Watch out for laughs: Gaze and laughter coordination in dialogue.

Chiara Mazzocconi (ILCB, LPL - Aix-Marseille University); Vladislav Maraev, Vidya Somashekarappa, Christine Howes (CLASP, University of Gothenburg).
chiara.mazzocconi@univ-amu.fr

In the current paper we present ongoing work investigating the interaction and coordination of laughter and gaze (both from the laugher and the partner) in relation to the pragmatic function performed by the laughter, aiming to contribute to the integration of gaze (Rossano, 2013), speech-acts (Sandgren et al., 2012) and non-verbal vocalization (Romaniuk, 2009) studies in conversation. Our work is crucially grounded on the assumption that para- and non-verbal behaviour are not simply redundant to the linguistic content conveyed, but themselves contribute meaning and affect the unfolding dialogue. We address the following questions: (1) Do laughs with different pragmatic functions relate to different patterns of gaze? (2) Does gaze towards a partner play a significant role in laughter coordination and alignment?

Our pilot data consists of 23 minutes from a multimodal corpus of loosely task oriented dyadic taste-testing interactions (Somashekarappa et al. 2020) annotated manually using the ELAN software. Laughter was annotated following the framework proposed in Mazzocconi et al. 2020. In the current work we focus on two of the features annotated: (1) the type of incongruity present in the laughter argument (i.e. the *laughable*); (2) the positioning of laughter in relation to the partner's laughter (*isolated*, *following*, or having the *same onset* as a partner's laugh). In particular we focus on the two most common laughable types: (1) *Pleasant incongruity* (PI): when a clash between the laughable and certain background information is perceived as witty, rewarding and/or somehow pleasant (e.g. jokes, goofy behaviour, and conversational humour). (2) *Social incongruity* (SI): a clash between social norms and/or comfort and the laughable (e.g. embarrassment, awkwardness, asking a favour, and criticism). With regards to gaze, we focus here on *gaze at the partner*, leaving to further investigation mutual gaze and joint attention. For each laughter event (74 laughs) we considered a time window of 3000ms centred either around the onset or the offset of the laugh. We considered gaze at the partner as a dichotomous dependent variable. We selected 10ms resolution, using a "first come first served" overlap handling and binned data at intervals of 100ms, rounding up any fractions to 1.

Our analysis (mixed-effect logistic regression) shows that participants are significantly less likely to look at their partner while producing laughs related to PI (mirroring data reported in Gironzetti (2017) during humourous exchanges), whereas laughs that relate to SI are accompanied by gaze at the partner (Fig. 1, Tab. 1), possibly in order to check their partner's response to the laughter in order to monitor that it had the desired positive effect. With respect to the non-laughing partner's gaze at the laugher we observe the opposite pattern around the laughter offset (Fig. 2, Tab. 2), possibly looking away to avoid putting extra pressure on the partner who signalled that they were appraising a potential discomfort (SI). Our observations regarding laughter positioning shows that gaze contributes to the synchronisation and alignment of laughter production, analogously to previously reported results for speech turn-taking (Bavelas et al., 2002): a laughter shortly following another one (Antiphonal laugh) is more likely to be preceded by gaze from the partner, and even more so if the two laughs have the same onset (Fig. 3, Tab. 3). Our results not only confirm that both laughter and gaze play a crucial pragmatic role in the unfolding of the dialogue, but also validate the taxonomy of laughter proposed in Mazzocconi et al. (2020) showing that laughs belonging to different classes are produced and perceived as performing different pragmatic functions, eliciting different multimodal behaviours from the interactants. Our study provides evidence that gaze does not only regulate turn-taking, but is also tightly linked to the discourse context (Torres et al., 1997) and dialogue acts performed by (para-)linguistic elements. It also provides empirical evidence to the debate about gaze aversion, opposing the view that social stress is the main explanatory factor (Stanley & Martin, 1968). In this case, laughers should avoid looking at the partner while producing a laughter related to SI.

Figure 1: Probability of laugher's gaze at partner around laughter onset according to incongruity type. *The probability of laughter duration is shown at the bottom of the figure.*

Figure 2: Probability of partner's gaze at laugher around laughter offset according to incongruity type.

Table 1: Log. Regr.: Laugher's gaze at partner at laughter onset according to incongruity type.

Factor	Estim.	SE	z	$Pr(>\|z\|)$
Bef/Aft	-0.04	0.07	-0.64	0.51
Incong. type	-0.046	0.14	-0.31	0.75
B./A.* Incong.	-0.78	0.14	-5.26	1.4e-07 ***

Table 2: Log. Regr.: Partner's gaze at laugher at laughter offset according to incongruity type.

Factor	Estim.	SE	z value	$Pr(>\|z\|)$
Bef./Aft. (B/A)	-0.10	0.09	-1.09	0.27
Incong. type	-0.53	0.19	-2.78	0.005 **
B./A.* Incong.	-0.70	0.19	-3.68	0.00 ***

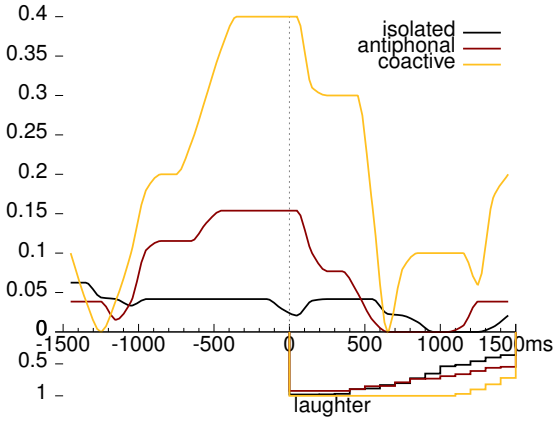

Figure 3: Probability of partner's gaze at laugher around laughter onset according to laughter positioning.

Table 3: Log. Regr.: Partner's gaze at laugher at laughter onset depending on laughter positioning.

Factor	Estim.	SE	z value	$Pr(>\|z\|)$
After onset/Before onset	-0.68	0.30	-2.26	0.023 *
Antiphonal (ie. Following)/Isolated	0.89	0.24	3.68	0.00 ***
Coactive (i.e. Same onset)/Isolated	1.88	0.26	7.2	5.79e-13 ***
After/Before onset : Antiphonal/Isolated	-0.14	0.41	-0.34	0.73
After/Before onset : Coactive/Isolated	0.49	0.41	1.20	0.22

References Bavelas et al., Journal of Communication, 2002; Gironzetti, PhD Thesis, 2017; Mazzocconi et al., IEEE Trans. on Affective Computing (2020); Romaniuk, Crossroads of Language, Interaction, and Culture (2009); Rossano, The handbook of conversation analysis, 2013; Sandgren et al., International Journal of Language & Communication Disorders, 2012; Somashekarappa et al., Proceedings 12th LREC, 2020; Stanley & Martin, Psychonomic Science (1968); Torres et al., First international workshop on human-computer conversation, 1997.