

Patricia S. Churchland

Braintrust: What Neuroscience Tells Us about Morality.

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In *Braintrust*, Patricia Churchland develops a philosophical framework to determine the source of moral values, drawing on converging evidence from evolutionary biology, experimental psychology, genetics, and neuroscience. In the past, she avoided asking moral questions because moral philosophy was disconnected from the evolution of the human brain—lacking a secure method, it was confined to mere opinion. However, since recent developments in biological sciences allow paths to discern human nature, Churchland offers a hypothesis that would explain what makes us social, in the hope that it can help us cope with social problems.

Morality, Churchland argues, is a four-dimensional scheme for social behavior shaped by the brain processes of (a) caring, (b) recognition of other's psychological states, (c) problem-solving in social contexts, and (d) learning social practices. Values, grounded in care for oneself and others, constrain social learning and problem solving, being more fundamental than moral rules. Due to selection, all nervous systems are organized to take care of the basic survival of the body through the process of homeostasis. The neurons in the brainstem and the hypothalamus monitor the internal state of the body relative to parameters necessary for survival, regulating blood pressure, heart rate, glucose and carbon dioxide levels. When a particular need is detected, a motivational emotion urges the animal to drink, eat, snuggle, or flee, and the sympathetic nervous system adjusts the body for 'fight or flight' response. Sensitive to survival priorities, this circuitry of care, regulated by the mentioned subcortical structures and the insular and cingulate cortexes, appears to be the ground-floor function of the nervous systems and the source of the most basic values—survival and wellbeing.

Citing neuroendocrinological evidence, Churchland argues that the neuronal system for self-care was adapted through selection to new goals—the care for others. A rat cleans and takes care of her newborn pups as if they were within her basic homeostatic ambit—her homeostatic emotions of pain and fear are triggered when pups are at risk as if her own well-being was threatened. The extension of self-care to the care of others depends on hormones oxytocin (OXT) and arginine vasopressin (AVP), which maternalize the female brain. These ancient neuropeptides, involved in the regulation of water and minerals in mammals, evolved to motivate maternal behavior, which is also reinforced by the release of endogenous opiates during lactation and suckling. Fear, anxiety, and physical pain, normally registered as 'protect-myself' signals in the brainstem and hypothalamus, evolved to engage 'protect-mine' tactics when offspring are threatened. Pain signals travel into the brainstem and hypothalamus, which regulate homeostatic responses, and get processed by the insula, representing state-of-me, and anterior cingulate cortex (ACC), responsible for the motivational aspect of pain. Insula

and ACC respond to physical as well as such social pains as threat to loved ones, separation, exclusion, errors of prediction, and guilt.

Discussing the differences in social behavior between montane and prairie voles, Churchland explains that mating for life, shared parenting, nest-guarding, and social clustering characteristic of prairie but not montane voles could be explained partly by the higher density of AVP and OXT receptors in their ventral pallidum and nucleus accumbens (part of the reward-punishment system) regions of the brain, which in turn can be explained by different environmental conditions. Experimentally blocking these receptors, preventing binding of OXT and AVP, leads to marked differences in social behavior. Although context-sensitive, it appears that OXT, released during positive social interactions, inhibits activity of amygdala and defensive behaviors by interacting with the hypothalamic-pituitary-adrenal axis, downregulating automatic fight-or-flight response and reducing stress. In humans, the allele rs53576A, a variant of the gene for OXT receptor, is correlated with anatomical differences in the volume of the hypothalamus, the connectivity between hypothalamus and amygdala, hypothalamus and anterior cingulate cortex, as well as behavioral differences in sociality (e.g. attachment, empathy, desire to belong, and parenting). Important to moral behavior, OXT explains how self-care extends to the care for kin and kith, reducing in-group conflicts and grounding social-problem solving in the basic values of attachment, concern for reputation, and fear of punishment and exclusion.

Discussing decision-making and cooperation, Churchland cites evidence showing that investors in the Trust Game, who received OXT nasal spray, trusted trustees more (41% vs. 21%), sending 17% more money than the controls. In a game exploring in-group/out-group hostility and cooperation, OXT had an effect on reducing egoism (52% vs. 17%) and increasing the in-group cooperation (20% vs. 58%), leaving the out-group hostility unaffected (28% vs. 25%). However, while in the Ultimatum game OXT subjects offered 21% more money than controls, in the Dictator game, where the rejection of the offer by the second subject is irrelevant, OXT had no effect. While Churchland is skeptical of the role of mirror neurons in empathy and the attribution of mental states, she believes that OXT improves identification of emotion and mental attribution in 'theory of mind' tasks.

Apart from OXT, cooperation depends on environment, competition, social hierarchy, temperament, and punishment. Providing benefits, group living also increases in-group competition. Thus, Bonobos, living in resource-rich environment with loose hierarchy and lower in-group competition, outperform the highly hierarchical chimps in cooperative tasks. Nevertheless, without the opportunity to punish free-riders in public goods games cooperation rapidly reduces to zero and free-riding strategy dominates. Yet, given even a costly opportunity, 87% of human players punished someone within a six-round game (above-average contributors doing more punishing), dramatically increasing cooperation (6-7.5 times). The psychological mechanism behind such cooperation is altruistic punishment, and the proximate mechanism of punishment is a negative emotion towards the free-riders—the reputation of trustworthiness is a virtue. In the end, Churchland argues that social virtues are favored by sexual selection and male generosity

and cooperation might function like the peacock tail, signaling attributes of strength and health.

Arguing that cooperation is a manifestation of attachment and caring, Churchland is critical of the innate morality thesis and genetic explanations of social behavior. To claim that a gene X is responsible for a behavioral trait Y, it must have a strong specific association with it in all environments and the physiological pathway from X to Y must be short and well understood. Lacking such pathway, such hypotheses must rely on universality of behavioral traits, which is consistent with innateness but does not imply it. In the absence of a story connecting genes and brain circuitry, the universality of some moral intuitions can be explained as common rational solutions to similar problems.

Churchland started the book addressing Hume's ought/is distinction and defending her approach from the charge of scientism. Saying that Hume objected only to sloppy inferences, she argues that naturalism finds roots of morality in how we are, and allows determining what we ought to do irrespective of the failure of a strictly deductive inference. At the end of the book, she returns to the discussion of morality, criticizing Moore's Naturalist Fallacy Argument as well as consequentialist and deontological approach to ethics with arguments well known in the literature. She finishes the book with reflections on tolerance and the importance of informing policy decisions with proper understanding of the roots of moral behavior.

Braintrust is a well written and informative book—its strength, and bulk, consists of the amalgamated empirical research on social behavior and Churchland's empirical speculation on the role of oxytocin in the evolution of morality and social decision-making. Yet, there are issues that should have been addressed. Churchland's criticisms of other theories as lacking physiological accounts connecting genes, brain circuitry, and behaviour presume a causal theory of scientific explanation that would have dismissed Darwin's theory for lacking any awareness of genetics. Causal accounts are desirable but not necessary—theories are tentatively accepted if they unify data and increase prediction and explanatory scope. The role of OXT in cooperation is compatible with the innateness thesis and alternative theories of cooperation, grounded on coalition-making for warfare or social dominance.

Furthermore, Churchland's case for grounding normative prescriptions in neurological findings and her criticism of traditional ethics fall short of the target. She makes an uncontroversial claim that policy should be informed by understanding of the roots of moral behavior, but this is not to say that policy goals should be derived from it. Does the empirical fact that people act more selfishly when lights are out mean that we should keep lights on or that we should adopt a different moral standard for nighttime? Churchland argues that despite our inability to deduce 'ought' from 'is', we can somehow figure out what we ought to do, but she neither explains how this can be accomplished nor appreciates that the ultimate problem is not in explaining or figuring things out but in justifying them. When Mill, conflating explanations and justifications, attempted to ground arithmetic in the observations of the manipulations of discrete objects, Frege mused on the good fortune that not everything in the world is nailed down,

since then $2+1$ would not equal 3. Paraphrasing, one should be glad that pharmaceutical companies have neither found the means nor benefit in decreasing our OXT receptors, since then cooperation and care for kin would no longer be a moral value. In the end, a naturalist approach should take these issues seriously, particularly in the light of the possible evolutionary origins of xenophobia, ethnocentrism, or coercive sexual behavior.

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