The sound of silence: the functions of gestures in pauses in native and non-native interaction

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Communication

Face-to-face communication is a multimodal phenomenon that occurs within a sociocultural context (Vygotsky, 1978, 1986). It involves speech, gestures, gaze, head movements, and body movements (Levinson & Holler, 2014; Moreno-Cabrera, 2011; Vigliocco, Perniss, & Vinson, 2014), and to understand it completely all of these aspects must be taken into consideration (Gerwing, & Dalby, 2014; Tenjes, 2001). Face-to-face communication also varies depending on the social situation, the roles of the participants, the identity of the participants, and the task that they are involved in. To date, most studies on co-speech gestures in communication have analyzed how gestures relate to speech, and gestures produced during speech pauses have been less examined.

In this chapter, we examine the functions of co-speech gestures during pauses. We propose that in addition to the functions that have already been identified: lexical search (*production oriented*) and turn giving/taking (*interaction oriented*), there is another function that

is directed to an interlocutor and whose purpose is to support comprehension (*comprehension oriented*). We use examples of interactions between native speakers of French and their interlocutors, native and non-native speakers of French, to illustrate these functions.

We first discuss co-speech gestures, next speech pauses and gestures, then the specifics of interaction between a native and a non-native speaker and how it affects both speech and gesture production (foreigner talk and gestures).

Co-speech Gestures

When people speak, they produce gestures along with their speech. These co-speech or spontaneous gestures are synchronous with speech and often occur with elements of high communicative dynamism, i.e., contrastive, focused or new information (McNeill, 1992). The gestures perform the same pragmatic functions as speech (Kendon, 1980; McNeill, 1992), and their strokes tend to co-occur with prosodic peaks (Nobe, 2000). These gestures and their co-occurring speech complement each other, where the gestures indicate an aspect present in the speaker's thought, but not expressed through speech.

McNeill (1992, 2005) has postulated that co-speech gesture and speech form a single cognitive system with speech expressing the verbal and gesture expressing the imagistic aspects of thought. These he claims develop from a growth point, "the speaker's minimal idea unit that can develop into a full utterance together with a gesture" (McNeill, 1992, p. 220). McNeill (2005) proposes an interactive 'imagery-language dialectic' in which thought, language, and

gesture develop over time and influence each other and in which the static and dynamic dimension aspects of language are combined.

Several arguments support this theory. First, gesture and speech are produced in synchrony. Second, there is semantic harmony between the two: gestures often convey visual referents such as the size, shape, and trajectory more easily than the speech (Goldin-Meadow, 2003; Wagner, Malisz & Kopp, 2014). Third, speech and gesture co-develop in first language acquisition and are both processed in Broca's area in the brain (e.g., Acredolo & Goodwyn, 1985, 1988; Andrén, 2011; Blake *et al.*, 2005; Butcher & Goldin-Meadow, 2000; Capirci *et al.,* 1996, 2005; Colletta, 2004; Gentilucci, & Dalla Volta, 2008; Goldin-Meadow & Butcher, 2003; Goodwyn & Acredolo, 1993; Goodwyn, Acredolo & Brown, 2000; Iverson & Goldin-Meadow, 2005; Iverson, Capirci, & Caselli, 1994; Iverson *et al.*, 2008; McNeill, 2005; Özçalışkan & Goldin-Meadow, 2009, 2011; Pizzuto & Capobianco, 2005). Fourth, listeners pay attention to both speakers' speech and gesture and pick up information that is present in gesture when it is not present in speech (e.g., McNeill, Cassell, & McCullough, 1994; Holler, Schubotz, Kelly, Hagoort, Schuetze, & Özyürek, 2014; Özyürek, 2014). Finally, some disorders, such as Parkinson's disease, that affect speech and discourse organization also affect gestures (e.g., McNeill, 1992; Duncan & Pedelty, 2007).

Gestures are related to speaker's speech patterns. Therefore they cannot be understood without the accompanying speech context. In addition, both the social situation and task influence what speech and gestures are used (Kendon, 2004; McNeill, 2005; Stam, 2016; Tabensky, 2008). Gestures are organized in hierarchical units (Kendon, 1972), known as gesture phrases: the movement of the hand from rest to return to rest. Gesture phrases consist of gesture phases: *preparation* (start/initial movement), *stroke* (which is obligatory and is the most

important part because it conveys meaning), *hold* (could be pre- or post- stroke where the gesture is held in a position), and *retraction* (return to rest).

Co-speech gestures perform many functions and often do this simultaneously. We propose that the functions of gestures can be grouped into three categories: *production oriented*, *interaction oriented*, and *comprehension oriented*. *Production oriented gestures* help the speaker in executing their message. For example, they lighten cognitive load (Goldin-Meadow *et al.,* 2001), help with the conceptual planning of speech by helping speakers organize spatial information (Kita, 2000; Alibali *et al.*, 2001), and facilitate lexical retrieval (Butterworth & Hadar, 1989; Hadar and Butterworth, 1997; Krauss *et al.*, 1995; Krauss & Hadar, 1999; Krauss, Chen, & Gottesman, 2000; Morrel-Samuels and Krauss, 1992; Stam, 2001, 2012). *Interaction oriented gestures* are gestures that manage the ongoing interaction between participants. For instance, they are used to retain and give turns during conversation (Duncan, 1972; Cosnier, 1996; Mondada, 2007; Sikveland, R., & Ogden R., 2013). Gestures can also add information that is present in speakers' thoughts to their speech (McNeill, 1992, 2005), which may help the interlocutor understand the utterance. In fact, research has shown that listeners pay attention to the gestures of their interlocutor (Beattie & Shovelton, 1999; Cassell *et al.* 1999; Holler, Shovelton, & Beattie, 2009). This function of gesture is, therefore, *comprehension oriented*. These *comprehension oriented* gestures can occur naturally in an interaction as a speaker explains something. However they can also occur intentionally in interaction where there is an asymmetrical relationship (a relationship in which one person has more power or knowledge than the other), for example, doctor/patient (Gerwing & Dalby, 2014), teacher/pupil (Azaoui, 2013; Brookes *et al.*, 2013), second language classroom (Lazaraton, 2004; Tellier, 2008;

Eskildsen & Wagner, 2013), or interaction between native and non-native speakers (Adams, 1998; Tellier & Stam, 2012).

Gestures, thus, can serve many functions depending on the social situation, the interaction, the task, and the participants. To date, the majority of studies on the functions of gestures have focused on gesture with their accompanying speech. Only a few studies have focused on gestures occurring with speech pauses, and these have looked at gestures in terms of production or interaction perspectives in symmetrical interactions (interactions in which individuals are of equal power or have equal knowledge). It is the purpose of this chapter to further examine speech pauses and gestures to see whether the three functions we have proposed for gestures occurring with speech also apply to gestures occurring with speech pauses. We first discuss speech pauses and then review research that has been conducted on gestures occurring during pauses.

Speech Pauses

Speech pauses have a long tradition of being regarded as markers of speech disfluency in linguistics (for a review, see Rühlemann, Bagoutdinov, & O'Donnell, 2011). However, "sustained speech does not involve continuous sound production. Even in the most fluent speech, frequent pauses may be detected, ranging in duration from a few milliseconds to several seconds" (Boomer & Dittman, 1962, p. 215). In addition, there is individual variation in frequency of pauses and pause length depending on the type of speech produced – monologue vs. dialogue, political speech vs. political interviews vs. conversational speech (Duez, 1982; Goldman-Eisler, 1961; Lallgee, & Cook, 1969). In recent years, pauses have, thus, been viewed

not solely as disfluencies but as important aspects of interaction, and more attention has been paid to the different types of pauses.

For example, Boomer and Dittman (1962) differentiated between juncture pauses (those that occur at the end of a clause) and hesitation pauses (those that occur within a clause), and Esposito, Stejskal, and Smékal (2008) point out that there are physical, socio-psychological, communicative, linguistic, and cognitive pauses and "that pauses may play several communicative functions, such as building up tension or raising expectations in the listener about the rest of the story, assisting the listener in her/his task of understanding the speaker, signaling anxiety, emphasis, syntactic complexity, degree of spontaneity, and gender, and transmitting educational and socio-economic information" (p. 1073-1074).

Moreover, Duez (1982, p. 12) stressed that "it is not possible to assign one function only to a pause: a pause can have different functions (hesitation, grammatical marking, breathing); conversely, a function can be realized in various ways: for instance, hesitation can be realized by a silent pause, a filled pause, a false start, a repetition, a lengthened syllable, or any combination of these."

Osada (2003) compared audio recordings of unmodified (normal) and modified speech on articulation rate, speech rate, pause unit length, individual pause length, and percentage of pauses. Modified speech was defined as caretaker, teacher, and foreigner talk, which have simplified input to enhance the interlocutors' comprehension. For samples of unmodified speech, she examined radio broadcasts for native speakers of English and audio books for adults, and for the samples of modified speech, she looked audio books of fairy tales for children, radio broadcasts for non-native speakers of English, and public speeches (inaugural addresses). In

modified speech, she found a slower articulation and speech rate, a shorter pause unit length, a longer individual pause length, and a higher percentage of pauses than in unmodified speech.

Rühlemann, Bagoutdinov, and O'Donnell (2011) compared narrative pauses with conversational pauses in a narrative corpus from the perspective that "pauses signal thought units" (p. 199). They found that narrative pauses were more frequent than conversational pauses; however, conversational pauses were frequently longer. They concluded that "pauses offer an immense potential for the study of speech and cognition: they open up a window on the mind" because they can be used to see what the speaker's thought unit is (Rühlemann, Bagoutdinov, & O'Donnell, 2011, p. 226).

Gestures with Speech Pauses

Most previous research on gestures occurring during pauses has focused on their *production oriented* and *interaction oriented* functions; that is, their role in aiding lexical retrieval and their role in turn taking/turn giving. Proponents of the lexical retrieval hypothesis have argued that the primary function of gesture is to aid with lexical retrieval Butterworth & Hadar, 1989; Hadar & Butterworth, 1997; Hadar, Dar, & Teitelman, 2001; Krauss, 1998; Krauss *et al.*, 1995; Krauss & Hadar, 1999; Krauss, Chen & Gottesman, 2000; Krauss, Morrel-Samuels & Colasante, 1991; Morrel-Samuels & Krauss, 1992; Tenjes, 2001) and that many of these gestures occur during pauses. Morrel-Samuels and Krauss (1992, p. 619), claimed based on their data "that gestures are synchronized with speech and that they are initiated before or simultaneously with (but not after) the onset of lexical affiliates."

To investigate this claim and to determine where the stroke onset (the beginning of the part of the gesture with meaning) of iconic gestures occurred (preceding, synchronizing, or following speech), Chui (2005) examined pauses and gestures in natural Chinese conversation and found that the majority of speakers began their gestures during speech.

Gestures produced without speech (before it occurs or after) have also been shown to have an interactive function especially in terms of turn giving and turn taking. Mondada (2007) studied pointing gestures in turn taking and showed that turn construction is multimodal and involves both linguistic and gestural features. She also found that turn taking can be initiated gesturally even before speech occurs.

> Pointing as a practice for turn taking can be initiated either before the actual completion of current speaker's turn (thereby projecting its end), or at the beginning of the incipient speaker's turn. In both cases, pointing displays a participation shift, the pointer initiating, often before even saying a word, her transition from the category of 'non-current speaker' to the category of 'incipient speaker', through the category of 'possible next speaker': in this sense, pointing gestures manifest the temporal, situated, embodied emergent process of the establishment of speakership (Mondada, 2007, p. 219).

Moreover, Cosnier (1996) found that dynamic gestures (i.e., not holds) at the end of a sentence can indicate that the turn is not over and that the speaker is just pausing temporally.

We propose that gestures have a third function during pauses – a *comprehension oriented* function – in addition to the *production oriented* and *interaction oriented* functions that have already been identified. We illustrate this function by looking at native/non-native interaction where there is an asymmetrical relationship between the interlocutors.

Gestures and Foreigner Talk

Communicating with a non-native speaker creates challenges for a native speaker as the non-native speaker may lack vocabulary and grammatical knowledge of the language. Thus, in communicating with a non-native speaker or foreigner, most speakers tend to adapt their speech to make it easier to understand, engaging in what Ferguson (1975) termed *foreigner talk*. They utilize basic vocabulary, shorter sentences, and present tense; articulate more; and speak more loudly and slowly.

Within second language acquisition research, the adjustments that speakers make in addressing non-native speakers (Wesche & Ready, 1985) and their effectiveness in facilitating acquisition (Long, 1980) have been explored. However, whether native speakers also adapt their gestures has only been examined by Adams (1998) and Tellier and Stam (2012). In a cartoon narration task where native speakers of English narrated a cartoon in English to both other native speakers and Korean speakers, Adams looked at the types of gestures the native English speakers used and showed that gesture production and the types of gestures the speakers used were affected by the presence of non-native interlocutors. However, he found only significant differences for deictic gestures in the two conditions. Following up on Adams, Tellier and Stam (2012) also investigated the differences in gestures used in native-native and native/non-native interactions. However, the task they used was different. They had future teachers of French explain words in French to native and non-native speakers that the interlocutors had to guess.

They found that the future teachers produced more iconic and deictic gestures, gestures that were longer in duration, and larger gestures in the non-native condition.

Gesture and Pauses Observation

As stated in the literature, gestures often appear during pauses as markers of disfluency and/or to help lexical retrieval. They have been basically viewed as occurring mainly for the benefit of the speaker in an interaction. However, gestures in pauses can also be used to manage interaction such as turn giving or taking.

We were curious as to as to whether there might be another function for gestures produced during speech pauses as we had observed that the future teachers sometimes produced gestures during pauses that were neither *production oriented* nor *interaction oriented*. Because the future teachers do the same task with both a native and a non-native partner and our previous work (Tellier & Stam, 2012) has shown that the future teachers adapt their gestures and speech to the non-native partner in order to provide them with comprehensible speech, we assumed that some differences would also appear in gestures during pauses. We, therefore, hypothesized that gestures during pauses could also be *comprehension oriented*.

Coding Scheme for Gesture and Pauses

In order to investigate the function of gestures in pauses, we developed a coding scheme for all the relevant occurrences of gestures with pauses in the speech of the data of the future

teachers we examined. We looked at all gestures that occurred during pauses. These included (1) gestures that occurred only during a pause, (2) gestures that occurred with speech and continued during a pause, and (3) gestures that began in a pause and continued with speech. We then used the following criteria for distinguishing relevant gestures: (1) the gestures produced in pauses last more than 300ms (so that the gesture is clearly visible and the pause is not just for breathing), and (2) the gestures are dynamic (i.e., they move) and meaningful (we excluded preparations, retractions, and holds occurring in pauses). These criteria were established by working on 20 explanations with three coders (one gesture researcher aware of the purpose of the study, one gesture researcher naïve to the purpose of the study, and one researcher, a non-expert in gestures, but who knew the aim of the research). They all separately coded the gestures occurring in pauses to check if they identified the same ones in order to produce criteria for the manual detection of gesture in pauses (Tellier *et al.*, 2013).

Sixty sequences of lexical explanation were examined (3 words: *râpé* 'grated', *océan* 'ocean', *emballer* 'to wrap'). Of these, thirty explanations were addressed to a native partner and 30 to a non-native. We identified a total of 244 occurrences of gestures in speech pauses. We identified 6 major functions of gestures occurring with pauses based on a coding scheme we had developed: (1) the gesture introduces the concept; (2) the gesture marks the word; (3) the gesture fills in a slot in a sentence; (4) the gesture is used to help the interlocutor; (5) the gesture is used to elicit an answer from the interlocutor; and (6) the gesture is used to by the speaker to search for a word (see Table 1). Once we had these 6 major functions, we then analyzed whether there were any similarities between them and whether they could be further organized into functions. We came up with 3 main functions – *production oriented, interaction oriented*, and *comprehension oriented* – based on the purpose of the gesture.

Table 1

Functions of gestures in pauses: new taxonomy

Introducing concept *(comprehension oriented)*	Gesturing to illustrate one or several keyword(s) BEFORE uttering them. Gazing at the interlocutor. It's not preparation for a gesture stroke. It is an actual gesture with meaning.
Marking the word *(comprehension oriented)*	Emphasizing a keyword by gesturing AFTER the word has been uttered. Gazing at the interlocutor. It's more than retraction, you can really see what the gesture looks like.
Filling in a sentence *(interaction oriented)*	Gesturing to replace the word that cannot be said in a sentence. It's like filling in a blank orally and can occur with "hum hum". Gazing at the interlocutor
Helping interlocutor *(interaction oriented)*	Gesturing while the interlocutor speaks or tries to speak to encourage them to answer. Gazing at the interlocutor
Eliciting answer *(interaction oriented)*	Indicating to the interlocutor that he/she should answer, turn giving. Gazing at the interlocutor.
Word searching *(production oriented)*	Looking for a word or a way to finish the sentence, accompanied by gaze aversion or looking at their own gestures.

Functions of Gestures in Pauses

To illustrate the three functions of gestures during pauses, we first present information on the properties of the pauses we observed in the interactions and then we present information on their functions.

Properties

The mean duration of pauses containing a gesture differed in the native-native and native/non-native interactions: 890ms with a native partner and 1130ms with a non-native partner. Although there is individual variation in the duration of the task, the task lasts considerably longer with a non-native partner for whom the task is more difficult (sometimes the word was unknown to the non-native). Therefore, comparisons between the two interactions are complex (see Table 2). In both interactions gestures can occur with pauses, but they were less frequent in the explanations with a native speaker (NAT) than with a non-native (NN). It is, therefore, difficult to tell whether the use of gestures in pauses is a strategy more likely used with a learner or whether this is due to the task lasting longer and providing more opportunities to gesture in pauses (since there are more gestures when the explanation lasts longer).

In the native interaction, it seems that gestures produced in pauses are mainly *interaction oriented* which is probably task-related (the future teachers want their partner to answer and they give them the turn with gestures). Gestures in pauses for word searching are very rare.

Table 2

Summary of gestures with pauses in both conditions

WITH A NATIVE PARTNER							
Original categories	Introducing concept	marking the word	filling in a sentence	Helping interlocutor	Eliciting answer	word searching	**Total**
	7	3	8	1	11	2	32
Merged categories	Comprehension oriented		Interaction oriented			Production oriented	
	10		20			2	
Ratio	31%		62.50%			6.25%	100%
WITH A NONNATIVE PARTNER							
Original categories	Introducing concept	marking the word	filling in a sentence	Helping interlocutor	Eliciting answer	word searching	**Total**
	36	63	13	16	55	29	212
Merged categories	Comprehension oriented		Interaction oriented			Production oriented	
	99		84			29	
Ratio	46.69%		39.62%			13.68%	100%

In the non-native interaction, the majority of the gestures produced during speech pauses are *comprehension oriented*: they either serve to introduce the concept (illustrate it before it is uttered) or mark it after it has been said. In both cases the gesture is meant to attract the partner's attention to the word and the pause helps the learner to segment the oral input. There are also a

good number of gestures in pauses that are *interaction oriented*, especially used to elicit the answer by giving the interlocutor the turn. We also found some instances of word searching and reformulation of how to express the concept because the non-native partner sometimes did not immediately know the word and the future teacher had to rephrase or find new ways of explaining. This could lead to more thinking in pauses where gesturing might help the speaker.

Illustrations of the Three Main Functions of Gestures in Pauses

We will now present occurrences of gestures in pauses to illustrate the three main functions we have identified: *production oriented, interaction oriented*, and *comprehension oriented*.

Production oriented gestures in pauses. A task such as the word explanation task produces speech hesitation. This occurs for two reasons: one is the constraints of the task (the participants are not allowed to use words from the same family or in a foreign language), and the other is when the interlocutor does not find the word, the future teachers have to find another way to explain things, and this results in speech disfluencies and pauses while they are thinking of another way. Very often, these pauses are filled with gestures that seem to assist with word search.

For example in Figure 1, the speaker first talks about Christmas presents, and then she tries to elicit an answer from her interlocutor by producing an iconic gesture for wrapping. However, since the non-native interlocutor does not answer, she looks for another way of saying things. The pictures show her looking for a synonym of *emballer* 'to wrap'. She is saying "*euh*,"

and then there is a long pause of 2268ms while she is miming the act of wrapping with both hands without looking at the interlocutor. The hesitation, the vocal and verbal context, the gesture and the gaze show that the future teacher is gesturing during the pause mainly for her own sake.

Figure 1. Silent gesture while word searching

This phenomenon of *gaze aversion* is known for facilitating thinking and access to memory by cutting somebody out of their environment and its visual stimulations (Glenberg *et al*., 1998). In another example (Figure 2), still when explaining *emballer* 'to wrap' to a non-native partner, a future teacher begins by explaining that it is the action of putting something in paper and covering it with the paper. But his partner does not seem to understand the word "cover" and repeats it showing his incomprehension. The future teacher then looks for a better way to explain, and this leads to a lot of hesitation and repairs during the word search. He says "*hum je"* 'erm I' then pauses for 5320ms. Then he says "*le euh donc poser l'objet*" 'the uh so put the object' and restarts his explanation of wrapping an object with more details. During his long pause he produces a gesture of 2890ms during which he enacts the action he wants to depict as if

he wanted to visualize it before describing it. During this gesture, he gazes out, not at his partner but at some imaginary point in front of him, and for a short moment it looks like he is on his own, without his partner.

Figure 2. Silent gesture while thinking

Interaction oriented gestures in pauses. The word explanation task is highly interactive because the partner has to provide an answer. It is thus important that the partner understand the concept and that the interaction keeps going. There are several ways that the future teachers show their interlocutors that they should answer and to encourage them. A lot of these require gesturing in speech pauses.

Eliciting answer. This is a very explicit turn giving when the future teachers indicate to their partners that they should answer. In the following example (Figure 3), the teacher explains *océan* 'ocean' and says that they are big seas and produces a large gesture with both hands depicting a large circle in front of her and showing a large entity. Her partner does not answer, so she adds examples by naming oceans "Atlantic" and "Pacific." Just when she finished saying "*pacifique"* 'Pacific' she reproduces the same gesture of a large entity, gazing at her partner and smiling. She ends her gesture with both palms up in a very inviting position. This very clearly

illustrates that she is giving the turn to her interlocutor to respond. “The speaker may gesturally […] give the turn, or indicate that the turn is open to either person (often by presenting two open palms)” (Bavelas *et a*l., 1995, p.397).

Figure 3. Eliciting an answer : *euh a- euh atlantique pacifi[que {2270ms}*]

Helping interlocutor. There are several occurrences of gesturing while the interlocutor speaks or shows his intention to speak. This encourages the interlocutor. In the following example, the word to guess is *râpé* ‘grated’, and the future teacher has just explained the action of grating cheese with a gesture of holding a grater with one hand and rubbing cheese on it with the other hand. The non-native interlocutor mumbles something then stops. The future teacher then reproduces his gesture while gazing at his partner to encourage him to proceed.

Figure 4. Gesturing to help the interlocutor

Filling in a sentence. This technique is very connected to a verbal technique of filling in blanks in a sentence. The future teacher produces a sentence and stops when the target word should be said. It is like filling in a blank in an oral exercise in the classroom. Most of the times, the oral blank is filled with a gesture depicting the word to find. In the next example (Figure 5), the future teacher explains *emballer* 'to wrap' and depicts the action. Then she says "*on utilise du papier [cadeau pour {800ms}]"* 'one uses paper to' with a pause while she mimes wrapping by drawing a circle in front of her. The native interlocutor then completes the sentence with the correct word.

Figure 5. *Filling in a sentence on utilise du papier [cadeau pour {800ms}]*

Comprehension oriented gestures in pauses. The following transcript (Table 3) is from the explanation of the word *râpé* 'grated'. FT is the future teacher, and NN is the non-native partner. The numbers between brackets correspond to the duration of speech pauses in milliseconds. The future teacher explains the word by using the example of a piece of cheese that you scrub on a cheese grater to reduce it in small pieces that she calls "*en petit fils"* 'threads'.

Table 3

Transcript of FT explaining râpé

1	FT	quand tu prends du **fromage** (790) tu sais du de **l'emmental** (580) pour manger avec
2		les **pâtes** (470) euh il est gros **comme ça** (300) et puis tu veux le mettre sur tes pâtes
3		alors tu le **passes** (660) pour qu'il devienne un (400) **en petits fils** (600) est-ce que tu
4		connais euh (250)
5	NN	oui oui je vois
6	FT	on dit que le fromage est (520)
7	NN	rapé
8	FT	voilà

FT	*when you take some **cheese** (790) you know some some **emmental** (580) to eat with **pasta** (470) uh it is big **like that** (300) and you want to put it on your pasta so you **rub** it (660) so it becomes a (400) in **small threads** (600) do you know uh (250)*
NN	*yes yes I see*
FT	*one says that the cheese is (520)*
NN	*grated*
FT	*there you are*

The verbal discourse of the future teacher is composed of a number of verbal strategies such as an example used throughout and a description of the action of grating (lines 1 to 3). Then she produces an unfinished sentence (line 6) so that her partner can complete it with the missing word. In addition, the speech contains a lot of pauses (9 pauses). In the first part of the explanation (lines 1 to 3), all the speech pauses precede or follow keywords like *fromage* 'cheese', *l'emmental* 'emmental', *pâtes* 'pasta', *comme ça* 'like that', *en petits fils* 'small threads' (in bold in the transcript). The speech pauses are used to facilitate the segmentation of the oral speech and the identification of important terms by the non-native partner. What is particularly interesting about this passage is that the future teacher gestures constantly, despite the number of pauses in oral discourse. As can be seen in the three examples (Figures 6-8) below, the location of the pause compared to keywords and the production of gesture during these pauses allows the speaker to highlight and illustrate the explanation of the elements she thinks relevant for understanding.

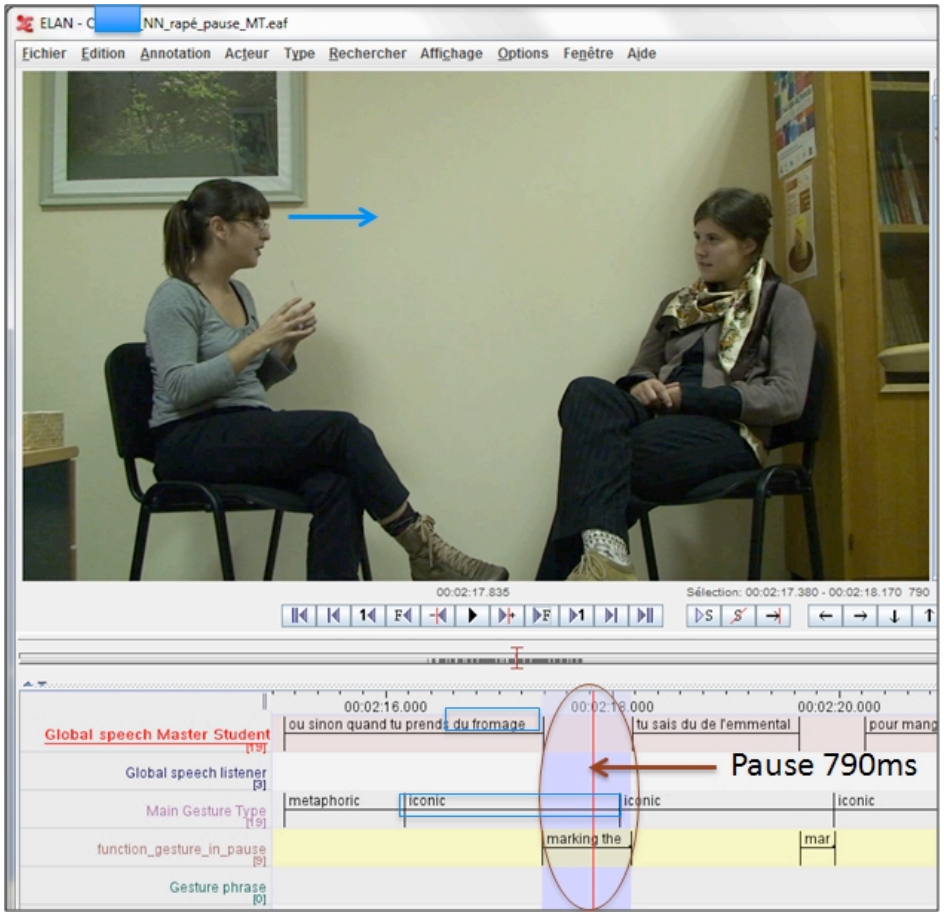

Figure 6. Gesture in speech pauses – Example 1

In Figure 6, the future teacher produces an iconic gesture with both hands as if she was holding a piece of rectangular cheese. This gesture starts when she says *"tu prends du fromage"* 'you take some cheese' and ends just before she begins the statement *"tu sais du de l'emmental* 'you know Emmental'. Between the two statements, she pauses for 790ms during which time the gesture goes on. The pause and gesture thus enable her to emphasize the word "cheese". During this occurrence, the future teacher looks at her partner.

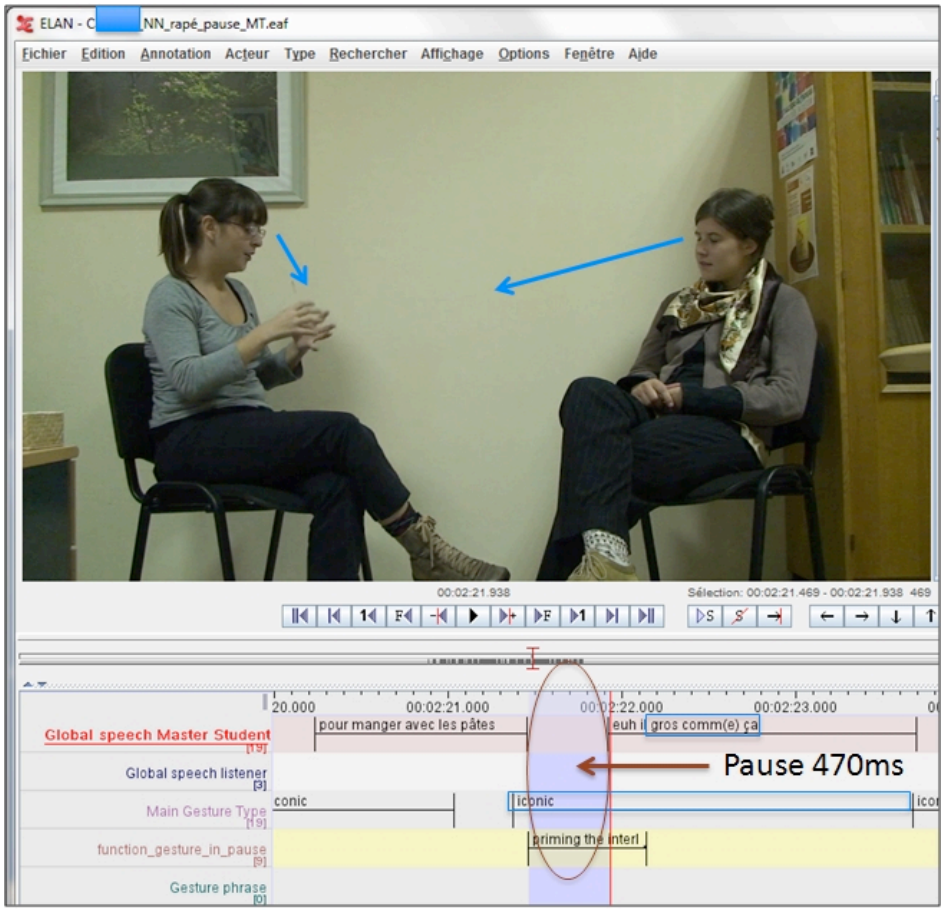

Figure 7. Gesture in speech pauses – Example 2

Then in Figure 7, she goes on by saying *"pour manger avec les pâtes*" 'to eat with pasta'. At the end of this statement, she begins to produce a move that resembles the gesture she had produced to illustrate the word cheese, but this time, it is to indicate the size. This gesture is accompanied by the statement *"euh il est gros comme ça"* 'uh it is big like that'. The relationship between gesture and speech here is supplementary because each brings different information and completes the other (the size is indicated only by the gesture), while in Example 1, there was a relationship of redundancy for gesture and speech in that they conveyed the same information. Between the two statements, she pauses for 470ms during which the action begins. Thus, instead of marking the keyword with a gesture in a pause after the issuance of the word, she illustrates the size before pronouncing "big like this." In a way, she introduces nonverbally

the contents of her statement and perhaps thus allows her partner to understand what follows. The gaze of the future teacher is then focused on the gesture, which also catches the eye of the partner. In general, when speakers look at their own gestures when speaking (especially when describing sizes and shapes), it draws the partner's gaze to the gestures (Gullberg & Holmqvist, 2006) as can be seen in the photo of Example 2.

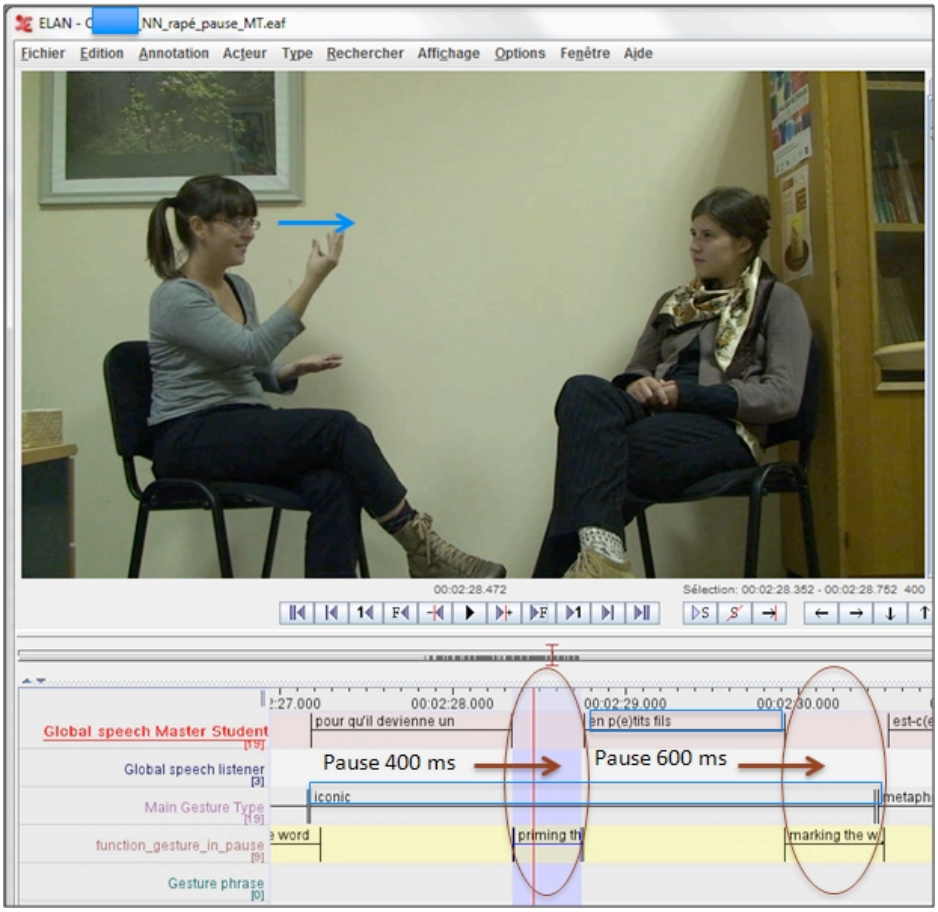

Figure 8. Gesture in speech pauses – Example 3

Then in Figure 8 after describing the action of *râper* by using the synonym *passes* 'rub', she says that the cheese *"pour qu'il devienne un (400ms pause) en petits fils (600ms pause)"* 'so it becomes a (400ms pause) in small threads (600ms pause)'. All of this part from the beginning of the statement to the end of the 600ms-pause is accompanied by a gesture that is redundant with speech in which the right hand is making up and down movements while

producing small finger movements to indicate a rain of small pieces of cheese ("small threads") that fall from the grater. The statement "small threads" is preceded and followed by two pauses of, respectively, 400ms and 600ms both during which the gestures continues. The key word is thus framed by this gesture. The gaze of the future teacher is clearly in the direction of her interlocutor.

As we have seen in these three examples, the use of pauses and the production of gestures in these pauses show that the teacher uses multimodal didactic discourse. She plays with verbal speech, pauses, and gestures to mark important words in her speech to make her statement easier to understand. Gaze direction here clearly sheds light on the intention of the speaker.

Gesturing profiles. When looking at the future teachers separately, one can see important individual variation. Some of them use a lot of gestures in pauses; others do not. Some use them only in the non-native interaction; others use them in both interactions. However, they all gesture in pauses at some point. Figures 9 and 10 show the main functions of gestures produced in pauses for each interaction and for each future teacher. Apart from teacher n°10, they all use more gestures in pauses with a non-native partner. Future teachers 2, 4, 5, 6 and 10 tend to use gestures in pauses in the native interaction to help keep the task going. Apart from teacher 7, they hardly use gestures in pauses to mark the keywords and serve comprehension.

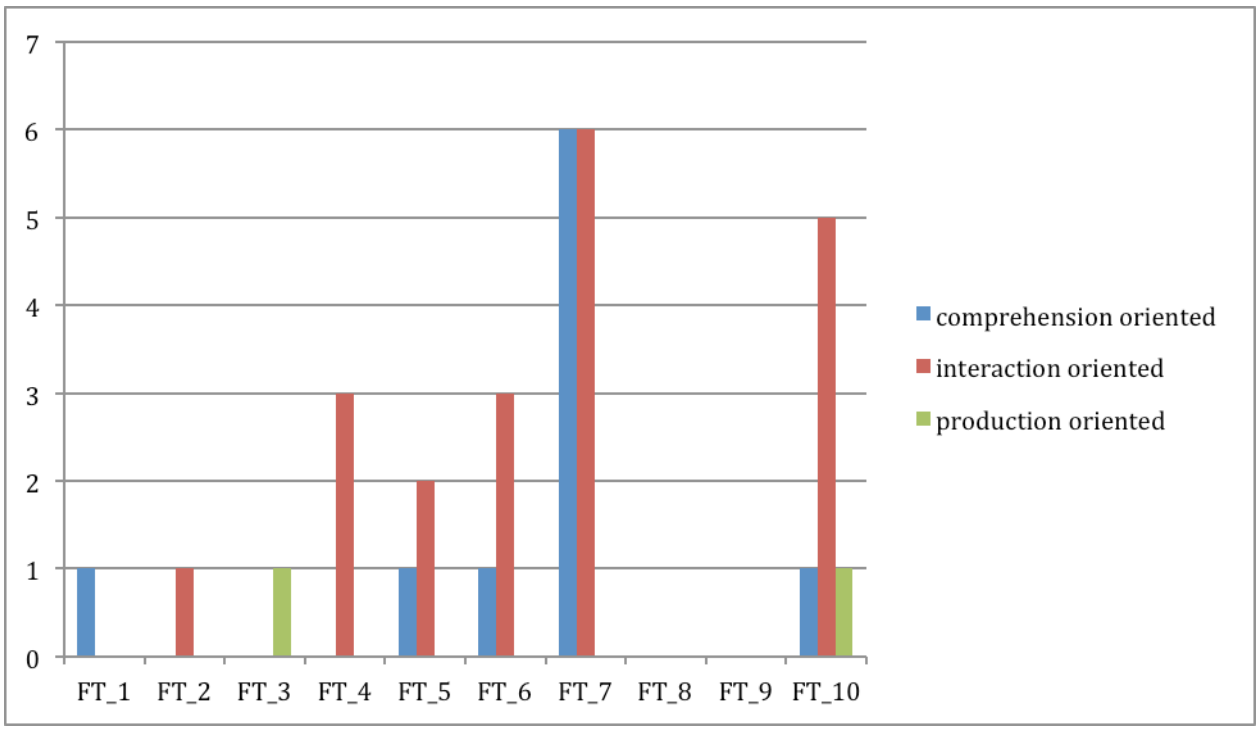

Figure 9. Functions of gestures in pauses for each future teacher (FT) in the native interaction

As far as the non-native interaction is concerned, they all use gestures at one point to serve the interaction and encourage their partner to answer. FT1, 2, 4, 5, 6, 7 and 9 use gestures in pauses to mark keywords more than for other purposes. Apart from FT 9 and 10, they all use gestures in pauses to overcome production problems at one point.

With a non-native partner, there appear to be three profiles. FT 5 and 7 use a lot of gestures in pauses. Future teacher 7 uses this strategy in both contexts and proves to be a very different gesturer from the others. Teachers 1, 3, 4 and 8 have an average amount of gestures in pauses with a non-native. Last, teachers 2, 6, 9 and 10 use a small amount of gestures in pauses and seem to use this strategy on an occasional basis. Even with this different amount of usage of gestures in pauses, the majority of the gestures for FT 1, 2, 4, 5, 6, 7, and 9 are comprehension oriented in function, whereas the majority for FT 3, 8, and 10 are interaction oriented. By examining the gesturing of the future teachers in two the interactions, it's clear that not only are

there different functions for gestures in pauses, but also individuals have different profiles in their use of gesture.

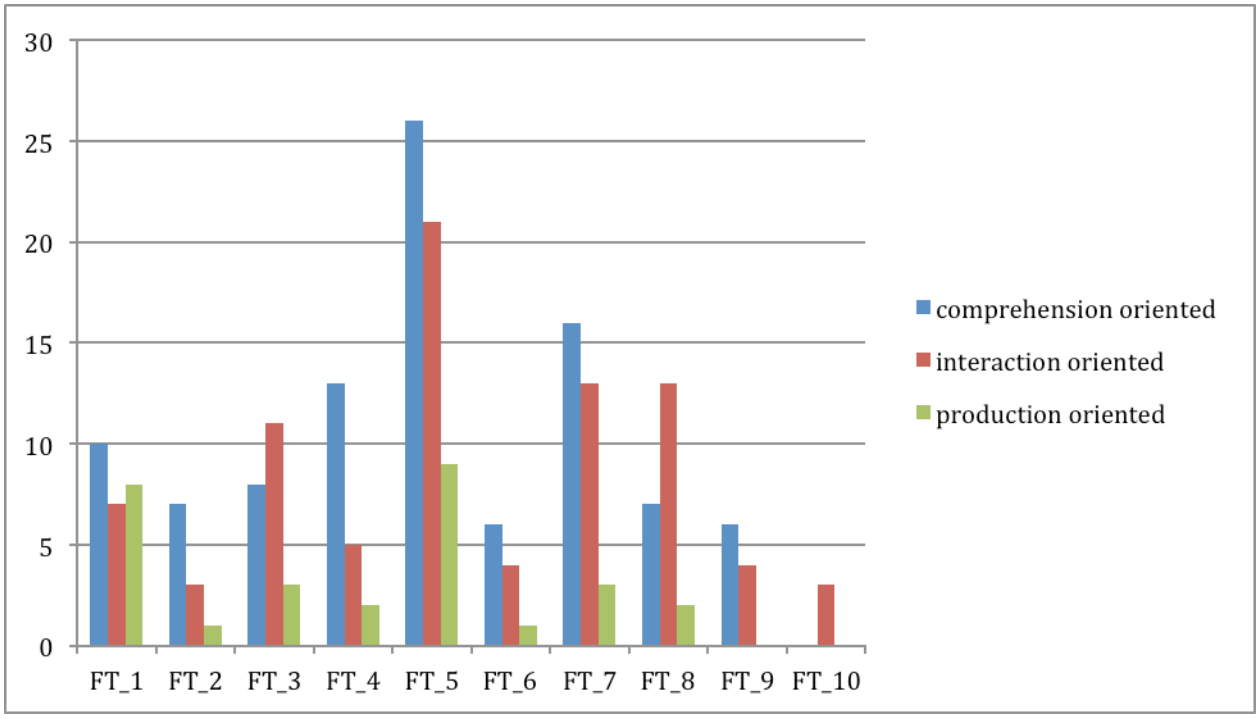

Figure 10. Functions of gestures in pauses for each future teacher (FT) in the non-native interaction

Discussion and Conclusion

We proposed that gestures produced during pauses have an additional function *comprehension oriented* to the functions that had already been identified: *production oriented* and *interaction oriented*. We have illustrated this function by looking at the gestures produced during speech pauses in a word explanation task between a future French teacher and two different partners (a native speaker and a non-native speaker of French).

We observed a considerable amount of gestures in pauses, especially in the non-native condition. The amount was striking and the gestures themselves illustrated the three different functions: *production oriented* (gestures that help the speaker to think and which have been described in previous studies), *interaction oriented* (gestures that are used to give a turn to the partner and/or to encourage them to speak which have also been studied by other researchers) and *comprehension oriented* (gestures that enable the speaker o highlight important words in his/her speech by isolating key words with pauses either before or after the word has been uttered). This last type of gesture in pauses helps the interlocutor to segment the oral input and helps comprehension. The fact that gestures (especially iconics and deictics) are produced in these pauses reinforces comprehension by illustrating the key words. When this occurs before the word has been uttered we named it "introducing concept" and when it occurs after, we termed it "marking the word". These strategies are very numerous in the non-native condition. They have pedagogical purposes and it is interesting to notice that the use of gestures in pauses has also been observed in naturalistic data of teacher talk in the classroom especially their interaction oriented and comprehension oriented functions (Tellier, in press). Facilitating comprehension and eliciting learner's speech are two main actions of the language teacher in the classroom (Cicurel, 1990).

The gestures that occur in the word explanation task are co-speech gestures that have pedagogical properties. They have some of the qualities of co-speech gestures particularly the *interaction oriented* gestures. They also have some of the qualities of teaching gestures (Tellier, 2008) particularly the *comprehension oriented* gestures, but they are not produced in a classroom while teaching a lesson to a class. Because we looked at gestures in pauses in only 60 explanations , it would be interesting to apply the taxonomy to gestures in pauses in other

explanations. It may shed further light on differences in *production oriented* gestures because some of them appeared to be word searches while others appeared to be searching for a way to reformulate a concept, not a search for a lexical item, but a search for how to accommodate the interlocutors' knowledge level with an explanation, something that is commonly done while teaching.

This is the first paper to propose a *comprehension oriented* function for gestures in pauses. It has shown that gestures in pauses have functions beyond word searching and interaction and opens the door for further studies on the many functions of gestures in pauses, especially in other asymmetrical interactions in which understanding each other is a crucial issue such as parent/child, doctor/patient or caregiver/old person, for instance. Gestures can enhance meaning and might benefit the interlocutor more when dissociated from speech (i.e. used in a pause). Further research should focus on the effect of gestures in pauses for understanding (*vs.* gestures produced simultaneously with the associated speech) and should be extended to different tasks, such as narration, description, and conversation.

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