The effect of behavioral synchrony on pain threshold and cooperation.

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Introduction

Across all cultures people engage in numerous types of activities that involve synchronous behavior, including singing, dancing, and collective rituals. This cultural ubiquity and prevalence has recently attracted the attention of several scholars. One explanation for these phenomena and their association with collective rituals is that synchronous collective behavior leads to an increase of cooperative and affiliative behavior. Recent experimental research on behavioral synchrony shows that synchronous behavior among individuals increases cooperation between them (Reddish, et al. 2013; Lakens, 2010; Launay, J et al. 2013; Wiltermuth & Heath, 2009).

There is considerable evidence that endogenous opioids, particularly endorphins, play a fundamental role in prosociality and social bonding (Machin & Dunbar, 2011). It has also been hypothesized that synchronized group behavior, such as collective dancing, singing, drumming, causes feelings of well-being due to the activation of pleasure mechanisms such as the opioidergic system (Machin & Dunbar, 2011; Cohen, et al., 2010). As endorphin release is experienced as a mild opiate 'high' and light analgesia (Stephano, et al. 2000), previous research used a measure of pain threshold assumed to vary as a function of endorphin release. Following this line of research and methodology, the research question of the current study is: Does behavioral synchrony cause an increase of pain threshold? And does this increase in pain threshold positively correlate with prosociality?

Hypothesis

We hypothesize that behavioral synchrony will lead to an increase in pain threshold, and will produce highest level of cooperation, compared to non-succesful synchrony and to individual behavior with no synchronization

Participants

One hundred twenty five participants were recruited from a participant-pool course at the Masaryk University in exchange for credits and the accurate amount they earn from a economic game.

Procedure

Participants individually performed 3 exercises, each five minutes long. Each exercise consisted of 75 repetitions of simple movement sequences. Three symmetric arm movements comprise each sequence. Participants listened to an irregular beat which gave a signal to start particular sequence, but the movements themselves have no guiding beat. During the exercise, participants stood in front of a wall on which, depending on then experimental condition, are projected different presentations: 1) no projection, 2) non-successful synchrony video and 3) synchrony video (see conditions). Participants were instructed to start each sequence after they hear the starting signal. In conditions with projections participants were instructed to try to fit their movements with the person in the video record. The pre-recorded videos were presented as real-time transmissions of another participant. The videos were filmed with a confederate, and during the recording, the confederate followed a specifically designed guiding beat for each particular movement. These behavioral formulations by the confederate were done to control the speed and delays of movements and the placement of errors. The face of the confederate was covered to avoid bonding based on face perception or individual sympathies.

Conditions:

A between subjects design was used with two conditions of perceived synchrony manipulation and a control condition

Control condition – no video presented. Participants perform the task alone.

Non-successful synchrony condition – the confederate's movements were distorted in three ways: 1) the speed of particular movement sequences changes randomly, 2) the particular sequences start with a random reaction time (.1 - .5 s) after the starting signals, or 3) the confederate makes prearranged movement errors

Synchrony condition – the confederate in presented videos performed exercises with a steady speed, with no errors, and particular sequences starte with a steady reaction time (.2 s) after starting signals.

Measurements

Pain threshold measure

Pain threshold was measured by using a Somedic Algometer (type I). A slowly increased (slope 30kPa s^{-1}) pressure was applied on the second phalange of the participant's index finger. Participants will hold in the other hand a push-button to indicate when the pressure becomes unpleasant. Pain threshold was measured at two times (with 2 min. distance) before each exercise and twice after all exercises.

Cooperation measure.

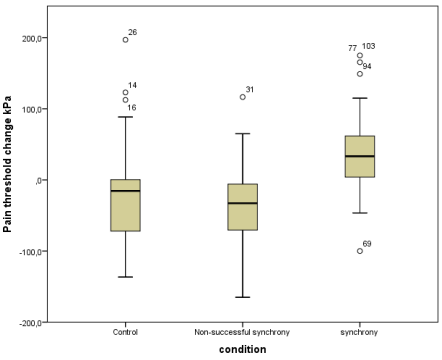
Participants played one round of a trust game with the confederate as their supposed partner. In our experiment, the participants always acted as player A (the trustor). Players start with 100 Czech crowns (CZK) allocated in 10 CZK coins, and choose how much they wish to give to player B (the trustee). Participants were told the amount they send to player B will be multiplied by 3, and sent to player B, who can return as much as they like. The willingness to invest therefore reflects the trust player A assigns to player B, and is considered as a cooperation measure. The amount of 100 CZK is roughly enough for lunch in the Czech Republic.

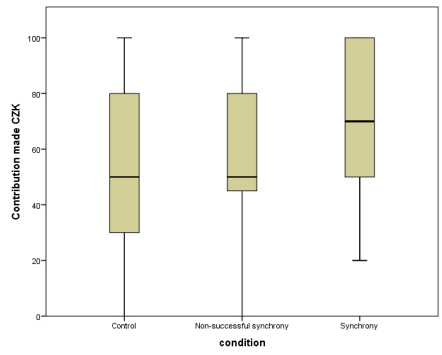
*Synchrony measurement**

To measure actual synchrony we use Actigraph Motion Detectors. These devices enable precise recording and comparison of movements. They will be attached to the right hand of the participant during the exercises and to confederate's right hand during the recording of videos used in experiment.

*Post-activity questionnaire**

Participants completed a questionnaire measuring demographics and self-reported prosocial measures and perceived synchrony. Specifically, perceived synchrony, cooperation, entitativity, perceived similarity and trust





Preliminary results

To examine differences between conditions in pain threshold changes and the amount of many invested in the trust game two one-way ANOVAs were used. The results show that there was a significant effect of behavioral synchrony on pain threshold, $F(2, 121) = 19.51$, $p < .01$, $\omega = .48$, and a significant effect on contribution in the trust game $F(2, 120) = 3.07$, $p = .05$, $\omega = .21$.

Planned contrasts revealed that pain threshold increased significantly in synchrony condition comparing to control condition, $t(121) = 4.29$, $p < .01$ (1-tailed), $r = .36$, and also comparing to non-successful synchrony condition, $t(121) = 6.03$, $p < .01$ (1-tailed), $r = .48$. Planed contrasts for donations in the trust game revealed that participants contributed significantly more in synchrony condition comparing to control condition, $t(120) = 2,38$, $p < .01$ (1-tailed), $r = .21$, but non-significantly comparing to non-successful synchrony, $t(121) = 4.07$, $p < .01$ (1-tailed), $r = .15$.

** These are preliminary results. The questionnaire data and synchrony data from Actigraph Motion Detectors were not fully analyzed yet and are not presented here.*

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