Lisa Parr - selected references

1 Parr, L. A., Modi, M., Siebert, E., & Young, L. J. (2013). Intranasal oxytocin selectively attenuates rhesus monkeys' attention to negative facial expressions. *Psychoneuroendocrinology, 38,* 1748-1756.
Notes: Intranasal oxytocin (IN-OT) modulates social perception and cognition in humans and could be an effective pharmacotherapy for treating social impairments associated with neuropsychiatric disorders, like autism. However, it is unknown how IN-OT modulates social cognition, its effect after repeated use, or its impact on the developing brain. Animal models are urgently needed. This study examined the effect of IN-OT on social perception in monkeys using tasks that reveal some of the social impairments seen in autism. Six rhesus macaques (Macaca mulatta, 4 males) received a 48 IU dose of OT or saline placebo using a pediatric nebulizer. An hour later, they performed a computerized task (the dot-probe task) to measure their attentional bias to social, emotional, and nonsocial images. Results showed that IN-OT significantly reduced monkeys' attention to negative facial expressions, but not neutral faces or clip art images and, additionally, showed a trend to enhance monkeys' attention to direct vs. averted gaze faces. This study is the first to demonstrate an effect of IN-OT on social perception in monkeys, IN-OT selectively reduced monkey's attention to negative facial expressions, but not neutral social or nonsocial images. These findings complement several reports in humans showing that IN-OT reduces the aversive quality of social images suggesting that, like humans, monkey social perception is mediated by the oxytocinergic system. Importantly, these results in monkeys suggest that IN-OT does not dampen the emotional salience of social stimuli, but rather acts to affect the evaluation of emotional images during the early stages of information processing

2 Hecht, E. E., Gutman, D. A., Preuss, T. M., Sanchez, M. M., Parr, L. A., & Rilling, J. K. (2013). Process versus product in social learning: comparative diffusion tensor imaging of neural systems for action execution-observation matching in macaques, chimpanzees, and humans. *Cerebral Cortex, 23,* 1014-1024.
Notes: Social learning varies among primate species. Macaques only copy the product of observed actions, or emulate, while humans and chimpanzees also copy the process, or imitate. In humans, imitation is linked to the mirror system. Here we compare mirror system connectivity across these species using diffusion tensor imaging. In macaques and chimpanzees, the preponderance of this circuitry consists of frontal-temporal connections via the extreme/external capsules. In contrast, humans have more substantial temporal-parietal and frontal-parietal connections via the middle/inferior longitudinal fasciculi and the third branch of the superior longitudinal fasciculus. In chimpanzees and humans, but not in macaques, this circuitry includes connections with inferior temporal cortex. In humans alone, connections with superior parietal cortex were also detected. We suggest a model linking species differences in mirror

system connectivity and responsivity with species differences in behavior, including adaptations for imitation and social learning of tool use

3 Parr, L. A. (2011). The evolution of face processing in primates. *Philos.Trans.R.Soc.Lond B Biol.Sci., 366,* 1764-1777.
Notes: The ability to recognize faces is an important socio-cognitive skill that is associated with a number of cognitive specializations in humans. While numerous studies have examined the presence of these specializations in non-human primates, species where face recognition would confer distinct advantages in social situations, results have been mixed. The majority of studies in chimpanzees support homologous face-processing mechanisms with humans, but results from monkey studies appear largely dependent on the type of testing methods used. Studies that employ passive viewing paradigms, like the visual paired comparison task, report evidence of similarities between monkeys and humans, but tasks that use more stringent, operant response tasks, like the matching-to-sample task, often report species differences. Moreover, the data suggest that monkeys may be less sensitive than chimpanzees and humans to the precise spacing of facial features, in addition to the surface-based cues reflected in those features, information that is critical for the representation of individual identity. The aim of this paper is to provide a comprehensive review of the available data from face-processing tasks in non-human primates with the goal of understanding the evolution of this complex cognitive skill

4 Parr, L. A. & Heintz, M. (2009). Facial expression recognition in rhesus monkeys, Macaca mulatta. *Anim Behav., 77,* 1507-1513.
Notes: The ability to recognize and accurately interpret facial expressions is critically important for nonhuman primates that rely on these nonverbal signals for social communication. Despite this, little is known about how nonhuman primates, particularly monkeys, discriminate between facial expressions. In the present study, seven rhesus monkeys were required to discriminate four categories of conspecific facial expressions using a matching-to-sample task. In experiment 1, the matching pair showed identical photographs of facial expressions, paired with every other expression type as the nonmatch. The identity of the nonmatching stimulus monkey differed from the one in the sample. Subjects performed above chance on session 1, with no difference in performance across the four expression types. In experiment 2, the identity of all three monkeys differed in each trial, and a neutral portrait was also included as the nonmatching stimulus. Monkeys discriminated expressions across individual identity when the non-match was a neutral stimulus, but they had difficulty when the nonmatch was another expression type. We analysed the degree to which specific feature redundancy could account for these error patterns using a multidimensional scaling analysis which plotted the perceived dissimilarity between expression dyads along a two-dimensional axis. One axis appeared to represent mouth shape, stretched open versus funnelled, while the other appeared to represent a combination of lip retraction and mouth opening.

These features alone, however, could not account for overall performance and suggest that monkeys do not rely solely on distinctive features to discriminate among different expressions

5 Parr, L. A., Heintz, M., & Pradhan, G. (2008). Rhesus monkeys (Macaca mulatta) lack expertise in face processing. *J.Comp Psychol., 122,* 390-402. Notes: Faces are salient stimuli for primates that rely predominantly on visual cues for recognizing conspecifics and maintaining social relationships. While previous studies have shown similar face discrimination processes in chimpanzees and humans, data from monkeys are unclear. Therefore, three studies examined face processing in rhesus monkeys using the face inversion effect, a fractured face task, and an individual recognition task. Unlike chimpanzees and humans, the monkeys showed a general face inversion effect reflected by significantly better performance on upright compared to inverted faces (conspecifics, human and chimpanzees faces) regardless of the subjects' expertise with those categories. Fracturing faces alters first- and second-order configural manipulations whereas previous studies in chimpanzees showed selective deficits for second-order configural manipulations. Finally, when required to individuate conspecific's faces, i.e., matching two different photographs of the same conspecific, monkeys showed poor discrimination and repeated training. These results support evolutionary differences between rhesus monkeys and Hominoids in the importance of configural cues and their ability to individuate conspecifics' faces, suggesting a lack of face expertise in rhesus monkeys