

CHAPTER 3

THE IMPACT OF THE SOCIAL ENVIRONMENT ON THE EVOLUTION OF MIND

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Abstract. Reasoning about agents constitutes more of a challenge than reasoning about objects. Agents move of their own volition and are motivated by internal states that are essentially private and hidden from view. Social animals must also adhere to social norms that are rarely explicitly represented. Competing or cooperating successfully in such a dynamic environment requires appreciating the social norms that define acceptable behavior and the intentional states that motivate the behavior of others. For these reasons, the social environment constituted a crucible that forged our cognitive capacities during evolution, capacities that color and constrain our thoughts and behaviors from birth through adulthood. These capacities include a biological preparedness to detect, acquire, and reason effectively about the implicit rules that specify what we are permitted, obligated, or forbidden to do, and a capacity for constructing hierarchically embedded mental representations of the minds of others. These capacities are prefigured in nonhuman primates in a way that make certain aspects of human cognition continuous with those of other social species.

We have the power to defy the selfish genes of our birth...

—Dawkins, 1976, p. 215

So although we arrive on this planet with a built-in, biologically endorsed set of biases...we can nevertheless build lives from this base that overthrow those innate preferences. We can tame and rescind and (if need be) repress those preferences in favor of “higher” preferences...

—Dennett, 1984, p. 45

1. INTRODUCTION

If you are a materialist, then you are committed (at least implicitly) to the view that

The mind (collection of cognitive functions) is what the brain does.

That is, our cognitive processes are instantiated as neurological processes. And unless you are a creationist, you are also committed to the view that

The brain was shaped by evolution.

If you accept these two premises, you are also committed to accepting their logical conclusion, namely, that

The mind (collection of cognitive functions) was shaped by evolution.

It is uncontroversial (in most circles) that visual and motor cognitive functions evolved in response to selective pressures exacted by the physical environment. Eyes, lateral geniculate nuclei, and visual and motor cortices are the legacies of evolutionary pressures associated with negotiating the physical environment. This paper offers some reasons for thinking that, similarly, several important cognitive functions were shaped (through evolutionary pressure) by the exigencies of the *social* environment. The legacies of this evolutionary history are (a) a *biological preparedness* to detect, acquire, and cognize effectively the structure of *social norms*, that is, the implicit rules that specify what individuals are *permitted*, *obligated*, or *forbidden* to do given their position in their social groups, and (b) a capacity for constructing hierarchically embedded mental representations of what is socially crucial but essentially hidden from view, namely, *the minds of others*. Further, the development of certain cognitive functions is (a) highly canalized, (b) early emerging, and (c) prefigured in non-human primates in a way that distinguishes it from many other kinds of reasoning. The implication is that social reasoning is not simply reasoning applied to the social realm, but a relatively independent/autonomous skill that is quite “old” and which can be dissociated from other reasoning skills.

2. THE EXIGENCIES OF THE SOCIAL ENVIRONMENT

2.1 The selective pressure for adhering to social norms

Let me begin by addressing the point that certain social cognitive functions are prefigured in non-human primates. Most non-human primates are social animals who live in groups of varying sizes. Neocortical volume across primate taxa correlates with mean group size, meaning that neocortex volume is related to the number of relationships a primate can keep track of in a complex social environment (Dunbar, 1992 and 1993). As far as primate taxa are concerned, larger societies seem to require larger brains.

Primate societies are characterized by kinship and rank relationships that constrain behavior in particular ways. These constraints are sometimes referred to as *implicit social norms* and they are reflected in virtually every activity, including who is allowed to sit next to, play with, share food with, groom, or mate with whom (Hall, 1964; Aruguete, 1994). Members of such a society of animals need to behave in accord with these implicit social norms in order to avoid agonistic encounters and to remain within the group. Like virtually all social mammals (including humans), this “social order” is best described as a *dominance hierarchy*, meaning that

Certain individuals have priority of access to resources in *competitive situations*. (Clutton-Brock & Harvey, 1976).

Dominant individuals protect their privileged access to resources by *detecting violations of implicit norms* and punishing them. For example, dominant males monopolize reproduction opportunities by aggressing against or threatening to aggress against females and subordinate males who are caught socializing or consorting (e.g., Cheney & Seyfarth, 1990, p. 227; de Waal, 1982).

It is impossible to ignore dominance rank when theorizing about the evolution of cognition because *dominance rank correlates with reproductive success*, and reproductive success is the engine that drives evolution. Those who dominate resources are less likely to die of predation or starvation (Cheney & Seyfarth, 1990, pp. 33-34), and are more likely to leave living offspring (e.g., Bertram, 1976; Bygott, Bertram, & Hanby, 1979; Dewsbury, 1982; Clutton-Brock, 1988; Ellis, 1995; Fedigan, 1983; Hausfater, 1975; McCann, 1981; Nishida, 1979;

Robinson, 1982; Silk, 1987; Tutin, 1979; de Waal, 1982; Watts & Stokes, 1971). Among some species of primates (e.g., chimpanzees and baboons), the relationship is even more striking because dominance status is unstable; for this reason, the level of reproductive success achieved by any individual is directly related to the length of time during which the individual is high-ranking (Altmann et al., 1996).

If dominance rank correlated simply and strongly with size, it would be difficult indeed to see how it could have much impact on the evolution of higher cognition. But in point of fact, dominance rank does *not* correlate with size in many species of primates (Smuts, 1985; Walters & Seyfarth, 1987). Instead, attaining and maintaining a high-ranking position depends on *forming and maintaining alliances* (Chapais, 1988 and 1992; Datta, 1983a-b; Goodall, 1986; Harcourt, 1988; Harcourt & Stewart, 1987; Harcourt & de Waal, 1992; Packer, 1977; Riss & Goodall, 1977; Seyfarth & Cheney, 1984; Smuts, 1985; Uehara, Hiraiwa-Hasegawa, Hosaka, & Hamai, 1994; de Waal, 1982). These alliances are formed and maintained through *reciprocal obligations*. During contests of rank, individuals typically call for help, and non-kin allies are most likely to supply that help if the individual in question has groomed them, shared food with them, or assisted them in agonistic encounters in the past (Chapais, 1992; Cheney & Seyfarth, 1990, pp. 67-69; Prud'Homme & Chapais, 1993; Seyfarth, 1976; Seyfarth & Cheney, 1984). These reciprocal relationships have the structure of transactions in that rate of intervention by individual A on behalf of B is proportional to the rate of intervention of B on behalf of A (de Waal, 1992). Similarly, chimpanzees retaliate against individuals who are reluctant to share food (i.e., show a low rate of food distribution relative to others) either by directly aggressing against them when they themselves request food (de Waal, 1989) or by misinforming or failing to inform them about the location of food (Woodruff & Premack, 1979).

The important point is that acquiring and maintaining a high-ranking position depends less on brawn than on brain, less on the capacity to out-muscle one's opponents than on the cognitive capacities to remember individuals as well as their kinship and rank, learn what is permitted and what is forbidden given one's position in the group, detect transgressions of social norms, form alliances, monitor transactional imbalances, and recognize when the benefits of reciprocating outweigh its costs. These, I propose, are basic and crucial social cognitive functions. They are, in a very real sense, what the social brain evolved to do. Without the capacity to detect instances of cheating,

one cannot dominate resources. Without the capacity to create and maintain alliances based on reciprocal obligations, one cannot acquire and maintain a high-ranking position within the social group. Finally, this analysis also implicates the capacity for detecting what is forbidden and what is permitted given one's rank. Without this capacity, subordinates risk incurring the wrath of their higher-ranking conspecifics, a situation that can (and does) result in ostracism and even death.

2.2 Social norms, cheater detection, and human reasoning

Have the exigencies of living in social dominance hierarchies left their mark on the cognitive functions of *human* primates? Three decades of research have demonstrated conclusively that people are particularly adept at deontic reasoning, that is, reasoning about what one may, ought, or ought not do (see Cummins, 1996b). Whenever one reasons about what one is *permitted*, *obligated*, or *forbidden* to do, one is reasoning deontically. This type of reasoning is distinct from discursive or theoretical reasoning in which the reasoner is required to determine the epistemic status (truth) of a rule or other description of a state of affairs. When reasoning deontically, one is less concerned with what is true than in choosing a correct or prudent course of action.

One of the most striking effects in the literature on human reasoning is what I've termed the *deontic effect*: When reasoning about deontic rules (social norms), people spontaneously adopt a violation detection strategy, that is, *they look for cheaters* (Cheng & Holyoak, 1985 and 1989; Cosmides, 1989; Cosmides & Tooby, 1992; Cummins, 1996a-d, 1997, 1998a-b, 1999; Manktelow & Over, 1991 and 1995). This extremely cogent and crucial reasoning strategy seems to be triggered almost exclusively by problems with deontic content, particularly permissions, obligations, prohibitions, promises, and warnings. The deontic effect has been observed in literally hundreds of experiments using a variety of reasoning tasks (e.g., conditional arguments, categorical syllogisms, equivalence judgments) over the course of nearly thirty years, making it one of the most reliable effects in the psychological literature.

As a simple example, imagine a friend tells you

If John goes to Baltimore, he always travels by car.
(If <p>, then <q>)

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