notion of *two-handedness*, understood as the production of two-handed independent gestures, and that of *co-enunciative ubiquity*, which refers here to the teacher's nonverbal ability to be the co-utterer with at least two students simultaneously.

2. Methodology

2.1 Participants

My research is based on the analysis of two native French secondary school teachers from the South of France (Toulouse and Montpellier). They both teach French to native learners (FL1) and French to non-native students (FL2). The initial idea was to analyze how these teachers dealt with school norms (i.e., linguistic and interactional norms) according to the contexts and students they taught.

The Toulouse teacher's French students were aged 14 whereas the Montpellier teacher's were 11. Both had 28 students per class on average. As for their non-native students, the classes they teach gather students from different origins and ages. In Toulouse, the class consisted of 12 different nationalities. The average age of the non-native students was 12.5 while Montpellier's FL2 class was composed of non natives aged 13 or so who came from 4 different countries.

2.2 The corpora and the coding

To carry out this study the data were gathered empirically ([29], [30], [31]) by filming each teacher in action in her two classes. I recorded some 20 hours of classroom interactions among which 6h30 were fully transcribed and coded using ELAN [32].

It included the transcribing of the speech of the teachers and the students on separate tiers, the annotating of the teachers' gesture dimensions, and the annotating of their mimics. I designed my typology of gesture and mimic dimensions and functions based on various works ([33], [34], [35]).

As far as gestures were concerned, I annotated emblems, deictics, metaphorics, beats, and iconics. As for the facial mimics, I coded the following dimensions: orientation of the gaze, frown, raise eyebrows, smile, nod, tilt. Combinations of two or three of these facial movement dimensions were possible. Following Tellier's typology [35], I considered three main teaching gestures functions: informing, managing and assessing. I adapted the latter considering that it also concerned assessing the way students took the floor in compliance or not with school rules [36].

2.3 The analysis tools

I mostly draw my analysis tools from the talk-in-interaction framework espoused by Kerbrat-Orecchioni [37]. The author emphasizes on the need to analyze interactions by merging theoretical tools proposed by discourse and conversational analysis, which implies calling upon Goffman's interactional approach, ethnography of communication and language act theory. This stance may seem to combine incompatible theories (*e.g.* language act theory and conversational analysis), yet according to the author only the combination of these approaches will facilitate a thorough understanding of the embodied (inter)actions. This approach generated the following results.

3. Results

It is possible to distinguish two aspects of nonverbal orchestration: two-handedness and co-enunciative ubiquity. Both will be studied in the following lines.

3.1 Two-handedness, one mode yet two functions

Two-handedness will not be understood here as the use of the two hands to produce a single gesture serving one of the three previously mentioned functions [38]. Rather, as each hand may generate gestures occurring within separate gesture units, the two hands may produce two different dimensions to serve two independent and complementary functions.

In the first example, the class is talking about the 2012 French elections for presidency. The word "debate" has come up during the discussion and non-native students are trying to define the word. This episode illustrates how, in less than 4 seconds, two-handedness can be used to assess a student's intervention and allocate the next turn to another student:

		Corpus M-FL2
1	T	debate +++ what does this word mean↑
2	Nolan	I don't know
3	T	you don't know↑
4	Antonio	*I* know
5	T	you know↑ ok we're listening to you
6	Antonio	like uhm:::
7	Nolan	two per<u>son</u>s
8	Antonio	<u>the</u> the persons speak
9	T	<u>pers</u>ons speak↑
10	Nolan	<u>some</u> ++ some <u>some</u>
11	T	<u>you're almost there</u> good <u>you've got it</u>
12	Nolan	[<u>some</u> <u>some</u>
13	Antonio	<u>many things uhm::::</u> one thing X
14	T	but more precisely + go ahead (*to Nolan*)↑
15	Nolan	when ++ two ++ persons speak] about a topic
16	T	exactly ++ exactly two persons talking about the SAME topic

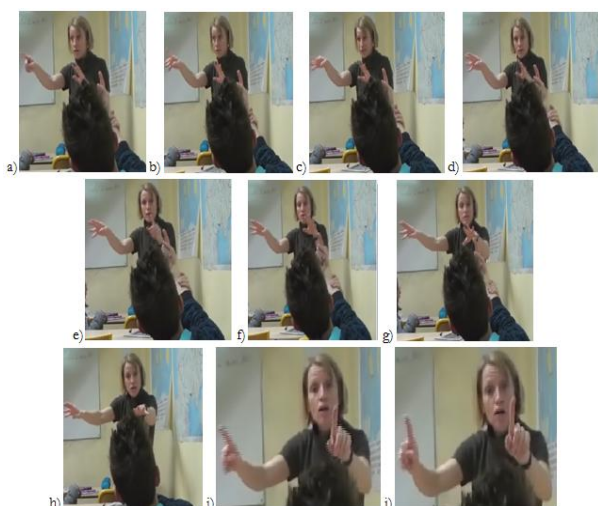Figure 1: *Two-handedness in FL2 context, turns 12-15.*

Figure 2: *Two-handedness in FL1 context, turns 2-6.*

Frames *a* to *d* illustrate the teacher producing an emblem with her right hand to assess the intervention of Antonio (turn 13), who is interrupted in turn 10 by Nolan at whom the teacher nevertheless points her left hand to give the floor (frames *e-g*). Interestingly, the teacher keeps her right hand oriented towards Antonio as if not to break the interaction initiated with him. This enables her both to build an interpersonal relationship with the two students and to accomplish shared understanding. She then retracts her right hand to mime the verbal explanation given by Nolan to whom she finally pays full attention as illustrated by the orientation of her head, gaze, body and hands (frames *i-j*).

The second example is extracted from the French to native instructional context. As the teacher is explaining the functioning of end-of-term school reports, a student (Loubna) interrupts her.

	Corpus M-FL1	
1	Youssef	Hum::::: are we not handed over the end-of-term school report after the second term teachers' conference
2	T	No ++ during the meeting the teachers give their opinion + we talk about the student **[**and then//
3	Loubna	there are the <u>class reps, too</u>
4	T	<u>we give</u>
5	Serge	there only is XX
6	T	Hush, will you please not intervene (*to Loubna*) ++++ and the hea**]**d teacher, in other words me, writes down this + the decision + ok

Frame *a* shows the teacher producing an iconic gesture that was meant to accompany her verbal explanation now postponed in turn 6 ("write down"). She is interrupted in her verbo-gestural explanation by Loubna, which accounts for the emblem she produces with both hands to ask the student to stop speaking (frames *d* to *g*). This pragmatic function is emphasized by the fixed gaze illustrated in frame *i*. She holds her left arm extended to literally keep the student at bay while she resumes her verbal-gestural explanation where she had previously left it. The two-handedness complementary functions are obvious in frames *j* and *k*: her right hand produces an iconic gesture to inform the students about the functioning of end-of-term school reports, and her left arm prevents Loubna from speaking.

An interview I had with this teacher opens an enhanced window onto this gestural action. She explained how useful this two-handedness was both on a pedagogical level to organize simultaneous interactions and on a more personal psychological perspective since it helped her relieve her voice and the inner turmoil she felt.

3.2 Shift of attention and co-enunciative[1] ubiquity

Nonverbal orchestration is made even more evident when teachers' actions are analyzed in a combined approach of deictic gestures and gaze. In this paragraph I will examine how the interplay of these media enables the teacher to "multiply" herself so as to be the co-enunciator of several students almost simultaneously. This ability, which I termed *co-enunciative ubiquity* [39], is illustrated in the following examples. They will enable me to demonstrate that besides the interpersonal relationship it helps to build, this ability has an impact on the interaction level.

This first extract of class interactions follows an excursion the FL2 class had to the theatre the previous week. The teacher is not pleased with the behavior her students had, and she wants them to reflect over their attitude.

	Corpus T-FL2	
1	T	the problem already happened in class
2	Omar	I know, Miss
3	T	yes
4	Ericka	not quarrel

---

[1] The notion "co-enunciative" insists on the simultaneous work of both participants of the interaction [40:44].

| 5 | Maria | no right to [use the cellphone] |
| 6 | Omar | XXX |

Figure 3: *Co-enunciative ubiquity in FL2 context, turns 2-6.*

Three students speak out almost simultaneously. The instructor's initial gaze orientation (frame *a*) informs us about the attention she pays to the utterance of a student (Omar) seated at the back of the class. At the same time, Ericka's overlapping turn makes the teacher orient her gaze towards her student and produce a deictic gesture to indicate the interest she gives to her idea (frames *b* and *c*). This is confirmed by the superimposed beat gesture (frames *c* and *d*). Finally, as she retracts her pointing gesture, she briefly looks at Maria, who is acknowledged as a co-participant of the interaction (frame *d*). This description aims to progressively unroll the multimodal teacher's action and to show how this teacher copes with the intrinsic polyfocal and polylogal dimensions of class interactions.

The following example taken from the FL1 class enables us to pursue the demonstration of the teacher's co-enunciative ubiquity and its implications. Here, the teacher is working on a short story about totalitarianism.

First, she asks her students to describe the image they have of the characters in the story. She then overtly allocates the turn to one specific student, as confirmed by the use of the student's name and the orientation of her gaze (frame *a*). An overlapping intervention coming from the left side of the class draws her attention and makes her briefly shift her head and eye orientation towards another student, Albert (frames *b* and *c*).

		Corpus T-FL1
1	E	so why do you think the character is about fifty years old (*to Pierre*)↑
2	Albert	[he's the average man in the street
3	Pierre	no + I don't know + about fifty or sixty I don't have a clue
4	E	XX ++ yes Albert] a little louder
5	Albert	he's the average man in the street
6	E	right ++ he's the average man in the street

Figure 4: *Shift of attention and co-enunciative ubiquity in FL1 context.*

While considering the frames, it is important to remember that "no one would dispute the close connection between movements of our eyes and shifts of attention" [41:5], no matter how restricted it may be. Posner [42:26] subdivided attention into three separate but interrelated functions: "(a) orienting to sensory events; (b) detecting signals for focal (conscious) processing, and (c) maintaining a vigilant or alert state". The first one is of some particular interest for our understanding of the interaction under study. Indeed, Lamargue-Hamel [43:10] explains that orienting to sensory events is implied in the selection and focalization of relevant pieces of information in a given task. Consequently, it is possible to give the teacher's re-orientation of her gaze and head an intentional purpose that serves her pedagogical interest. It also illustrates the ability to divide her auditory attention: she seems to be constantly filtering external stimuli according to their relevance for the current interaction. Additionally, frames *d*, *e* and *f* illustrate the almost simultaneous combined gesture/gaze disjunction. As her gaze comes back to focusing on Pierre she starts a pointing gesture with her right hand indicating Albert at the back of the class. The beat she produces on her deictic gesture (frame *e*) informs us about the relevance of his intervention.

The first analysis we can make is that this action exemplifies the instructor's ability to pay attention to (at least) two students at the same time. Additionally, the two channels have two separate functions: her gaze has a managing function (attributing the turn) while her pointing gesture assesses Albert's utterance. A second analysis concerns the instructional technique the teacher uses. It corroborates the divided attention we mentioned since the co-enunciative ubiquity she performs helps her select the utterance that best fits her lesson planning. Note that the hand gesture may also serve as a way to "provide the recipients with a 'forward-understanding', i.e., an anticipation, of what will come next" [44:226]. In other words, it anticipates the following exchange with Albert; and the other students are thus informed about the next locus of interest.

This nonverbal action also has consequences on the interactional level. Indeed, research on interaction has often recognized the use of gaze as a means to indicate the ratified interlocutor ([45], [46], [47]). It is here confirmed by the teacher's use of the name Pierre to overtly designate her privileged interlocutor. Yet, the combined analysis of the gesture/gaze disjunction and the teacher's utterance tells us what is really at stake in the extract. An interpretation that can be hypothesized is that this hand gesture/gaze action entails a "communicational trope" [45:92], i.e., the inversion of the hierarchy of the interlocutors. Pierre's utterance loses

its interest, the teacher hardly paying attention to the end of his sentence (turn 4). Right from the beginning her attention is polarized by Albert's intervention which is more in compliance with what she wanted her students to understand and keep in mind.

4. Conclusion

To summarize, in this paper I have focused on how teachers resorted to multimodal resources to cope with polyfocal classroom interactions which require organizing turn-taking, informing, and assessing several students simultaneously.

I first explored the production of two-handed independent gestures. The results show that they serve distinctive yet complementary teaching functions: assess verbal proposal and allocate turn, or inform and assess unauthorized intervention. By producing two independent gestures, the teacher is able both to build an interpersonal relationship and progress in her lesson plan. The teacher's comments that I collected during an interview enabled to expand this analysis. They draw our attention to the importance of two-handedness on a more intrapersonal and psychological level. Secondly, I have examined the nonverbal orchestration a step further by investigating the production of hand gestures in collaboration with gaze orientation. I have paid attention to what I termed co-enunciative ubiquity, i.e., the multimodal ability to manage polyfocal and polylogal class interactions. The interplay of gaze and deictic gestures also served the teacher's intention to have students anticipate the next focus of attention. Additionally, reference to attention theory enabled me to show how this ability attested the fact that the teacher selected the intervention that best suited her pedagogical purpose. This was confirmed by the interactional consequence of this multimodal action, namely a reversal in the hierarchy of the addressed which follows a teaching goal: showing interest to the most appropriate answer.

Interestingly, the results also show that the instructional context has no impact on how the teacher handles this nonverbal orchestration. Two-handedness and co-enunciative ubiquity compose each instructor's "teaching style" ([48], [36]). This term refers to the fact that while some teaching actions may be adapted to the specificity of a given context, others may be recurrent from one pedagogical context to another both in the form they take and in their pedagogical intent. These unvaried actions compose the "teaching style" of some teachers. In this perspective, and as far as our teachers are concerned, no matter the instructional context (FL1 or FL2), there is no difference neither in the way they conduct this orchestration nor in the motivations behind it. I believe these examples of orchestration are not specific to the language teaching classes and may be observed also in other instructional contexts.

Finally, this study corroborates the need to analyze teaching gestures in natural teaching contexts. It enables the opening of an enhanced window onto the complexity of teachers' nonverbal actions.

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Symbols used in transcriptions

T	Teacher
↑	upward intonation
underlining	overlapping
++	pause
XX	inaudible utterance
:::::	stretching of sound
//	interruption
[ ]	gesture production