Laughter in naturalistic mother-child interaction: from 12 to 36 months

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1. Introduction

Laughter is a social vocalization universal across cultures and languages (Ruch & Ekman 2001, Sauter et al. 2010). Rather than being an automatic response to funny stimuli, research shows that it is finely sequentially-organized, timed in interaction and conveys a broad range of meanings even in serious contexts. Laughter emerges as a primitive and unconscious vocalization reflecting positive inner states (Provine, 1996) and, through the modeling and influence of the environment, it becomes an important and deeply social form of non-verbal communication; that is crucial in bonding, establishing relationships and managing interactions. Speakers tend to laugh 46% more than their audience (Provine, 1993) and people are 30 times more likely to laugh when they are not alone, even in the absence of a humorous stimulus (Provine, 2004).

Laughter emerges in infants at around 3 months of age as a response to physical stimulation, and over the first year it is progressively elicited by more and more distal events, e.g. socially inappropriate or incongruous acts (Mireault et al. 2012). This development stems from a marked innate interest in others' actions, emotions and states which support the development of a mind reading ability needed to infer the playful intention of others and to not be scared by incongruous stimuli (Semrud-Clikeman et al. 2010).

Research reports that mothers laugh more frequently and display a higher tendency to join the partner's laughter (i.e. antiphonal laughter) (Table 1) than their children (Nwokha et al., 1994). The rate of infants' laughter, both non-dyadic and antiphonal (Table 1), increases over time becoming correlated with the rate of mothers' laughter (Ziajka, 1981) only by the second year.

The increase of antiphonal laughter can reflect a deeper interest in others' mental states and feelings, a better comprehension of their causes and a higher pleasure in sharing them: meaning e.g. "If you think that this is funny, so do I" (Fogel et al. 1992), which entails a meta-representation of the partner mental state situated in the context in which the laughter occurs.

Non-dyadic Laughter	a laugh not preceded by any laugh from the conversational partner within 4s
Antiphonal (aka dyadic) laughter	a laugh that occurs less than 4s after a laugh by the partner with or without overlap

Table 1: Definitions non-dyadic and antiphonal laughter

Interestingly in children affected by Autism, where social competences, mind reading, empathy and pragmatic skills represent the core of the difficulties, atypical laughter patterns have been reported: despite a typical frequency of laughter, a lower rate of shared laughter, together with the tendency to laugh at inexplicable stimuli, are observed (Reddy et al. 2002).

Laughter emerges in infants long before walking, gesturing and speaking. Laughter behaviour, in terms of frequency, context of occurrence and timing development, may thus serve as an early marker for certain delays or impairments in social, emotional and learning (Bruno et al. 1987) development. It may also be informative and predictive of communicative and language development.

2. Current study

The nature of the current study is in the first instance exploratory, aiming to observe laughter behaviours development in childhood from 12 to 36 months and to investigate the relation to language, communicative and pragmatic abilities, in order to deepen the little research available on the topic. Longitudinal analysis are being carried out on the laughter behaviour of three typically developing native British-English female children. We coded videotapes of natural interactions with their mothers in a familiar context. One of the children showed a slight delay in language acquisition, being possibly labelled as a "late bloomer". Observations will be conducted on two hours of video-recording at five time points for each child: 12, 18, 24, 30, 36 months [1].

We identified the occurrence of laughter both for the child and for the mothers. For each laugh event we specified its context of occurrence, the partner's response, its position in relation to

[1] The videos analysed are part of a larger longitudinal project conducted by Dr. Andrew Nevins and Sam Green investigating the impact of the ambient language on learning speech sounds.

speech (overlapping others' utterance or co-occurence with speech from the speaker) and its temporal sequence parameters: non-dyadic and antiphonal laughter.

Our preliminary results (2 hours of coded video at 5 time points for two children) show a developmental trend in children's explicit response (look, smile or laugh) to mothers' laughter - in contrast to a constant explicit response from the mothers (Figure 1). Most of the laughter occurs in interaction, being elicited more often by action from the partner (physical or verbal) rather than external targets.

The laughter behaviours of the mothers are very different from that of children. Consistent with the literature, mothers laugh more frequently than their children (mean number of laughter occurrences/10 minutes: Mother1: 6.54; Child1: 2.96; Mother2: 6.92; Child2: 1.60), with a rate close to the one reported in adult-adult interaction: 5.8/10min (Vettin and Todt, 2004).

Speech-laughter (i.e. laughter produced simultaneously with speech) is frequently observed in mothers (M1 25%; M2 18%), at a rate very similar to one reported in Nwokah et al. 1999 (18.6%) and contrasting with previous data by Provine (1993) in adult-adult interaction (0.1%). Contrary, the same behaviour is almost absent in children, suggesting that by 36 months, children have not yet developed the ability to integrate laughter into speech. On the other hand, children's laughter never overlaps with partner's speech from at least 12 months, possibly revealing an early acquisition of conversational turn-taking ability.

The percentage of antiphonal laughter is markedly higher for mothers (M1 32%; M2 43%) than children (C1 5%; C2 3%), being close to the percentage observed in adult-adult game-interaction (34%, Smoski and Bachoroski, 2003). Interestingly the rate of antiphonal laughter from the mothers seems to decrease and then become stable as the language ability of the child (as measured by the OCDI[2] and the LINCOLN T-CDI[3]) develops. This is particularly marked for C2 who presented a slight delay in language production: the antiphonal rate by the mother decrease steeply from 12 to 30 months, nearing the percentage of M1 around 30 months, when the language scores of the child reach 50%. These data could indicate a privileged use of laughter as a response to children's laughter when they are not well confident with language.

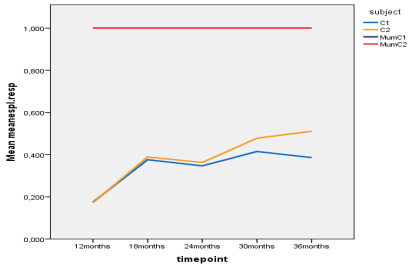

Figure 1: Children (C1, C2) and mothers (M1, M2) explicit responses to partner's laughter.

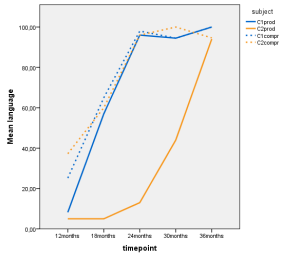

Figure 2: Language inventory scores: production and comprehension (C1; C2).

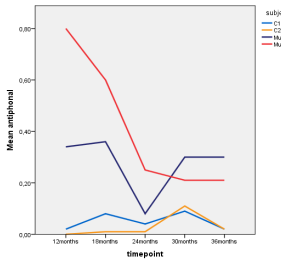

Figure 3: Rate antiphonal laughter overtime by children (C1; C2) and mothers (M1; M2)

3. Conclusion and future research

Overall, our initial results show that children's reactions to mothers' laughter increase from 12 to 36 months. Children as young as 12 months appear to have mastered the conversational turn-taking convention. On the other hand, their antiphonal laughter and speech laughter still sporadic at 36 months. Mothers' laughter behaviours could be influenced by child language ability. Their laughter and antiphonal laughter rate when interacting with an infant are similar to the rates reported in adult-adult interaction, while speech-laughter seem to occur more frequently than in adults' interaction. Ongoing analyses are being conducted on the third child. Data collected at the last time point for empathy, theory of mind and perspective taking ability will be analysed and compared to the observed laughter behaviours. Future research will extend the longitudinal span from 36 months to middle-childhood exploring when adults and children patterns get closer. We will also investigate laughter patterns of mother-child interaction in clinical population in order to better understand the relationship between laughter, language, communicative and cognitive development, contrasting patterns in children affected by Specific Language Impairment and High and Low Functioning Autism. It would be than interesting to investigate whether laughter by mothers decreases over time only in response to laughter or to all non-verbal behaviour by the child.

[2]*Oxford Communicative Development Inventory - a UK adaptation of the MacArthur-Bates CDI*

[3]*Lincoln Toddler Communicative Development Inventory - a UK adaptation of the MacArthur Toddler CDI*

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