Convergence of laughter in conversational speech: effects of quantity, temporal alignment and imitation*

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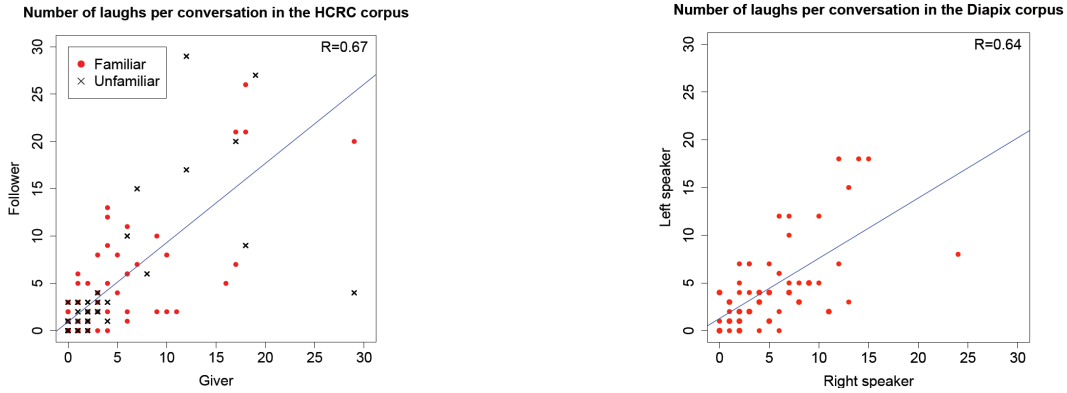
A crucial feature of spoken interaction is joint activity at various linguistic and phonetic levels that requires fine-tuned coordination. This study gives a brief overview on how laughing in conversational speech can be phonetically analysed as partner-specific adaptation and joint vocal action. Laughter as a feature of social bonding leads to the assumption that when laughter appears in dialogues it is performed by both interlocutors. One possible type of convergence is when the conversational partners adapt their **amount of laughter** during their interaction. This partner-specific adaptation for laughter has been shown by Campbell (2007a). Persons, initially unknown to each other and without any negative attitude to the unknown partner, had to talk in ten consecutive 30-min conversations (interval of one week). With each conversation the level of familiarity increased which was also reflected by the increasing number of their laughs. Smoski & Bachorowski (2003) also showed that familiarity plays a big role for the number of laughs: friends laugh more often together than strangers do. But there is also evidence that the level of social distance plays a role for phonetic convergence/divergence in speech in terms of extended voice onset time in stop consonants (Abrego-Collier et al. 2011). Figure 1 illustrates the convergence effect in terms of the number of laughs for two speech corpora of task-based dyadic conversations (Anderson et al. 1991 for a map task; Baker & Hazan 2011 for a spot-the-difference game) with rather high correlation values. However, the familiarity effect based on the experimental data of Smoski & Bachorowski (2003) could not be confirmed with the conversational data of the Map Task Corpus (Anderson et al. 1991).

Figure 1: Correlations of number of laughs in the conversations of the HCRC Map Task Corpus divided into conversational partners who were familiar with each other or not (left) and the Diapix Lucid Corpus with friends only (right). Multiple occurrences of combinations are not visible here.



An even more partner-specific adaptation is the **temporal alignment** of laughter in conversations. In conversations the paradigm of "one speaker at a time" seems valid, for instance in a larger cross-linguistic study Stivers et al. (2009) show "that all of the languages tested provide clear evidence for a general avoidance of overlapping talk". But there are also studies on conversational speech observing a substantial amount of overlapping vocalization, mainly as 'cross-talk' (e.g. Campbell 2007b or Heldner & Edlund 2010). But particularly laughter has a tendency to overlap with laughter as could be shown by Laskowsi & Burger (2007), Truong & Trouvain (2012b) and also Smoski & Bachorowski (2003). Obviously laughter seems to represent an optimal opportunity for joint vocalization. Such a temporal alignment can sometimes also be observed in spontaneous speech where we can find collaborative completions (Local 2005) as continuations of the conversational partner with matching prosodic features. This type of emergent coordination is probably less often observed in contrast to planned vocal coordination in choir singing, ritualized community talking in church (e.g. common praying) and experiments with synchronous reading (Cummins 2007). Figure 2 gives two examples for the close temporal vicinity of laughs in conversations which often lead to partial overlap of laughs.

Laughter also seems to represent a good candidate for **phonetic imitation** when both interlocutors are laughing synchronously. In two recent studies (Truong & Trouvain 2012a,b) we could show for various

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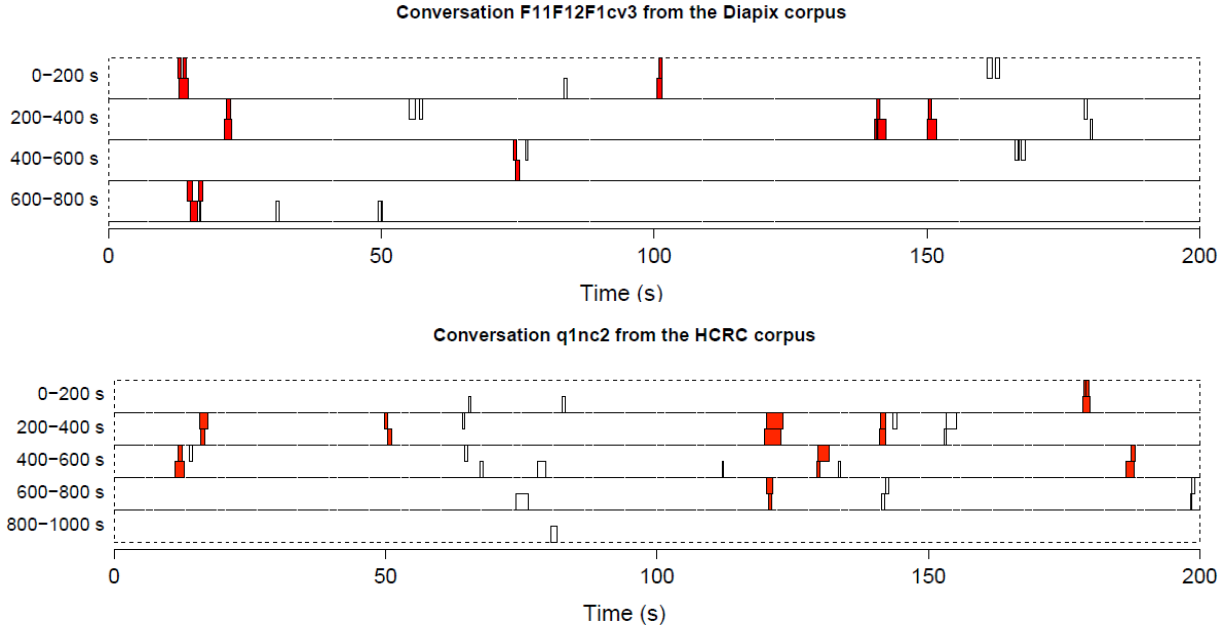
corpora of conversational speech that overlapping laughs are stronger prosodically marked than non-overlapping ones, in terms of higher values for duration, mean F0, mean and maximum intensity, and the amount of voicing. This effect is intensified by the number of people joining in the laughter event. We also found that group size affects the amount of overlapping laughs which illustrates the contagious nature of laughter and which could be interpreted as entrainment at group level.

Figure 2: Laugh activity plot for the conversation F11F12F1cv3 (Diapix) and q1nc2 (Map Task). In each track of 200 sec each bar stands for a laugh (red: both speakers overlap). Bar width represents duration of the laugh.



In summary, laughter as a cue for entrainment/convergence is mirrored by the number of laughs of conversational partners and especially by their temporal alignment resulting in overlapping laughs. Thus, laughing in social interactions is a joint vocal action *par excellence* which is also reflected by its acoustic forms. Future research has to show the fine-grained mechanisms of the temporal and acoustic interplay of speakers laughing together and how this interplay is perceived by listeners.

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