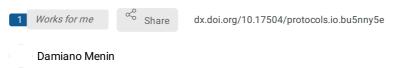# Two forms of yawning modulation in three months old infants during the Face to Face Still Face paradigm

Damiano Menin[1]

May 20, 2021

[1]Tiziana Aureli, Marco Dondi

Damiano Menin

ABSTRACT

The last decades have seen an increasing interest in the phenomenon of yawning and the dynamics of its modulation, yet no widespread consensus exists on its origins and potential functions. Although most scholars have focused on its potential physiological functions, e.g., related to thermoregulation, arousal modulation or cortisol levels, an emerging line of research has been investigating the social implications of yawning, including its hypothesized relationship with empathy. This protocol is designed in order to test for potential gender differences in yawning and self-touch hand movements occurrences during the Face to Face Still Face (FFSF) procedure. Moreover, through the use of path analysis, the protocol allows to investigate potential dynamics of facilitation, inhibition or covariance, between and within the two behavioral patterns across the three episodes of the paradigm. Analogous protocols can be used to test analogous hypotheses with regard to other behavioral patterns.

CREATED

May 18, 2021

LAST MODIFIED

May 20, 2021

PROTOCOL INTEGER ID

50062

GUIDELINES

The Face to Face Still Face paradigm should be carried out keeping in mind the aim of minimizing the distress experienced by infants. If an infant cries during the procedure, the paradigm should be interrupted and the parent should be encouraged to comfort his/her child.

1   **Recruitment of participants**

The sample should include healthy infants younger than 12 months of age and a parent. In the original study only mothers were included but other studies might include both fathers and mothers. Infants should be balanced for sex.

2 Data collection

Parent-infant dyads participate in the FFSF paradigm. Parents are asked to play with their infants in a face-to-face interaction without using toys for two minutes (Face-to-Face episode, FF), stop playing and maintain a still face with neutral expression and no vocalizations for one minute (Still-Face episode, SF) and then resume the playful interaction for two minutes (Reunion episode, RE).
The infant (awake and alert) has to be placed in an infant seat facing the parent and the scene has to be video-recorded separately by three cameras, one focused on the infant, one on the parent and one including both members of the dyad. The three videos should be subsequently edited and synchronized in a split-screen video.

3 Coding

Frame by frame behavioral analysis of video-recordings has to be performed by two independent coders expert in behavioral micro-analysis (with the secondary coder examining roughly one third of the videorecordings). Behavioral analysis can be carried out using ELAN, a free professional software for the creation and management of complex annotations on video and audio (Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands; http://tla.mpi.nl/tools/tla-tools/elan/).

4 Yawn coding

Yawns should be identified holistically based on the following description from the *System for Coding Perinatal Behavior* (SCPB), based on the action units (AUs) detailed in the comprehensive, anatomically based Facial Action Coding System for Infants and Young Children (Baby FACS) and previous studies in the literature.
"Yawning (AU 94) is a stereotyped behavior characterized by a slow mouth opening with deep inspiration, followed by a brief apnea and a short expiration and mouth closing. One of the characteristic features of yawning is its timing, with a gradual acceleration followed by an abrupt deceleration of the facial actions involved. Yawning usually emerges from a relaxed face, initially involving mouth stretching widely open (AUs 25 + 27) and upper eyelids drooping (AU 43). Although the specific AUs accompanying yawns vary, at apex they may include tightly closed eyelids (AUs 6+7+43), flattened tongue shape (AU 76b), and swallowing (AU 80). During the plateau, brow knitting (AU 3), brow knotting (AU 4), nose wrinkling (AU 9), lateral lip stretching (AU 20), nostril dilatation (AU 38) and head tilting back (AU 53) may occur. In this phase, the expansion of the pharynx can quadruple its diameter, while the larynx opens up with maximal abduction of the vocal cords. Yawning is often accompanied by limb stretching and other bodily movements."

5

Self-touch hand movements coding

Self-touch hand movements should be identified based on the following description from SCPB.
"These movements involve hands and arms and ends with the contact of hand or fingers with the head, face or mouth region. It is possible to distinguish between four different behavioral patterns, although in the analysis phase their scores can be aggregated. They are: *11A. Hand To Head Movements;11B. Hand To Mouth Movements;11C. Hand To Face Movements; 11D. Finger-Sucking".* Because no specific hypothesis was formulated for distinct sub-categories, only the general category was considered.

6 Data analysis

Using Cohen's Kappa, inter-rater reliability should be calculated between the primary and secondary coder. Multilevel regressions at the minute-level, with self-touch hand movements occurrences as outcome, phase and participant's sex as independent variables (fixed effects) and participant ID as random intercept, should be run to investigate potential modulations (i.e., still face effect and carry-over effect) of different behavioral patterns across the FFSF procedure. Based on the distribution of the dependent variables, poisson or binomial regressions could be preferable.
Post-hoc analyses should be run using the Tukey HSD test.

Finally, a path analysiscan be run in order to investigate, e.g., the relationships between the number of yawns and of self-touch hand movements throughout the three phases of the procedure, adopting the maximum likelihood estimator. In the original study, all analyses were carried out in the R statistical environment, version 4.0.2, using the lmerTest and the lavaanpackages.