



Research Networking Programmes

Short Visit Grant or Exchange Visit Grant

(please tick the relevant box)

Scientific Report

Scientific report (one single document in WORD or PDF file) should be submitted online within one month of the event. It should not exceed eight A4 pages.

Proposal Title: The role of oxytocin in shaping emotion perception and approach and avoidance behavior during social interactions

Application Reference N°: 5934

1) Purpose of the visit

Over the past few months, I was collaborating with Dr. Cade McCall, Dr. Bethany Kok, and other colleagues at the Department of Social Neuroscience, Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig to investigate the role of oxytocin (OT) in different aspects of social cognition and non-verbal behavior during face-to-face social interactions. While the original purpose of my visit was to analyze data from one study on this topic, the time permitted me to work on two papers in this domain. First, I worked with Dr. McCall to analyze data from a novel paradigm using immersive virtual environments to study nonverbal reactions to different emotional displays. We are currently writing the paper that will introduce that method. Now that it has been validated, we will use this method to study the effects of direct administration of OT on nonverbal responses to the affective displays of others. For the second paper, I worked with Dr. Kok examining the relationship between OT and vagal tone, and their influences on social behavior.

2) Description of the work carried out during the visit

As stated above, during the visit I carried out two tasks. Firstly, I analysed the experimental data from our previous study investigating how emotion perception affects approach and avoidance behavior during social interactions. In this study, we investigated gaze and interpersonal distance toward others displaying different emotional facial expressions by asking participants to complete a brief interaction with a humanoid agent

in a virtual environment (adapted from Bailenson et al., 2003). Each agent in the task expressed one of a range of emotions. We were particularly interested whether participants would treat the agents differently in terms of approach and avoidance behaviors. As such, we measured "proxemic" variables such as gaze and interpersonal distance during the interaction. Because we used digital immersive virtual environments, we were able to study these proxemic behaviors in relatively naturalistic contexts without sacrificing experimental control. This work let me develop my research skills in terms of programming and conducting statistical analyses.

For the other project, I was responsible for preparing a part of a manuscript investigating vagal and oxytocinergic influences on social perception and emotions. The study of biological influences on positive social behavior repeatedly finds that resting activity of the vagus nerve, and central OT, predict positive, affiliative behaviors toward certain others (e.g., Quintana et al., 2013). As such, this research aimed to differentiate overlapping effects of OT and vagus on social perception and emotions investigating the associations between baseline peripheral measures of these biological characteristics and self-reported emotions and perceptions of a variety of common life events. I wrote the sections of the manuscript which address the issues related to the action of OT on social perception and emotions and its neurobiological basis. This work let me develop my writing skills and familiarize myself with the current state of the art that is highly relevant for my PhD project.

3) Description of the main results obtained

In the experiment on nonverbal behavior, we found that participants responded nonverbally to the emotions of agents. Specifically, they avoided the angry and sad agents relative to an emotionally neutral agent. A closer look at individual differences demonstrated that this pattern was particularly strong among participants who reported being affected by others emotions and those who were comfortable showing compassion to others. Together these data demonstrate that the paradigm is useful for measuring implicit, likely unconscious, nonverbal reactions to the affective states of others.

The results, presented in the manuscript I was working on with Dr. Kok, showed that baseline levels of plasma OT predicted experiencing more positive emotions during social events whereas vagal tone predicted both experiencing more positive emotions during social events and rating more events as social. OT and vagal tone interacted to further amplify the effect of sociality on positive emotions. These findings suggest that OT and vagal tone may influence social behavior in complementary but distinct ways.

4) Future collaboration with host institution (if applicable)

In the future, we plan to carry out the proposed project that looks at the influences of OT on emotion perception and non-verbal behavior during social interactions. Further, we have additional novel ideas for future research and joint publications investigating, e.g., individual differences and anxiety as well as anxiolytic effects of OT using digital immersive virtual environments. This testifies to the fact that both institutions are interested in future collaboration that promotes social cognition research in Europe.

5) Projected publications / articles resulting or to result from the grant (ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant)

We are currently finishing the article on the nonverbal behavior in virtual environments for submission as a short reports methods paper, likely to the journal *Social Psychological and Personality Science*. The other collaboration will result in a form of a publication that has been prepared and is foreseen to be submitted to *Psychoneuroendocrinology*, i.e. a journal with the high impact factor presenting findings from a wide scope of research including social cognition and its link to neuroendocrinology. ESF has been acknowledged in both papers and the reprints will be forwarded to ESF in the due course.

6) Other comments (if any)

This grant enhanced the transfer of knowledge from the lab working in the field of social neuroscience to my home university in Poland, in which research at the interface of social cognition and neuroscience has just started to be conducted. Particularly, the research experience gained in the host institution turned out to be invaluable for preparing another grant application that will be submitted shortly and is related to my PhD thesis. Moreover, the fresh knowledge obtained during the visit was communicated to junior researchers at my home university through institute colloquia and will be subsequently presented to master students through supplementary courses.

Taken together, this grant enabled me to improve my knowledge and research skills that will help me to start conducting novel research within the scope of social cognition and social neuroscience that has been so far neglected in Poland, and specifically at my home university.

References

Bailenson J., Blascovich J., Beall A., Loomis J.M. (2003). Interpersonal distance in immersive virtual environments. *Personality and Social Psychology Bulletin*, 29:819-833.

Quintana D.S., Kemp A.H., Alvares G.A., Guastella A.J. (2013) A role for autonomic cardiac control in the effects of oxytocin on social behavior and psychiatric illness. *Frontiers in Neuroscience*. 7:48.