The Role of Movement in Social Perception

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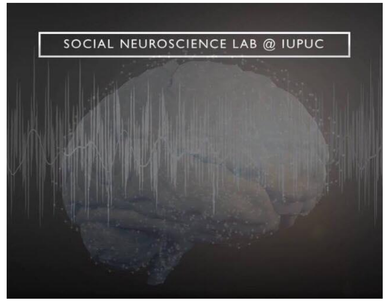


INTRODUCTION

Body movement can be used to both convey and interpret social information. The objective of this study was to examine the extent to which movement information both correlates with social features of the actor and social perceptions of the perceiver.

Body movement was studied by using point light displays (PLDs) as stimuli to obtain ratings of valance and arousal from perceivers. PLDs are the most basic representation of biological movement and have been effectively used in research since the 1970's[1]. Valance and arousal ratings were analyzed against Shannon entropy, which served as a metric for order and disorder in body movement[2]. Shannon entropy was also analyzed against standardized measures that evaluate personality traits and social skills.

Hypotheses

1)Movement is sufficient to convey emotional information.
2) Idiosyncrasies in an actor's movement are associated with the social attributions made by others.
3) Idiosyncrasies in an actor's movement are associated with atypical social characteristics.
4) Valence and arousal differences between angry expressions and happy expressions can be differentiated by others.

METHOD

Subjects

A total of 30 undergraduate students participated in this study. N=15 in Experiment 1 and N=15 in Experiment 2.

Apparatus & Stimuli

The Microsoft Kinect (Figure 1) and the *Kinect-Based Biological Motion Capture Toolbox* (KBC) were used to capture movement data in the form of *point light display* (PLD) videos and (x,y) time-series data. PLD videos only show the movement of some of the body's main joints (shoulders, elbows, wrists, hips, knees, and ankles) by representing them as dots in space, while removing all other information (Figure 2).

Figure 1: The Microsoft Kinect

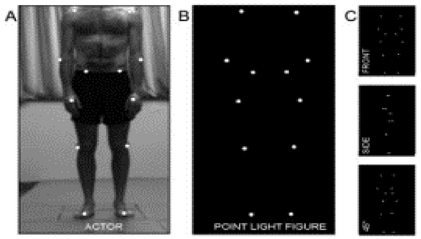


Figure 2: Point-light display representation of the body

PROCEDURE

EXPERIMENT 1:

Standardized measures were used to build a "social profile" of each subject. Then, subjects were recorded with the Kinect while carrying out a series of movements.

Social Measures:
- Ten-Item Personality Questionnaire (TIPI)[3]: evaluates personality
- Reading the Mind in the Eyes Task for Adults[4]: evaluates social cognitive ability
- Autism Spectrum Quotient for Adults (AQ)[5]: evaluates autistic traits and symptomatology
- Friendship and Relationship Quotient for Adults[6]: evaluates social competence

Movements:
- Walk in a straight line from one point of a room to another point.
- Act out movements that represent 2 emotional states: anger and happiness. Participants were read a script to induce the desired emotion.

EXPERIMENT 2:

Participants viewed 15 sets of 7 point-light videos recorded during the movement task described in Experiment 1. For each participant the order of the videos was randomized using white noise vector transformation.

Participants were asked to rate each video based on 7-point Likert scales. Walk videos were rated on dominance, while the 2 emotion videos were rated on valence and arousal.

Movement Measure:
Shannon (information) entropy was used to characterize movement in the PLDs. In this context, Shannon Entropy is a metric of disorder vs. order. Thus, high entropy indicates disorder in the PLD movements, whereas low entropy indicates order in the PLD movements. Shannon entropy is calculated using:

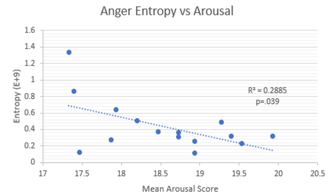
$$El(s) = -\sum_i s_i^2 \log(s_i^2),$$

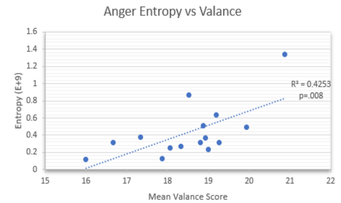
Where *s* is the signal being analyzed. In this case, each point in the PLD data is a different signal.

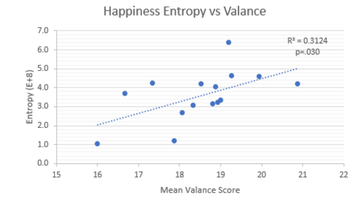
ANALYSIS

To explore the hypotheses stated earlier, Pearson correlations were analyzed using statistical software. Shannon entropy for the 2 emotion tasks was analyzed against scores on the 4 standardized social measures, as well as against ratings of valance and arousal. The walk video was analyzed against ratings of dominance and extroversion, as well as against scores on the Autism Spectrum Quotient for Adults questionnaire. A paired sample t-test was also analyzed with statistical software. The data analyzed for this statistic were the mean anger and mean happiness valance scores.

RESULTS







	1	2	3
1. Mean Shannon Entropy-Anger	-	-	-
2. Mean Shannon Entropy-Happiness	-	-	-
3. Mean Shannon Entropy-Walk	-	-	-
4. TIPI Emotional Stability Score	-.015	.057	-
5. TIPI Extroversion Score	.081	-.205	-
6. Reading the Mind in the Eyes Score	-.091	.213	-
7. AQ Score	.276	-.067	.183
8. Cambridge Friendship Questionnaire Score	-.210	-.348	-
9. Mean Valance Rating Score	.652**	.559*	-
10. Mean Arousal Rating Score	-.536*	-.014	-
11. Mean Dominance Rating	-	-	-.107
12.Mean Extroversion Rating	-	-	-.076

** Correlations significant at the 0.01 level
*Correlations significant at the 0.05 level

There was not a significant difference between anger (M=3.77, SD=.46) and happiness (M=3.72, SD= .48) valance ratings, t(95)=.235, p=.818.

DISCUSSION

The results obtained in this experiment suggest there is a connection between movement information and other's perceptions of emotional attributes. For the two emotion PLDs, perceived valance and arousal were associated with change in the disorder/order of the movement of the PLDs. This finding partially supports our first hypothesis: that movement information is sufficient to convey emotional information. However, movement information alone may only convey certain features such as levels of arousal or positiveness/negativity (valance) of the movement.

Our second, third, and fourth hypotheses were not supported with the current data. This may suggest that the ability to make complex social attributes of others may require additional features other than movement. Variability between actors may have impacted the correlations that were not found to be significant. More work is currently underway in our lab to better understand the role of movement in social information processing.

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