

SOCIAL KNOWLEDGE IN WILD BONNET MACAQUES, *MACACA RADIATA*

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A very important component of social cognition in primates is the knowledge that individuals might possess with regard to certain attributes of other individuals that they regularly interact with within their social group. In addition to the obvious recognition of each animal as a distinct individual, the possible attributes that such knowledge might encompass could include their dominance ranks and affiliative relationships – factors that seem to influence much of the social behaviour displayed in primate societies.

In bonnet macaques, a frequent interaction between females is that of an allogrooming supplant, in which a dominant female displaces one member of a pair of grooming females, both subordinate to her. In the majority of these supplants (~80%), the most subordinate of the three individuals leaves her grooming partner as soon as she observes the dominant female approaching them – such females are thus clearly aware of their own subordinate status relative to the other two individuals. On about 20% of these occasions, however, it is the other female (the more dominant of the two allogrooming individuals) that leaves – and the factor that most significantly appears to influence this decision is the high social attractiveness of her grooming partner, as defined by the amount and consistency of allogrooming that this individual receives from all the other females in the troop. These dominant retreating females are thus clearly aware of the social attractiveness of their subordinate partners; bonnet macaque females, therefore, appear to be knowledgeable of the social relationships of the other females in the troop.

That individual females might also know the relative dominance ranks of their troop members is revealed by the typical patterns of aggressive behaviour and allogrooming choices that occur during such triadic interactions. If neither of the two allogrooming subordinate females retreat when the third dominant female approaches them, for example, the latter usually displays aggression towards the more subordinate of the two. Occasionally, however, she does not display any agonistic behaviour but proceeds to directly allogroom one of the two individuals –

and, in the majority of these cases, she grooms the more dominant female. Approaching females thus seem to be aware of the relative dominance ranks of the two other females, both subordinate to her.

Further statistical modelling of the decisions made by the females indicate that three factors are taken into consideration when they decide to either remain behind or retreat during allogrooming supplants: knowledge of the subject's own dominance rank, her rank difference with the approaching dominant female and rank difference with her grooming companion. Individuals are thus clearly aware not only of their own positions in the rank hierarchy, but also of that of the other females in the troop. A model which incorporates the absolute dominance ranks of the latter, however, fails to explain the observed behavioural patterns. Knowledge of another individual's dominance rank is, therefore, egotistical in that it seems to be acquired only relative to one's own; a female knows of her rank difference with another female but does not appear to be aware of the absolute position of her adversary in the rank hierarchy.

The observation that rank difference with the approaching dominant female and that with the grooming companion both influence the decision-making process indicates that a bonnet macaque's knowledge system is integrative in nature – females are able to simultaneously process information about all their interacting companions and use this knowledge effectively during social interactions. The decisions made in this particular situation are, in reality, even more complex: the intermediate female in a grooming supplant chooses to retreat as the approaching individual becomes relatively more dominant to her while her grooming companion becomes comparatively more subordinate (as also more socially attractive).

The knowledge of dominance ranks and social relationships that individual macaques possess appears to constitute a clear example of recognition of individuality and individual attributes by these animals. Furthermore, the decision to retreat or remain behind during allogrooming supplants also depends on the absolute position of the actor in the dominance hierarchy – the more subordinate an individual the more likely she is to retreat. Clearly then, each bonnet macaque female has knowledge of some of her own individual attributes as well.

Although all of these abilities must obviously call for some form of fairly sophisticated mental representation of particular individuals, including themselves, associated with their specific properties, what remains unclear is how exactly such information is categorised and coded for in the non-verbal cognitive architecture of the macaque mind. It is also important to note that, during triadic interactions, the integrative property of the bonnet macaque's knowledge system allows her to respond appropriately to the relative dominance ranks of the other interacting individuals. It is striking, therefore, that whatever may be the stored imagery of the individual attributes of the two females she is interacting with, it is possible for her to access both these sources and integrate them when finally making a socially complex decision.

FURTHER READING

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