Social Perception and Interaction Database (SoPID) – a novel database of dyadic actions

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INTRODUCTION

Biological motion processing is among the most basic of the human social cognitive abilities[1]. Healthy individuals have been shown to be able to process a wide range of social signals from point-light displays (PLD), including affective state and intentions of the observed agent[2]. The ability to process higher-order social information from PLD has also been shown to be linked with widespread activity across main "social brain" networks[3,4]. Here, we present a novel PLD dataset (Social Perception and Interaction Database; SoPID) which may be used for studying multiple levels of social information processing.

METHODS

SoPID creation: Two pairs of professional actors were asked to perform a wide range of dyadic actions during two motion-capture session, including:

(1) communicative interactions (e.g. A asks B to sit down; B sits down, COM)

(2) emotional exchanges (e.g. A shouts at B; B apologizes, EMO);

(3) independent actions of agents (e.g. A squats down; B jumps, IND) a

Preprocessed stimuli has been visually degraded to PLD. Additionally displays of 100% scrambled motion (SCR) of two agents have also been created.

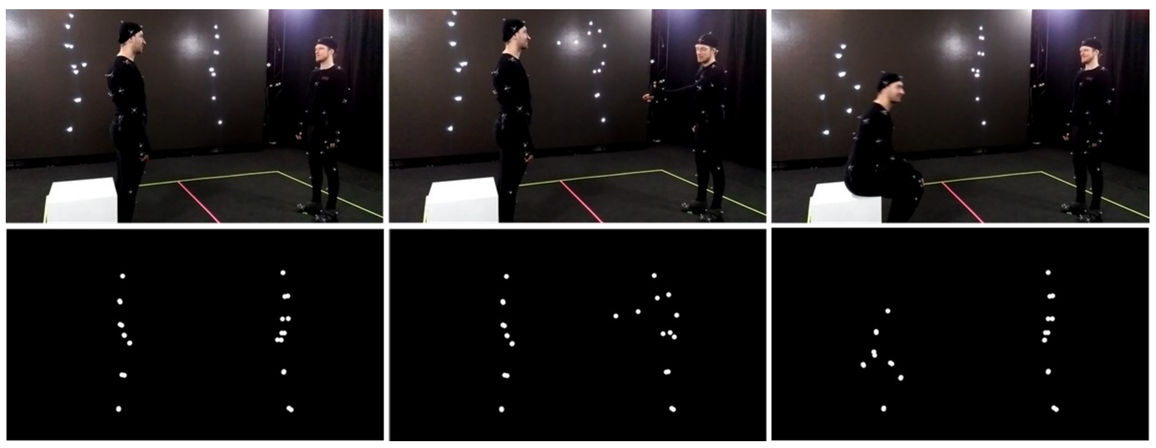

Fig. 1. Exemplary item presenting communicative interaction.

SoPID validation studies: Three studies have been performed to establish behavioral and neural correlates of SoPID items processing. Individuals with no known history of psychiatric or neurological disorders were recruited via online platforms to participate in the studies.

Study 1: Fifty-seven animations presenting actions of two agents have been created from SoPID (perspective camera with FoV=10; camera position = F; marker size = 6). Twenty participants (9 M; 25+/-9 yrs old) were asked to provide verbal description of each stimulus after watching it twice.

Study 2: Twenty animations presenting action of a single agent have been created from SoPID (ortographic camera (size = 1.5); camera position = R; marker size = 6). Each animation was rendered at four scrambling levels: 0%, 15%, 30% and 100%. Twenty participants (10 M; 24+/-8 yrs old) were asked to report whether human motion was presented after watching each animation.

Study 3: Forty seven individuals (28 M; 33+/-8 yrs old) were presented with four types of displays and asked to qualify them into one of the four categories (COM/EMO/IND/SCR) during neuroimaging session. Stimuli were presented in a mixed design: upon presentation of 3 stimuli from the same category (9 s.) a response screen (RESP) was presented for 3 s. and then fixation cross (REST) was shown for subsequent 8 s. Task was presented in three runs, each lasting 7.5 min. Data were collected with 3T scanner with 32-ch. head coil and preprocessed using standard pipeline with SPM12 and ART. All of the results were FWE corrected to obtain $p<0.05$.

RESULTS

Study 1: High level of recognizability of the type of the action (88±16%) and emotional state (76±21%) of the agents were observed during explicit interpretation of SoPID vignettes.

Study 2: A robust effect of scrambling observed: unscrambled stimuli were classified at significantly higher rate as a human motion (19.4+/-1.3) compared to 15% (13.4+/-3.6), 30% (4.2 +/-2.9) and 100% (1.2+/-2.7) scrambled motion.

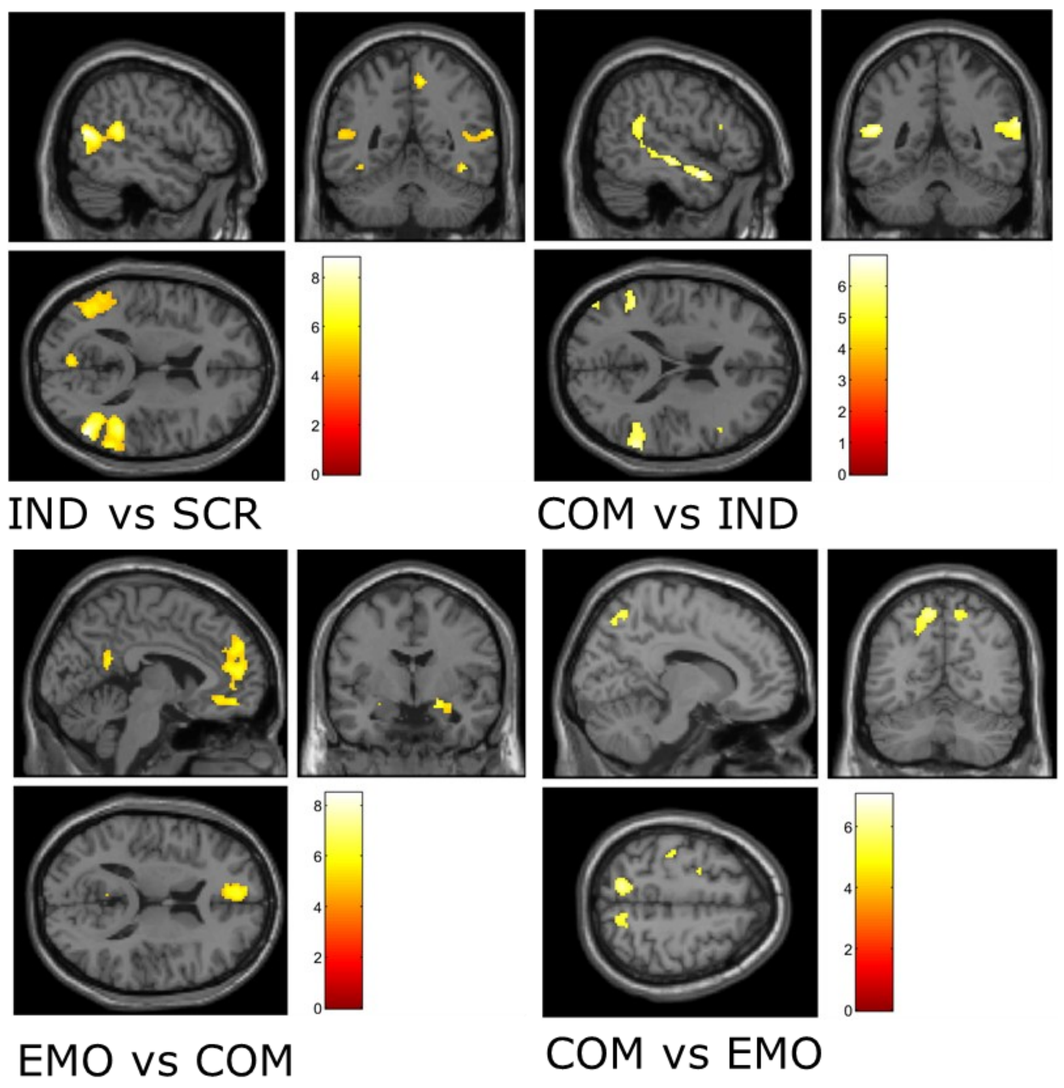

Fig. 2. Patterns of activation elicited by processing of SoPID vignettes.

Study 3: Differential patterns of activity have been observed for each contrast of interest. Firstly, processing of biological motion vignettes was linked to widespread activity within social perception network (bilateral posterior superior temporal sulcus [pSTS] and fusiform areas). Processing of communicative interactions vs individual actions elicited widespread activity in right STS and right frontal areas as well as left pSTS. Processing of emotional exchanges was linked to higher involvement of bilateral amygdala, medial prefrontal and posterior cingulate areas compared to non-emotional interactions, while the opposite contrast was linked with activation of bilateral superior parietal lobule.

CONCLUSIONS

Similarly to previous studies we found that communicative interactions may be inferred with high level of behavioral accuracy from point-light motion[2] and that processing of social interactions is linked to the widespread activity of mentalizing and action observation networks in healthy individuals[3,4]. By presenting separately emotional and non-emotional interactions, we have also established that differential patterns of activity within mentalizing and action observation network may be observed during the processing of specific types of social interactions. While it may be suggested that larger involvement of affective and mentalizing network during emotional vs. non-emotional interaction processing may be associated with implicit mentalizing, due to the overt nature of the task used in Study 3, this possibility should be examined by future studies based on passive viewing/spontaneous mentalizing paradigms.

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