Some uses of head tilts and shoulder shrugs during human interaction, and their relation to stancetaking

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Abstract— **When people engage in discussion or debate, they do not only use spoken language to position themselves in the course of interaction: they use their bodies as well. In this paper, we take a systematic, corpus-based, bottom-up linguistic approach rooted in gesture studies and interactional linguistics to account for the possible functions of two types of gesture during stancetaking in the course of human-human interaction: lateral head tilts and shoulder shrugs. The absolute or contextual direction of head tilts does not seem directly relevant to stancetaking, but rather related to the pragmatic deictic function of abstract pointing. Shoulder shrugs can work as markers of "dis-stance" or disengagement, in which case they take on an epistemic-evidential dimension. Both gestures tend to be used when the gesturer either disaffiliates with third party positionings, or affiliates with his/her interlocutor's stances.**

Stancetaking; positioning; gesture; head tilts; shoulder shrugs; affiliation/disaffiliation

I. INTRODUCTION

The expression of a speaker's feelings, attitudes and judgments, also known as stance, first came to the fore in corpus linguistics with the analysis of written texts, focusing on the writer's perspective [1]. Yet, recent developments in interactional linguistics have shown that stance is a fundamentally interactive phenomenon [2], and call for taking its study from subjectivity to the realm of intersubjectivity [3], with a focus on naturally occurring spoken interaction. Stancetaking is a pervasive phenomenon in spontaneous conversation, where participants do not talk much about events or actions, but rather express their feelings, judgments and attitudes, and check their views of the world with fellow interactants [4]. Stance is socially contextualized, interpersonal, and dynamic in nature: it is "a public act by a social actor, achieved dialogically through overt communicative means, of simultaneously evaluating objects, positioning subjects (self and other), and aligning with other subjects, with respect to any salient dimension of the sociocultural field" [5].

As is commonly done in analysis and modeling of social interaction [6], we assume that a speaker's positioning in interaction (expressing attitude, judgment, evaluation, perspective) is intersubjective in nature. This means that when speakers voice their own viewpoint on something, they do so within the context of utterance, addressing their interlocutor and taking them into account in formulating their personal perspective. Speakers are held accountable for the stances they take, since there is an epistemic dimension to any positioning (i.e. related to the degree of speaker commitment towards, or certainty of, what is said). When speakers position themselves in the interaction, they often do so explicitly **with respect to other positionings** [7], thereby introducing a **"stance differential"** [5]. Acknowledging a stance differential is a form of "**dis-stancing**", between the speaker's stance and another, prior positioning. This prior positioning could be a former stance of the **speaker's him/herself**, a positioning of the **interlocutor's**, or that of a **third party's** (i.e., the positioning of someone from outside the context of interaction). When speakers initiate a positioning, or position themselves towards a former positioning of their own, we say that their stancetaking is **self-oriented**. When they take a stance with respect to a positioning of the interlocutor's or of a third party's, we say that their stance-taking is **other-oriented**. When positioning themselves with respect to another stance, speakers usually do one of two things: they either **affiliate** with it (i.e., agree with, support it) or **disaffiliate** with it (i.e., disagree with it). In this paper, we aim to find out to what extent two upper-body movements, lateral head tilts and raised shoulders, play a communicative role in conveying such aspects of stancetaking.

Alongside stancetaking, multimodality is another core feature of spontaneous conversation. As Kendon suggests ([8], [9]), gestures used during natural communication fully participate in the global meaning of a speaker's utterance. And yet, with the exception of the detailed qualitative analysis by anthropolinguists and conversation analysts of stance as the display of affect in the course of interaction ([10], [11], [12]), the role of gesture as part of stancetaking has so far hardly been investigated by gesture and interactional linguists. For instance, Kärkkäinen's otherwise impeccable study of epistemic stance in spontaneous conversation [13] leaves the multimodal dimension of stancetaking aside. This paper is hence meant as a contribution to the budding field of multimodal stancetaking analysis within interactional linguistics; it makes a bridge between the theoretical work on stancetaking and positioning and the empirical study of physical behaviours of bodily positioning and movement.

The paper also has two major methodological aims. First, it suggests a systematic, corpus-based, bottom-up method for

retrieving functions of gestures during stancetaking using annotation and coding software (ELAN, Excel). Second, by relying on descriptive statistics, our approach aims to bridge the gap between the qualitative-only methods of conversation analysis and the quantitative-only methods of computerized analysis of language, thereby entering into a dialogue with them.

II. Background

The multimodal nature of spoken communication is now beyond dispute, as shown by a thriving body of research in the field of gesture studies, generally with a focus on manual gestures (see for instance [14] and [15]) and their many forms and functions (see [9] for a detailed overview). Yet, other gestures can play a major communicative role, among which upper-body movements of the head and shoulders. Head movements can have semantic, narrative, discourse-structuring or interpersonal functions [16], headshakes can convey a variety of meanings deriving from negation [17], and head nods can indicate both alignment and affiliation [12]. Raised shoulders are the core component of shoulder shrugs, which can also include a raised or low brow, open hands palm up, and a head tilt to express a speaker's distance or disengagement [18].

Tilted heads and raised shoulders do not always qualify as gestures, but we analyse them only in instances when they do so. Bodily movements qualify as gestures when they are "excursionary" in nature [17]: a head tilt is considered as a gesture when at the end of the tilt, the head is back in the orientation it had at the moment when the tilt began. Likewise, a raised shoulder constitutes a gesture when it goes back down to its initial position after the shrug. As with manual gestures, head tilts and raised shoulders can be broken down into gesture phases [9]: preparation, stroke, (post-stroke hold,) retraction. It was Streeck's preliminary analysis of shrugs [18] that motivated the present combined study of lateral head tilts and raised shoulders. Shrugs, he explains, are "compound enactments". A prototypical shrug involves several body parts: "the eye-brows (which are being raised), the hands (which are turned so that the palms face up); the forearms (which may be lifted), and the shoulders (which are also raised). In addition, the head may be tilted" [18]. It now becomes clear why raised shoulders have been chosen as a unit of analysis rather than shrugs per se: shrugs are complex enactments with variable features that can only be identified and grouped in a family-resemblance way. On the contrary, raised shoulders are simple, easily delineated gestures that allow us to trace shrugs, since they are typical core components of shrugging. Streeck's work also justifies a joint analysis of head tilts and raised shoulders, since they work together at least during shrugging, this "complex and varied displays of great communicative importance (and perhaps a candidate gesture universal)" [18].

Several studies provide a sound basis for thinking that left-right head tilts and shoulder raising are relevant to the study of stance. Müller and Haferland [19] identified the category of performative (manual) gestures as modulations of ubiquitous everyday activities of the hand, which for instance metonymically relates the Palm Up Open Hand (PUOH) gesture to actions of giving and receiving [20]. Hence, we can suppose that a speaker's moral attitude is reflected to some extent in their physical attitude. One function of head tilts arising from the study of sign language is to mark perspective shifts [21], while markers of perspective shifts in American Sign Language are likely to have their origin in co-speech gesturing [22]. More recently, lateral head tilts have been identified as possible markers of perspective shifts during spontaneous spoken conversation as well [23]. Although several gesture scholars have touched upon their communicative functions, lateral head tilts and shoulder raising have not yet been studied systematically on their own, as we propose to do based on a corpus of videotaped conversational data.

III. Corpus

The corpus used in this study is a sub-part of the Cambridge Student Corpus (CSC), a 12-hour corpus of videotaped conversations between university students between 18 and 30 who are native speakers of British English. The CSC was collected in Cambridge in 2011 by the first author and colleagues. Participants were all volunteers who learnt about the corpus project via Cambridge University mailing lists or ads posted on campus. Volunteers were asked to come along with a friend for a recording of informal conversations in pairs, and all participants gave their informed consent to have the recording used strictly for the purpose of linguistic research.

The sub-part of the CSC under scrutiny in this article involves four videotaped dyadic conversations between students who discuss environmental issues. Each of the four pairs involves a male and a female participant who know each other well, since they are friends. Since the shortest of the four videos lasts 14:50 minutes, the three other videos were analysed only up to that time, so as to make them as comparable as possible. The total length of analysed videos amounts to 58:20 minutes, with a total of eight speakers, four males, four females. For purposes of anonymity, the male and female speakers in the first conversation are respectively referred to as M1 and F1, the male and female in the second conversation as M2 and F2, and so on with M3 and F3 and M4 and F4.

In each recording, the two participants sat on chairs about a meter away from each other in the familiar setting of a university supervision room, in front of a digital camera. Chairs were positioned diagonally so that speakers were half-facing each other, half-facing the camera, and they were filmed from the head down to below the knee. In this layout, the camera's slanted angle on the participants gives the best possible view of the form, location and orientation of their body movements. An extra microphone connected to the digital camera was placed on a small table in front of them, so as to maximize the quality of the sound recording.

The participants engaged in semi-guided conversations structured by an activity: on the small table in front of them, there was a pile of environment-related questions such as "should we stop using nuclear power?" or "how did you react to the Fukushima nuclear accident in March 2011?". Each pair of participants was asked to take turns picking a question, asking it to the other person and discussing it together as much as they wanted. They were asked to go on to the next question

when they ran out of ideas, until the researcher stopped the activity after 15 to 20 minutes. Despite the constraints of the activity, the interactions were spontaneous in character.

IV. CODING METHOD

The 58:20 minute video corpus was annotated for each participant's lateral head tilts and raised shoulders by the first author using the open-source software ELAN [24]. Four passes were made on each video to annotate each gesture with each participant. This was done with the sound off to avoid possible biases based on the co-occurrence and/or content of speech.

During the annotation process, three different recurring forms emerged for each gesture. A lateral head tilt was either: a tilt to the **right**; a tilt to the **left**; or a **left-and-right** tilt, in instances when the speaker's head oscillated quickly from left to right and this oscillation clearly constituted one single gesture. For occurrences of raised shoulders, either: **both** shoulders were raised; the **left** shoulder only was raised; or the **right** shoulder only was raised.

Annotations in ELAN were then exported into two separate Excel spreadsheets (one for head tilts, one for raised shoulders) for further coding, with each line in Excel corresponding to one annotation. One crucial feature of this annotation design is that annotations were sorted in ELAN and exported in Excel, first by speaker, second in chronological order. By sorting annotations this way, we choose not to address issues of alignment between speakers as the interaction unfolds. Instead, we analyse the use of each gesture from the perspective of the speaker-gesturer, in each gesture's local interactional context.

In Excel, we gathered more specific information about the verbal and non-verbal environment of each head tilt or instance of raised shoulders, concerning the sort of verbal and non-verbal behaviour that overlaps with each gesture:

- Non-verbal behaviour: gaze direction, head movements (nod, shake…), facial expression (mouth corners down, brow up…), trunk movements (including shoulders up), hand gestures (referential, discourse-structuring, …); and whether the gesture is part of a shrug.
- Verbal behaviour: Who is speaking or not during the gesture: the gesturer? The interlocutor? What is the content of the co-occurring speech if there is any? What is the general function of the multimodal utterance including the gesture in the interaction? What discourse markers are related to the function of the multimodal utterance if any? (*I think, so, well,* …)

The purpose of the first pass on the data with the sound off in ELAN was to approach bodily movements as potential gesture candidates in a systematic, unbiased way. One purpose of the second pass in Excel was to check whether bodily movements annotated as gestures actually bear communicational meaning, with the help of the spoken interactional context. During the Excel coding, some ELAN annotations were discarded for further analysis on two grounds: (1) If the amplitude of the movement was eventually deemed almost imperceptible, they were re-qualified as neutral and left aside. (2) If they did not fulfill any communicational role and were simply part of a posture shift (trying to find a more comfortable sitting position, raised shoulders as part of laughter), they were re-qualified as self-adaptors afterwards [25] and left aside, as is usually done in gesture studies. Henceforth, the relevant raising of the shoulders that was coded will be referred to as a 'shoulder shrug'.

The other, and major purpose of the second pass in Excel is to trace potential recurring patterns in the use of gestures within their multimodal context, during the third and final step in our analysis (next section). Starting from the Excel coding, we grouped similar micro-contexts of gesture use in a second set of analytical columns to pinpoint these gestures' specific functions. We think that such a corpus-based, bottom-up approach of the data is the most relevant way to uncover the functions of gesture during naturalistic human interaction. The relative importance of recurring patterns in the data is supported by descriptive statistics obtained automatically in Excel.

V. ANALYSIS AND RESULTS

Our corpus produced **218** occurrences of lateral head tilts and **102** occurrences of raised shoulders being core components of shrugs. Shoulder shrugs and tilted heads occurred simultaneously **32** times. Head tilts and shoulder shrugs were distributed across speakers as indicated in Figure 1 to 3.

As measures of standard deviation show, the distribution of head tilts and shoulder shrugs is quite heterogeneous across the 8 speakers (Fig. 1). And yet, despite individual variation, the majority of speakers use a bit of all gestures. Overall, right tilts are used slightly more than left tilts (50% against 40% of occurrences), which are both more frequent than the 'left and right tilt' gesture (10%). Shrugging with both shoulders is more frequent than with only one (61% vs 39%).

participant	left-and-right tilt	left tilt	right tilt	total
F1	3	9	11	23
F2	1	2	4	7
F3	3	15	20	38
F4	7	16	25	48
M1	0	13	8	21
M2	3	4	13	20
M3	1	10	21	32
M4	4	18	7	29
Total	22	87	109	218
Mean	2,75	10,88	13,63	27,25
Stan. dev.	2,19	5,72	7,56	12,49

participant	both shoulders up	left shoulder up	right shoulder up	total
F1	4	11	1	16
F2	9	0	6	15
F3	7	1	1	9
F4	3	2	0	5
M1	10	5	3	18
M2	11	2	0	13
M3	9	4	1	14
M4	9	2	1	12
Total	62	27	13	102
Mean	7,75	3,38	1,63	12,75
Stan. dev.	2,87	3,46	2,00	4,13

Figure 1. Counts and dispersion of head tilts and shoulder shrugs across the 8 participants

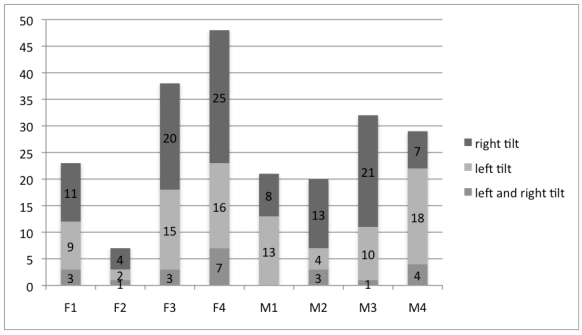


Figure 2. Distribution of the 218 head tilts across the 8 speakers

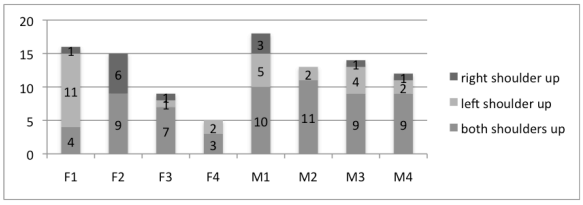


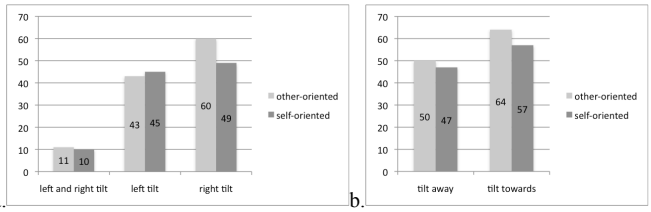
Figure 3. Distribution of the 102 shoulder shrugs across the 8 speakers

A. *Lateral head tilts*

The descriptive information coded for head tilts was further analysed in Excel across parameters of stancetaking, addressing the following: (1) Is the multimodal utterance self-oriented or other-oriented? (2) Is the speaker positioning him/herself with respect to another positioning? If so, is this other stance a former one of his? The interlocutor's? A third party's? (3) Is the speaker's interactive positioning displaying affiliation? Disaffiliation?

As Figures 4 and 5 show, there is no clear tendency as to whether the absolute (left/right) or contextual (towards the interlocutor/ away from them) direction of tilts might be related to self- or other-related positionings. This is confirmed by the fairly small values of standard deviation in each case – however, perhaps less evidently for right tilts.

If the direction of a tilt does not seem stance-related, its (absolute) direction seemed to matter when the head tilt was used for abstract pointing, in a way that has been evidenced for



a. b.

Figure 4. (a) Absolute and (b) contextual direction of the 218 head tilts across self- and other-oriented positionings

c.

	left-and-right tilt	left tilt	right tilt	total
other-oriented positioning	11	43	60	114
self-oriented positioning	11	44	49	104
total	22	87	109	218
mean	11,00	43,50	54,50	109,00
stan. dev.	0,00	0,71	7,78	7,07

d.

	tilt away from the interlocutor	tilt towards the interlocutor	total
other-oriented positioning	50	64	114
self-oriented positioning	47	57	104
total	97	121	218
mean	48,50	60,50	109,00
stan. dev.	2,12	4,95	7,07

Figure 5. Mean and standard deviation for (c) absolute and (d) contextual direction of the 218 head tilts

hand gestures (see [26] and [27]). In cultures where time (and writing) is conventionally oriented from left to right, gestures referring to the past tend to be placed on the left while reference to the future occurs on the right of the gesture space – as exemplified by speaker M3's tilt left on "before" when saying, "…or whatever it was before that Kyoto Protocol". Left-and-right tilts also seem to fulfill what resembles a deictic function by situating elements of discourse in separate spaces when the co-occurring speech is about alternatives, lists or contrast (7 out of a total of 22 occurrences of left-and-right tilts), corroborating [16]. Their second main use seems to be conveying the speaker's modal attitude of mitigation (uncertainty, or weighing the pros and cons, in 9 occurrences).

Finally, the data displayed a remarkable pattern in instances of stance differential, when speakers positioned themselves with respect to a prior stance. Alongside clear-cut instances of affiliation and disaffiliation, a third category of mitigated affiliation emerged. A speaker displays mitigated affiliation when, for instance, the head tilt accompanies utterances like "yeah, but", "I suppose, yeah", "well… yeah", or co-occurs with no speech, lowered eyebrows and a spread (tense) mouth. Another pattern emerged when head tilts were produced without co-occurring speech on the part of the gesturer. Together with gazing at the other participant and remaining silent, sometimes smiling and leaning forward, head tilts participated in the active display of attention to the other participant's speech, thereby taking on a clear interpersonal function. Figure 6 sums up these various tendencies.

The use of head tilts in displays of affiliation, mitigated affiliation, disaffiliation, and listening to the other participant, concern **105** occurrences in total. Interesting subsets emerge. Speakers do not use head tilts to position themselves with respect to a former stance of their own very often (11 times in total). Yet, when they do so, it is often to revise their opinion (9 occurrences of disaffiliation with a former personal stance). A clear pattern stands out in the use of head tilts in contexts of affiliation or disaffiliation: when head tilts accompany affiliation, they are often directed at the other participant; but when speakers use them to disaffiliate, it is mostly to refer to a third party's stance, to someone outside the context of the conversation. Overall, head tilts signal a positively polarized attitude towards the interlocutor on the part of the gesturer, with in total 47 occurrences out of 105 (including affiliation (28) even when mitigated (8), and the silent, but active display of attention when listening (11), Fig. 6). Direct disagreement with the other participant is rare (with just 4 occurrences of plain disaffiliation with the interlocutor) – although head tilts

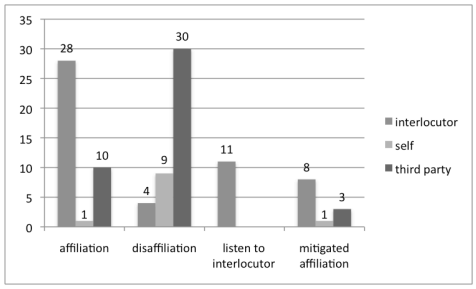


Figure 6. Head tilts accompanying affiliation, mitigated affiliation, disaffiliation or listening

accompany a less overt, more potential kind of disagreement with the other participant, perhaps bearing only the guise of consensus, in the form of mitigated affiliation.

B. *Shoulder shrugs*

We now turn to the analysis of shoulder shrugs. Starting from Streeck's preliminary study of shoulder shrugs [18], we decided to check to what extent the descriptive information collected for the 102 occurrences of shoulder shrugs in Excel could be accounted for in terms of distance and disengagement. Working bottom-up from the descriptive coding, we looked for recurring patterns in the local multimodal context of each occurrence. This allowed us to evidence and specify the role

played by shoulder shrugs in stancetaking, as well as refine the definition of the "disengagement" or "distance", or, as it were, "dis-stance", involved.

The use of shoulder shrugs proved highly relevant to the study of intersubjective stancetaking: 81% of shoulder shrugs in the corpus are used at times when the speaker positions him/herself with respect to another stance, 87% of which belong to others (the interlocutor or a third party).

In a whole set of occurrences, shrugging seems to be used in moments when the speaker-gesturer is acknowledging a "**stance differential**" (after [5]) between another stance (a former stance of his/hers, of the interlocutor's or a third party's) and his own positioning. This is how we understand shrugging to indicate the speaker-gesturer 's distance, or rather "**dis-stance**", as the speaker positions him/herself with respect to a prior stance, while simultaneously acknowledging this stance differential. As with head tilts, the stance differential is often resolved in affiliation or disaffiliation: either the speaker **adjusts** to the prior positioning, or he/she **disagrees** with it. A couple of examples might help illustrate this function of shrugging. When M2 shrugs and smiles on saying "oh yeah… that makes sense!," he suddenly distances himself from a former stance of incredulousness, and disaffiliates with it. When talking about the nuclear accident in Chernobyl, F2 says "people understandably will say, if it's happened once, it's once too often", and shrugs on "understandably": she first acknowledges the existence of a third party's positioning and then affiliates with it.

In another set of cases, shrugs seem to function as **epistemic-evidential markers**, namely relating to the gesturer's degree of knowledge of, and commitment to, a state of affairs, as well as the origin of this knowledge. They can accompany a speaker's expression of **uncertainty**, ignorance, or refusal to commit oneself by passing a judgement, which are also typical pragmatic functions of the expression "I don't know" in spontaneous conversation (cf. [28]), and indeed the two sometimes co-occur to produce these effects. In such cases, shrugging marks disengagement based on low or null epistemic commitment. Shrugging also relates to disengagement in instances when the speaker-gesturer explicitly takes no responsibility for a state of affairs, and this can happen for different reasons. In some cases, speakers shrug to convey the **obviousness** of a state of affairs, based on facts **observable by everyone**, or **general knowledge** and doxic beliefs, as in F2's "obviously… obviously it's bad". This sense of obviousness can also stem from the context of interaction itself, e.g. when gesturers implicitly refer to **knowledge they share** as friends (with the shrug typically co-occurring with "you know"), or show that the gesturer's positioning is so obvious and **self-explanatory** that it doesn't even need to be stated (typically with a shrug occurring after a conclusive "so", at the end of a turn). Finally, the third epistemic-evidential use of shrugs is related to a **logical or chronological necessity** beyond the gesturer's responsibility as in M2's "if you made a valid point, they would agree with it", with a shrug on "point" (in some cases, with a sense of expectedness as in M4's shrug on "I wouldn't be surprised"). In all these cases, shrugs indicate disengagement because they express a lesser to inexistent commitment on the part of the gesturer.

Out of the 102 occurrences of shoulder shrugs, **47** indicated disengagement (Fig. 7) and **50** indicated dis-stance (Fig. 8). **5** occurrences received the label of "dis-stance and disengagement" when the shrug seemed to do both things at the same time. An example of this is when M1 is giving a voice to a third party whom he disagrees with, namely, natural scientists and conservationists who suggest that the extinction of endangered species is a natural process that needn't be stopped. In "oh maybe it's better if we just let the giant panda die", M1 shrugs on "it's better if we just", but it's impossible to tell apart the conservationists' disengagement in the face of natural necessity, and M1's own disaffiliation with them.

Figure 7 below indicates the distribution of disengagement-related occurrences of shrugs across the epistemic-evidential categories that emerged from the data. Logical necessity stands out as the first motivation for shrugging in a disengaged way, with a typical sense of the "what can you do?" powerlessness sometimes associated with shrugs.

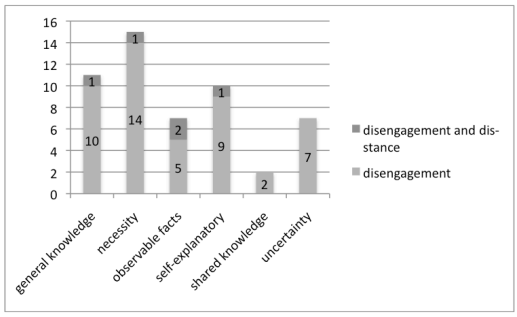


Figure 7. Distribution of disengagement-related shrugs across epistemic-evidential categories

Even though lateral head tilts were found to participate in shrugging in 32 occurrences, we could trace no specific communicational pattern related to their presence or absence in shoulder shrugs (for instance, 17 participated in the display of dis-stance, 14 in that of disengagement, 1 in doing both simultaneously). Yet, when shrugs accompany a stance-differential resolved in affiliation or disaffiliation, they follow a pattern comparable to that of head tilts, as Figure 8 shows. Indeed, as with head tilts, when shrugs are associated with a display of affiliation, it is usually for the gesturer to affiliate with the interlocutor. Conversely, when the gesturer shrugs to display disaffiliation, he/she most of the time disaffiliates with a third party, i.e. someone outside the immediate context of interaction.

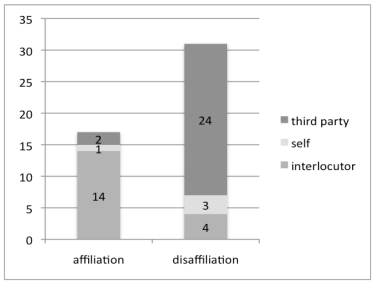


Figure 8. Distribution of dis-stance-related shrugs resolved in affiliation of disaffiliation across sources the prior positioning.

VI. Conclusion

In this corpus-based study of videotaped conversations, we adopted a bottom-up approach, studying lateral head tilts and shoulder shrugs within their local multimodal interactional context to uncover their potential functions with respect to stancetaking. The direction of head tilts, either absolute (left/right) or contextual (away from/ towards the interlocutor) wasn't directly relevant to stancetaking, and rather seemed related with the pragmatic function of abstract pointing. Shoulder shrugs emerged as expressing "dis-stance" (i.e. acknowledging a stance differential) and/or disengagement (in which they take on an epistemic-evidential dimension). Although lateral head tilts can happen together as part of shrugging, we could trace no specific function related to their co-occurrence. Our main finding was that participants tend to use the two gestures in a similar way when positioning themselves with respect to a prior stance: either to affiliate with their conversation partner's stance, or to disaffiliate with a third party's positioning. This preliminary study doubtlessly calls for further research: e.g., the heterogeneous distribution of results calls for a larger set of participants. Even so, this study appears as a useful step towards understanding the key interpersonal role played by lateral head tilts and shoulder shrugs during stancetaking in conversation.

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