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Short Communication

Your word is my command: Oxytocin facilitates the understanding of appeal in verbal communication

Michaela Pfundmair*, Franziska Lamprecht, Florentine M. von Wedemeyer, Dieter Frey

Ludwig-Maximilians-University of Munich, Leopoldstr. 13, 80802 München, Germany

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ABSTRACT

The hormone oxytocin is known to facilitate positive communication behaviors. In the current study, we aimed to examine how it affects the interpretation of verbal information during communication. We predicted oxytocin to promote the understanding of the socially most effortful dimension of appeal. After intranasal administration of oxytocin or a placebo, participants responded to a "four-ear communication" questionnaire. Results revealed that participants under oxytocin not only chose the dimension of appeal as first choice significantly more often than participants under placebo but also preferred it over most of the other dimensions of interpretation. The findings add to our knowledge of oxytocin as a facilitator of social approach and indicate how oxytocin might work in communicative settings.

1. Introduction

"Buy oxytocin—it will [. . .] make you feel more at ease with other people, to be more sociable and communicative". Inter alia, this is how the hormone oxytocin (OT) is praised in the Internet. The excitement about OT in the popular press and general public has been caused by recent research showing that OT is involved in various social processes, however, little is known about its effects on verbal communication.

The last decade of research has presented OT as a hormone with powerful social outcomes. In addition to its positive effects on social cognition like an increased gaze to the eyes (Guastella et al., 2008) and facilitated perception of subtle social cues from the eye region (Domes et al., 2007), it has been shown to enhance genuine prosocial behaviors like in-group trust and cooperation (De Dreu et al., 2010). In an attempt to summarize these findings, OT's general function has been postulated to be a facilitator of social approach (see Kemp and Guastella, 2011) which indicates its powerful impact on nonverbal communication. Surprisingly, however, little is known about OT's effects on verbal communication. In a recent study, intranasal OT significantly increased positive communication behaviors during couple conflict discussions in a lab setting (Ditzen et al., 2009). Moreover, OT facilitated the recognition of positive relationship words (Unkelbach et al., 2008). Linking these findings, we raised the question how the recognition of words could be associated with communication behavior under OT. For this purpose, we consulted Schulz von Thun's (1981) "four-ear model" (see Dietrich, 2013; Jiang, 2015; or Risius and Beck, 2014; for English sources).

This theory assumes that each verbal message simultaneously implies four different dimensions of information: the factual content (mere information), self-revelation (information about the communicator him- or herself), relationship (information about the communicator's opinion on the recipient and about the relationship between communicator and recipient), and appeal (information about the communicator's requests from the recipient). Typically, a communicator aims to send out one of these dimensions; the recipient, however, receives all four of them and has to decide how to interpret the message. Although each message principally contains all four dimensions, people typically choose only one for interpretation. The way in which the recipient interprets a message depends on which of the "four ears" is most predominant in the recipient at the moment. Apart from characteristics of the situation and nonverbal cues, this usually depends on the recipient's individual background (e.g., intentions, expectations; Risius and Beck, 2014). Lopsided receiving habits can render any messages in other than the expected ones (Dietrich, 2013). The dimension of appeal is socially most demanding: Its underlying presumption is a concept of communication as social exchange or even unilateral donor action on behalf of the recipient (Schulz von Thun, 2011). Whereas the other three dimensions include pure information, the appeal dimension

* Corresponding author at: Department of Psychology, Ludwig-Maximilians-University of Munich, Leopoldstr. 13, 80802 Munich, Germany.
E-mail addresses: michaela.pfundmair@psy.lmu.de (M. Pfundmair), franziksa.lamprecht@psy.lmu.de (F. Lamprecht), florentine.wedemeyer@psy.lmu.de (F.M. von Wedemeyer), dieter.frey@psy.lmu.de (D. Frey).

aims to create an effect: The communicator wishes to accomplish, change, or preserve something through communication (Dietrich, 2013). The appellative ear is therefore particularly open to meet the communicator's expectations (Jiang, 2015). According to the norm of reciprocity (Gouldner, 1960), such a socially accommodating communication style is likely to be mirrored—and might, insofar, be the most promising booster for social approach.

Taking into account OT's function as a minimizer of ambivalence in social settings (Preckel et al., 2015), we suggested the link between the recognition of relationship words and positive communication behaviors to be a modified interpretation of information. With OT being involved in increasing approach-related behaviors and reducing withdrawal-related behaviors (Kemp and Guastella, 2011) it might also promote the socially most effortful and, as such, possibly most promising interpretation of verbal information, namely appeal. Therefore, we hypothesized a priori that OT increases the understanding of Schulz von Thun's (1981) appeal dimension. To test this prediction, participants intranasally administered either OT or a placebo and then filled out a questionnaire that investigated their preference for interpreting communicative information.

2. Method

2.1. Participants and design

Forty-three healthy males (mean age = 29.95 years; *SD* = 12.24) who were recruited around campus participated in this study that investigated psychobiological determinants of communication. Sample size was based on past oxytocin research (Unkelbach et al., 2008); data collection was stopped at the end of the academic term. Exclusion criteria were significant medical or psychiatric illness, medication, smoking more than five cigarettes per day, drug or alcohol abuse (based on De Dreu et al., 2011), allergies, and hypersensitivity to preservatives in the OT spray. Participants were instructed to refrain from smoking or drinking (except for water) two hours before arrival. The experiment was approved by the local Ethics Committee.

The study followed a randomized, placebo-controlled, double-blind, between-subjects design.

2.2. Procedure and materials

After written informed consent was obtained, participants self-administered either 24 I.U. (three puffs per nostril) of OT (Syntocinon Spray, Defiante) or a placebo (sodium chloride solution) under experimenter supervision. After a 40-min period which allows OT to be effective, participants started a "four-ear communication" questionnaire on the computer (see Supplementary material for the questionnaire and its validation). This questionnaire contains 16 short verbal messages (e.g., "Imagine one of your friends telling you: I had a fight with my girlfriend"). For each of these messages, participants were instructed to draw up a ranking list on four possible interpretations from ranking position 1 to 4 for factual content (e.g., "I had a fight with my girlfriend"), self-revelation (e.g., "I'm worried because my relationship is not going so well"), relationship (e.g., "I can talk to you about my relationship"), and appeal (e.g., "Please listen to me and give me advice"). To create overall scores, we computed frequencies on how often each of the four dimensions were chosen per ranking position. For example, if a participant always chose the appeal dimension as the most suitable interpretation (i.e., ranking no. 1), he would have a score of 16 for appeal and a score of 0 for factual content, self-revelation, and for relationship. Subsequently, participants performed two unrelated tasks. In the end, they were debriefed and paid a monetary reward of €7.

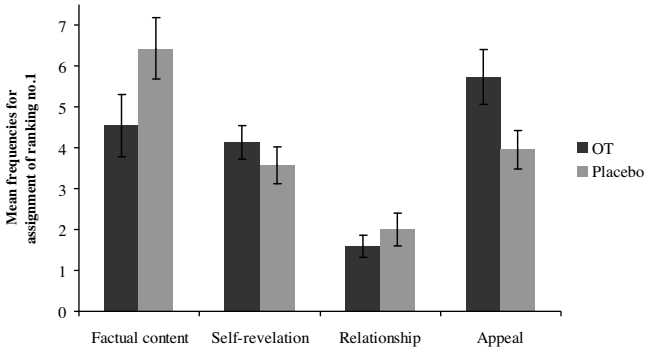

Fig. 1. Mean frequencies for the communication dimensions as a function of substance (OT vs. placebo); error bars represent ± 1 *SE*.

3. Results

3.1. Sample

Participants in the OT and placebo conditions did not differ in age (OT: $M = 30.77$ years, $SD = 13.19$; placebo: $M = 29.10$ years, $SD = 11.43$), $t(41) = 0.45$, $p = 0.659$, education, $\chi^2(4) = 3.49$, $p = 0.479$, or martial status, $\chi^2(3) = 5.71$, $p = 0.127$. Moreover, they showed similar completion times for the communication questionnaire (OT: $M = 16.78$ min, $SD = 5.13$; placebo: $M = 15.38$ min, $SD = 4.90$), $t(41) = 0.92$, $p = 0.363$.

3.2. Communication style

To test our hypothesis that participants under OT but not placebo would primarily understand messages within the dimension of appeal, we calculated a Mann-Whitney *U* test. It revealed that participants in the OT group assigned more often ranking no.1 to the appeal dimension ($M = 5.73$, $SD = 3.15$) than participants in the placebo group ($M = 3.95$, $SD = 2.16$), $U = -1.93$, $p = 0.054$. The same pattern emerged even clearer using a chi-square test, $\chi^2(1) = 4.24$, $p = 0.039$. To investigate whether participants under OT preferred the appeal dimension over the other dimensions, we calculated a Friedman test. It showed a statistically significant difference in assigning ranking no.1 depending on the dimensions in the OT group, $\chi^2(3) = 23.94$, $p < 0.001$. Post-hoc analyses with Wilcoxon signed-rank tests were conducted with a Bonferroni correction applied, resulting in a significance level set at $p < 0.017$. Participants in the OT group assigned significantly more often ranking no.1 to the appeal dimension ($M = 5.73$, $SD = 3.15$) than to the relationship ($M = 1.59$, $SD = 1.26$), $Z = -3.93$, $p < 0.001$, one-sided, and (marginally significantly) to the self-revelation dimension ($M = 4.14$, $SD = 1.93$), $Z = -1.55$, $p = 0.062$, one-sided, but similar often to the factual content dimension ($M = 4.55$, $SD = 3.58$), $Z = -0.85$, $p = 0.205$, one-sided, see Fig. 1.

We also investigated the other dimensions exploratively. Another Mann-Whitney *U* test showed that participants under placebo ranked significantly more often the factual content dimension first ($M = 6.43$, $SD = 3.43$) than participants under OT ($M = 4.55$, $SD = 3.58$), $U = -1.97$, $p = 0.049$. This pattern similarly occurred using a chi-square test, $\chi^2(1) = 2.95$, $p = 0.086$. The Friedman test revealed a statistically significant difference in assigning ranking no.1 depending on the dimensions in the placebo group, $\chi^2(3) = 15.08$, $p = 0.001$. Again, post-hoc analyses with Wilcoxon signed-rank tests were conducted with a Bonferroni correction applied, resulting in a significance level set at $p < 0.017$. Participants in the placebo group

assigned ranking no.1 significantly more often to the factual content dimension ($M = 6.43$, $SD = 3.43$) than to the appeal ($M = 3.95$, $SD = 2.16$), $Z = -2.06$, $p = 0.020$, one-sided, the relationship ($M = 2.00$, $SD = 1.87$), $Z = -3.27$, $p < 0.001$, one-sided, and the self-revelation dimension ($M = 3.57$, $SD = 2.04$), $Z = -2.24$, $p = 0.011$, one-sided.

Descriptive statistics and analyses for the other ranking positions can be found in the Supplementary material.

4. Discussion

In our study, interpreting communicative information depended on OT. OT increased the participants' tendency to primarily understand verbal communication in terms of the dimension of appeal: Not only did participants under OT choose significantly more often the dimension of appeal as first choice compared to participants under placebo but they also preferred it over most of the other dimensions. With the exception of ranking no. 3, we did not observe a systematic pattern within the minor ranking positions (see Supplementary material). People usually select one interpretation of verbal information spontaneously without considering possible alternatives. We therefore assume that the first ranking position is the most important; the remaining ranks might even have been randomly chosen to serve the response format.

Appeal as the predominant interpretation strategy for people under OT might explain the missing link between the facilitated recognition of relationship words (Unkelbach et al., 2008) and increased positive communication behaviors (Ditzen et al., 2009) when OT is administered: An accommodating style of understanding words (i.e., through the dimension of appeal) might facilitate positive communication. Our result that OT promoted the construal of information in communicative settings within the dimension of appeal supports recent findings on reduced ambivalence under OT (Preckel et al., 2015) and the general assumption of OT inducing social approach behaviors (Kemp and Guastella, 2011).

One could suggest that OT should also increase the understanding of verbal communication in terms of the relationship dimension as research has revealed facilitated recognition of relationship words under OT (Unkelbach et al., 2008). It should, however, be considered that Schulz von Thun's (1981) relationship dimension differs from the relationship category as defined by Unkelbach and colleagues: The relationship dimension is a delicate one as it is accompanied by a very sensitive and sometimes overly sensitive relationship "ear" (Jiang, 2015). If the relationship "ear" is oversized, the recipient takes all messages personally to the point of feeling offended and is thus less socially focused. The relationship category by Unkelbach et al. (2008), on the other hand, is related to bonding—a concept that rather matches the appeal dimension that includes altruistic efforts taken by the recipient to meet the communicator's expectations.

In our daily life, a communicator's message is typically accompanied by context and nonverbal cues that can help the recipient to identify the correct dimension (Risius and Beck, 2014). In our design, we did not investigate verbal communication in real face-to-face situations but created written conversational fragments, thus cutting out both context and nonverbal messages. In this way, we could test our hypothesis within a set of different communicative settings and without possible confounding variables. Importantly, this procedure ensured an investigation of the participants' pure response styles free of any biases. As the preference for one specific "ear" usually depends on the recipient's individual background (Risius and Beck, 2014), we were able to get an idea of the psychological condition of people under OT. It would, however, be an important second step in future research to examine the impact of OT in ecologically more valid terms and investigate the interaction between the well documented effects of OT on nonverbal cues (e.g., Domes et al., 2007; Guastella et al., 2008) and verbal communication.

Past research has shown that OT is not only involved in prosocial behaviors but also facilitates behaviors like attacking potential intruders (Shamay-Tsoory et al., 2009) or competing with rivals (De Dreu et al., 2010). When dealing with close others OT seems to magnify prosociality; it, however, diminishes prosociality when dealing with out-group members or competition (see Bartz et al., 2011). In our study, the communicators were designated in-group members. We would expect a different picture of results if the sources of communication would be out-group members. It should, moreover, be noted that only male participants were tested, as is the case in most studies of OT. Recent research, however, suggests gender-dimorphic effects of OT: For example, men under OT rate faces more negatively (Hoge et al., 2014) and show more self-interest in moral judgments (Scheele et al., 2014), whereas the opposite emerges for female participants. Thus, gender might also moderate the effect of OT on communication styles. Finally, as our results revealed rather minor effects, future research would benefit from replicating the findings in a series of OT studies.

By developing and using a new method, our study could shed some light on the hardly researched area of verbal communication under OT. Our findings indicate that OT can help in "hearing what isn't said" (Peter F. Drucker)—in particular with regard to socially demanding aspects.

Conflict of interest

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Contributors

M. Pfundmair developed the study concept. All authors contributed to the study design. Testing and data collection were performed by F. Lamprecht and F. M. von Wedemeyer. M. Pfundmair performed the data analysis and interpretation. M. Pfundmair drafted the manuscript, and F. Lamprecht, F. M. von Wedemeyer, and D. Frey provided critical revisions. All authors approved the final version of the manuscript for submission.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.psyneuen.2016.07.213.

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