Neuroscience and Biobehavioral Reviews 92 (2018) 453–463

Contents lists available at ScienceDirect

Neuroscience and Biobehavioral Reviews

journal homepage: www.elsevier.com/locate/neubiorev

A touch-scaffolded model of human prosociality

Jinlong Su, Yanjie Su*

School of Psychological and Cognitive Sciences and Beijing Key Laboratory of Behavior and Mental Health, Peking University, Beijing, China

ARTICLE INFO

Keywords:
Prosociality
Allo-touch
C-tactile afferents
Evolution
Human development

ABSTRACT

For centuries, scholars have been puzzled by the distinct human prosociality. A variety of explanations have been proposed to unveil the mystery of it and nearly all these explanations have focused on the role of complex cognitive processes. In this paper, we propose a novel hypothesis that human prosociality is touch-scaffolded. We argue that early tactile stimulation such as maternal touch serves as the basic component that enables the emergence of nascent human prosociality. During this process, C-tactile afferents along with many neuropeptides, such as oxytocin and endogenous opioids, play pivotal roles in the touch – prosociality connection by facilitating the formation of an intimate caregiver-infant bond and the development of a positive social schema. Our model provides a different perspective on the development of human prosociality and builds a bridge between the human tactile system and high-level psychology – human prosociality.

1. Introduction

Humans are different from other species in many respects, one of which that stands out is their distinctive prosociality. They help strangers and donate money to people they have never met. They are proactive to share, co-operate and are endowed with a sense of fairness. This distinctive human prosociality has laid the foundation for the emergence of a highly complex large-scale society. But what makes human prosociality so special? Theorists have proposed a variety of explanations, such as kin selection, reciprocity, multilevel selection, culture-gene coevolution and socialization (Chudek and Henrich, 2011; Nowak, 2006; Wilson and Sober, 1994). These explanations have aimed to answer the question from two perspectives: what drives the evolution of human prosociality and how it evolves. In fact, both perspectives greatly contribute to our understanding of human prosociality.

However, although many explanations have been put forward to explain the evolution and development of human prosociality, one component has been hardly considered: the human sensory system. Inspired by evidence on the link between allo-touch and prosocial behavior (see Dunbar, 2010; Gallace and Spence, 2010), we posit that allo-touch has played an important role in the evolution and development of human prosociality. Specifically, we propose that human prosociality is touch-scaffolded. It should be noted that we do not think touch is the sole (or most important) driving force that shapes human prosociality, but consider it a more basic building block that lies deep in human prosociality or a point of entry to human prosociality. Below we first present some of the most common explanations for human prosociality. Next we elucidate our touch-scaffolded prosociality model and provide supporting evidence from the ontogenetic and phylogenetic perspectives. Finally we point out empirically testable predictions that can be drawn from the touch-scaffolded model, followed by a discussion of the significance and shortcomings of the model.

Yet before proceeding, we make some necessary clarifications. In the current paper, we use the term “prosociality” in its broad sense to refer to any kind of other-oriented psychology and behavior such as social orienting, altruistic emotion, and co-operation; “allo-touch” to refer to the touch targeting another individual rather than oneself (e.g., maternal touch). Besides, there exists a great deal of work in the field of touch and it is not possible to cite all of the literature. So we cite only a selection of relevant papers that best illustrate the story we want to tell.

2. Current explanations of human prosociality

Scholars from many fields have long been intrigued by the distinctive human prosociality and have proposed a lot of hypotheses trying to explain it. Evolutionary theorists believe that inclusive fitness, reciprocity, group selection and culture-gene coevolution play pivotal roles in prosociality evolution (for a review, see Chudek et al., 2013). Economists and psychologists mainly aim to explore the proximate causes of human prosociality, such as altruistic punishment, norm internalization, moral emotion, intuitive prosociality, personality traits and moral education (Fehr and Fischbacher, 2003; Gintis, 2003; Narvaez, 2006; Zaki and Mitchell, 2013). Below we make a brief introduction of a selection of representative theories so as to let readers

* Corresponding author at: School of Psychological and Cognitive Sciences, Peking University, 5 Yiheyuan Road, Beijing, 100871, China.
E-mail addresses: jinlongsu@pku.edu.cn (J. Su), yjsu@pku.edu.cn (Y. Su).

https://doi.org/10.1016/j.neubiorev.2018.07.008
Received 1 December 2017; Received in revised form 21 May 2018; Accepted 11 July 2018

establish a general understanding of the mainstream theories exploited to explain human prosociality.

Traditional explanations of human prosociality usually assume that humans are selfish in nature. They need reflective or deliberate self-control to forego personal gains to benefit others and it is the ability to suppress unwanted behaviors that supports prosocial behaviors (Stevens and Hauser, 2004). However, recent work in psychology and neuroscience have suggested that this might be not the case and it is more likely that prosocial behavior represents an impulse of its own, rather than the outcome of inhibition of selfish urges (Rand et al., 2012, 2014; Zaki and Mitchell, 2013). However, there still exists debate on how this prosocial impulse comes about. Zaki and Mitchell (2013) argued that the prosocial impulse might reflect an evolutionary adaptation. As supporting evidence, children in their first year had already exhibited prosocial preferences (Hamlin et al., 2007). Rand and colleagues contended that it was shaped by past experiences – just like the development of many social heuristics, people in their daily life often received long-run payoffs from helping others or cooperating with them, so the behavior patterns were automatized gradually (Rand, 2016; Rand et al., 2014).

Culture-gene coevolution provides another perspective on how human prosociality evolves (Chiao and Blizinsky, 2010; Fehr and Fischbacher, 2003; Richerson et al., 2016). This perspective argues that culture shapes the human genome by driving the evolution of human brains and bodies, which in turn enables the development of more complex human culture (Chudek and Henrich, 2011; Feldman and Laland, 1996). The culture-gene coevolution relies on interaction between culture and epigenetic regulatory circuits, which has received some kind of support in studies in epigenetics (for a review, see Deichmann, 2016). Building on the literature, Chudek and Henrich (2011) further proposed that we humans were equipped with an evolved norm-psychology and it was the norm-psychology that underlay our distinctive prosociality. According to Chudek and Henrich (2011), norm-psychology comprised “a suite of psychological adaptations for inferring, encoding in memory, adhering to, enforcing and redressing violations of the shared behavioral standards of one’s community” (p. 218), which further gave rise to the emergence of moral emotions, altruistic punishment and many other psychological components that played important roles in the evolution and development of human prosociality (Chudek et al., 2013; Henrich, 2004; Henrich et al., 2006).

Besides, reciprocity is also a widely used approach to explain human prosociality (Trivers, 1971). It can be divided into direct reciprocity and indirect reciprocity (Rand and Nowak, 2013). Direct reciprocity arises if there are repeated encounters between the same two individuals — I help you today and you will help me tomorrow. It means one’s helping will get paid in the future, so the cost would be balanced out. Indirect reciprocity involves reputation, whereby one’s action towards the other one depends on the latter’s previous action towards other individuals (Rand and Nowak, 2013). Some researchers also call indirect reciprocity reputation or signaling (Engelmann and Fischbacher, 2009; Ohtsuki and Iwasa, 2004). Regardless of the terminology, they all refer to the phenomenon that one helps others in order to build or uphold a good reputation so that one will get paid in the future. With the support of indirect reciprocity, individuals may engage in costly behaviors that benefit the group as a whole. The reputation or signaling system allows us to track people’s behavior and to use this kind of information to incentivize cooperation or helping (Panchanathan and Boyd, 2004; Rand and Nowak, 2013). Results of agent-based simulations and experimental studies have provided strong and consistent support for the roles of reciprocity in the evolution and maintenance of cooperation as well as many other types of prosocial behaviors (Falk and Fischbacher, 2006; Fehr et al., 2002; Fujisawa et al., 2008; Lacetera and Macis, 2010; Nowak and Sigmund, 2005; Sandroni, 2000; Yoeli et al., 2013).

The explanations above provide us with multiple perspectives on studying human prosociality. However, it is obvious that nearly all of them base human prosociality on high-level complex mechanisms such as reciprocity, reputation, experience-based prosocial intuition, culture and social norms, but neglect more basic processes that may underlie human prosociality. For example, studies have found that early maternal touch plays an important role in the development of infants’ prosociality (for a review, see Field, 2004). But why does early maternal touch contribute to children’s prosociality development? The theories we mentioned above could hardly explain this phenomenon. Moreover, not restricted to humans, the relation between touch and prosociality development seemingly also exists in nonhuman primates (Harlow, 1958, 1961), which suggests that the touch-prosociality connection found in humans might be not evolutionarily novel.

Since complex psychological processes are usually scaffolded on more basic processes (see Vygotsky, 1980), it is possible that human prosociality might also have a more basic root. In the current study, we propose that allo-touch, which also could be found in nonhuman animals and has been relatively neglected in this field, is involved as a more basic and evolutionary older component that underlies human prosociality. In so doing we hope to introduce a perspective that links human prosociality to the low-level psychological component such as sensation and trigger more studies in this field.

3. A touch-scaffolded prosociality model

In ontogeny, the initial dyadic interactions, which usually happen between mothers and infants, provide the starting point for one’s social development. During early mother-infant interactions, allo-touch happens frequently (Tronick, 1995). The amount of maternal touch that occurs during brief interaction periods is estimated to range from 33% to 61% of infant-caregiver interactions (Perez and Gewirtz, 2004). Also, cross-cultural studies have showed that touch, gaze and affective vocalization are important interactive components in mother-infant interactions across all cultures and compared with mothers in western cultures the mothers in traditional societies use more tactile contact in their interactions with infants (Richter, 1995). More importantly, maternal touch conveys a series of emotions, including but not limited to love, caring, sympathy, empathy and a sense of security (Stack, 2004). Thus, being allo-touched has been intimately connected with prosocial orientation of the toucher since one was an infant. We propose that such an allo-touch – prosociality connection serves as a scaffold for the development of more complex forms of human prosociality. Below we first review the evidence that supports our hypothesis. Next, we trace the evolution of such an allo-touch – prosociality connection and point out the ontogenetic mechanisms that might make such a connection possible, followed by a brief description of the biochemical basis of the connection.

3.1. Human prosociality is touch – scaffolded

In our framework, allo-touch contributes to human prosociality as a basic and evolutionarily old component. There are two levels of interpretations of it. In one aspect, it suggests that being allo-touched in early years of life will contribute to prosociality development. In another aspect, once allo-touch – relevant representations are salient, one will show much more prosociality, including activated prosocial psychology and prosocial behaviors. According to Anderson (1983), if two units are closely associated with each other in the network (the “network” here could refer to neural networks as well as networks comprising of cognitive constructs and their connections. For further details, see also Anderson et al., 2004), then the activation of one unit will automatically spread to the other one, heightening the readiness of the latter for biased mental processes. So the scaffolding in our model refers not only developmental scaffolding but also cognitive scaffolding. Below we list three lines of evidence that supports our hypothesis. First, we review the literature in developmental psychology to show that being allo-touched in early years of life plays an important role in the