Humour in early interaction: what it can tell us about the linguistic, pragmatic and cognitive development of the child.

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Abstract

We analyse longitudinally humour episodes appreciation and production in 4 North-American children while interacting freely with their mums at home (Providence Corpus, Demuth et al. (2006)), at 12, 18, 24, 30, 36 months. We annotate humourous episodes combining resources from the General Theory of Verbal Humor (Attardo and Raskin, 1991), namely the construct of *Script Opposition* (im/possible, ab/normal, non/actual), with a further characterisation of those in terms of the knowledge domain such opposition is related to (e.g. Natural World, Social Conventions, Meta-linguistic). We observe significantly different distributions in the types of SO and domains between mothers and children and a developmental trajectory in the emergence of SOs and domains in children. We discuss how these patterns reflect the child linguistic and cognitive development and how they can inform us about the general principles of reasoning acquired and developing.

1 Introduction

Humour is inherently interactive and relies deeply on shared knowledge, conventions, and cultural norms (Priego-Valverde, 2003), being often context-dependent (Cunningham, 2005). Humour appreciation has indeed been shown to correlate and be informative about pragmatic and mentalising abilities (Aykan and Nalçacı, 2018; Bischetti et al., 2019). Most scholars identify the presence of incongruity as one of the fundamental components of humour (Raskin, 1985; Attardo and Raskin, 1991; Yus, 2017; Maraev et al., 2021; Tannen, 1993; Mazzocconi et al., 2020). The ability to appraise (and eventually enjoy) an incongruity entails the acquisition and knowledge of a typical pattern. Therefore when looking at child development, humour appreciation can be informative about their pragmatic development and considered as a marker of what children are learning about the world, their culture and language (Martin, 2007; Mireault and Reddy, 2016; Loizou and Recchia, 2019; Telli and Hoicka, 2022) (and about their current models). Piaget (1945) considered laughter in relation to humour as a sign of cognitive mastery: humour being mostly appreciated when the stimulus involves concepts that the child has just acquired or is in the process of learning, placed therefore at the *zone of proximal development* (Vygotsky, 1980), when it is neither too hard nor too easy to grasp the incongruity (Zigler et al., 1966; McCall, 1972; McGhee, 1979). While some cross-sectional studies have been conducted (e.g. Hoicka and Akhtar (2012); Telli and Hoicka (2022)), structured longitudinal investigations of humour development are still scarce.

2 Current Study

We investigate humour appreciation and production in spontaneous mother-child interaction longitudinally from 12 to 36 months of age. We analyse humour episodes occurring in 4 American English mother-child dyads (Providence Corpus, Demuth et al. (2006).) during 30 minutes of spontaneous interaction at home at 12, 18, 24, 30 and 36 months of child age. We integrated the speech annotations available from the CHILDES database with those related to laughter occurrences (N=287) and pragmatic functions publicly shared in Mazzocconi and Ginzburg (2022) and Mazzocconi and Ginzburg (2023) respectively[1].

Following the methodology used by Archakis and Tsakona (2005) in adult conversation, we established two criteria for humourous episodes identification: (1) the occurrence of laughter and (2) the identification of an incongruity appraised or intended as pleasant (Mazzocconi et al., 2020) in what the laughter is related to. The current study is based on the analysis of 271 humourous episodes:

[1]All transcriptions and audio/video files can be found on the CHILDES database. Laughter annotations are available at https://osf.io/48fmd/ and https://osf.io/8enf3/.

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113 identified through laughs produced by children and 158 through laughs produced by mothers.

Each humourous episode is annotated in terms of the **Script Opposition(s)** involved (Raskin, 1985; Attardo and Raskin, 1991), following the hierarchical step-wise methodology by Hempelmann and Ruch (2005): (1) *Possible-Impossible*, (2) *Normal-Abnormal*, (3) *Actual-Non Actual* (i.e., when the overlap/clash is between two possible and typical scripts, and the incongruity relies on having initially considered one instead of the other). Each SO is further characterised by describing which knowledge **Domain** it is related to: (1) *Natural World*: Human scheme, Physical Laws, Use and properties of objects; (2) *Social Domain*: Default action sequences, Moral rules, Conversational rules; (3) *Meta-linguistic Domain*: Phonetics, Phonology, Semantics, Pragmatics (i.e. less probable meaning, e.g. irony or scare-quoting). Annotations were conducted using the software ELAN[2] (Brugman and Russel, 2004) and the statistical analyses using R (R Core Team, 2022).

3 Results

The most frequent type of SO is *ab/normal*, being in proportion more frequent in mothers than in children (Fisher's Exact Test, p=.011). The SO *im/possible* is significantly more frequent in children than mothers (p <.001), while the SO *non/actual* is more frequent in mothers than in children (p =.016). While the SOs *ab/normal* and *im/possible* are present over all the time points analysed, in children we observe the SO *non/actual* only from 24 months of age. In terms of Domain, SOs related to Natural World are significantly more frequent in children than in mothers (p <.001); those related to the Meta-Linguistic domain are more frequent in mothers than in children (p=.004), while SOs pertaining to Social Conventions are more balanced (p=0.26). When looking at the longitudinal patterns, the tendency for children to appreciate SO related to Natural World more than mothers is constant over time. On the other hand, we observe that mothers produce more laughs in relation to Social Convention violation especially at the first time points, while towards 36 months the percentages observed are more balanced for this domain. Looking at the sub-types, in children we observe the emergence of laughter related to humourous episodes involving violations of Conversational Conventions only from 18 months, and to the violation of Moral Rules from 24 months (being more frequent in children than in mothers). Humour episodes in the Meta-Linguistic domain are more frequent in mothers at all time-points. Children appreciate SOs related to Phonetics aspects of speech and vocal production similarly to mothers from 12 months of age, while we see SOs related to Phonology and Semantics to be rarer in children. Humourous episodes related to the Pragmatic subdomain, are observed only in mothers when the child is 36 months, while absent in children.

4 Discussion

We observed developmental trajectories both for the type and the pertaining Domain of SOs involved in humourous episodes appreciated by children. The significantly higher frequency of laughter related to *im/possible* SOs in children than in mothers might be related to the fact that funniness is best found at the zone of proximal development (Piaget, 1945; Vygotsky, 1980). Children might especially appreciate this kind of SO, since relying on the ontology of the world that they are in the process of building, while for mothers such oppositions might be less amusing. The observation of the *non/actual* SO only from 24 months might be due to the fact that it involves the ability to co-activate two potentially possible and normal scripts for a specific context and switch between the two, implying more complex cognitive processes (e.g. executive functions and inhibition) still developing during childhood (Best and Miller, 2010). Similarly, we observe that SOs related to different knowledge domains are appreciated over time and important differences can be observed between mothers and children. Our data invite a refinement of the humour developmental stages proposed by McGhee (1979), showing that some types of humour, at least in interactional ecological contexts, are accessible to children earlier than previously postulated: we observe misnaming of objects and actions already from 18 months (rather than between 2 and 4 years) and playing with word sounds already from 12 months (rather than between 3 and 5 years). Our results show that laughter in relation to humourous episodes can give us important insights into early cognitive, linguistic and pragmatic development, as well as into the general principles of reasoning acquired and developing in children.

[2]Inter-annotator agreement details in Appendix.

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Limitations

The conclusions from our study should be taken cautiously given the small sample size analysed (4 mother-child dyads over 5 time-points) due to the chronophagus method applied, requiring manual annotations. Moreover, our study is focused exclusively on middle-class American English speaking dyads and we cannot therefore scale our conclusions to any other language and culture given the impact that those factors have both on parenting interactional dynamics (Hoff, 2006) and laughter and humour production and perception (Martin, 2007; Jiang et al., 2019).

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5 Appendix

5.1 Inter-annotator agreement (IAA)

IAA was conducted among 2 coders in two steps. The first step was aimed at testing agreement on humour episodes identification (i.e. Pleasant incongruity laughables: start- and end-time boundaries), while the second was aimed at testing agreement on the specific classifications in terms of Script Oppositions (SO) and domain. The first phase (Pleasant incongruity/humourous episodes identification and segmentation) was conducted on 20% of the laughter annotations applying the *Staccato* algorithm implemented in ELAN (Lücking et al., 2011).[3] The average degree of organization between annotators is of 0.74. The raw percentage of agreement on whether each laugh (n=47) was related to a humourous laughable, or not, is 93.6% (3 disagreements). For the second step, looking at the specific classification of each humourous laughable in terms of SO and Domain, we asked the second annotator to analyse all the laughables annotated by the first annotator for children and mothers. An *Other* category was offered to all coders, whenever specific humour episodes could not be classified according to the proposed framework. Overall, for SO we obtain a percentage agreement of 92.8 ($\pm$ 1.33) and a total Krippendorff's α of 0.79; for the Domains we obtain a percentage agreement of 90.1 ($\pm$ 5.09) and an overall Krippendorff's α of 0.78. IAA on sub-domains is 95.4% with a Krippendorff α of 0.82. Regarding the IAA on SO classification within each sub-domain , we observe an overall percentage of agreement of 91.9 ($\pm$2.1) and a Krippendorff's α of 0.77. After discussion, annotators came to unanimous agreement on the annotations and those values retained for the current analysis.

5.2 Distribution of Script Oppositions

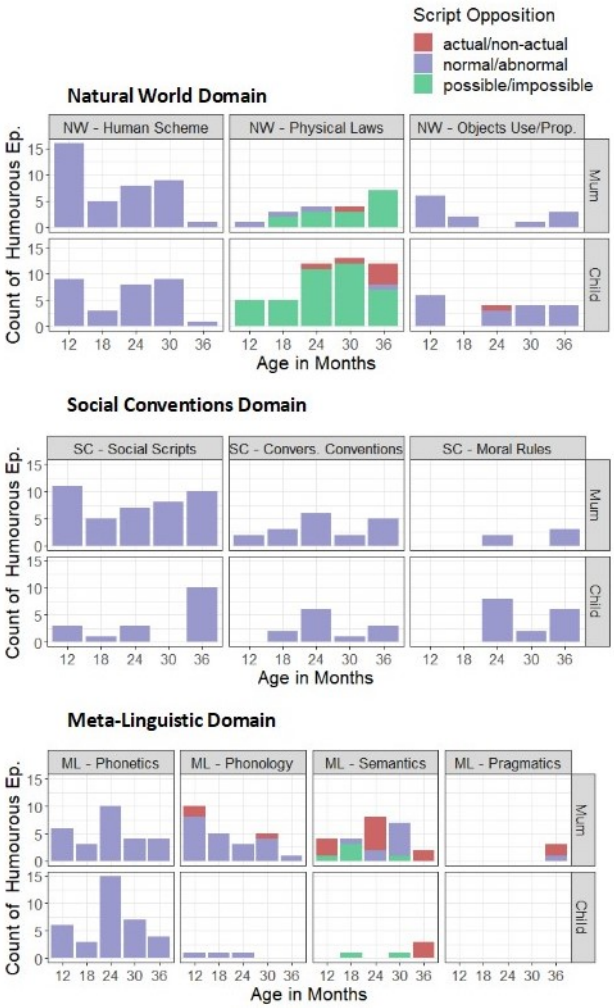

Figure 1: Count of Script Oppositions (*Im/Possible, Ab/Normal, Non/Actual*) over time as a function of knowledge Domain (*Natural World, Social Conventions, Meta-Linguistic*) in Mothers and Children

[3] We ran the analysis with 1000 Monte Carlo Simulations, a granularity for annotation length of 10, and a = 0.05.