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In Brain We Trust

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ABSTRACT: The central question of Churchland's book *Braintrust*[1] is *where do moral values come from*? She answers it in terms of the latest research in neuroscience, evolutionary biology, experimental psychology, and genetics. By explaining and understanding our social practices via scientific research Churchland tries to provide a neurobiological platform for morality and thus illuminates the usually neglected account that moral properties are in some sense natural properties. She puts the results of the latest empirical experiments into the philosophical framework in such a way that it forms a foundation for our moral behaviour. The book is therefore about the *biological approach to human morality.* However, in what sense moral properties *are* (via social properties) natural (neurobiological) properties, as the naturalistic approach to the origins of human morality suggests, remains murky. To blame is presumably the presently limited powers of neurobiological explanations of social, and consequently, moral behaviour since the complex neural mechanisms of our brains are still not clear enough.

KEY WORDS: Moore, morality, naturalism, naturalistic fallacy, neurophysiology, social life.

Churchland's motivation for the search of the origins of morality might be found in her introductory story from her childhood which ultimately taught her that in the Middle Ages the system of *trial by ordeal* worked well when a confession had to extraced from the guilty, or worse, when the innocent had to be protected: the former conceded their guilt in the belief that God would not help them whereas the latter did not fear trial by ordeal in the belief that God was on their side, which proved to be a fatal mistake when the women accused of witchcraft drowned in the river. The

[1] Patricia S. Churchland, *Braintrust*, Princeton: Princeton University Press, 2011, 273 pp.

main question addressed by the author is therefore *where do moral values come from*? In order to answer it the author looks at the latest research on social behaviour in the fields of neuroscience, evolutionary biology, experimental psychology, and genetics and tries to put it into the philosophical framework in such a way that it forms a foundation for our moral behaviour: "My aim here is to explain what is probably true about our social nature, and what that involves in terms of the neural platform for moral behaviour" (3).

She rejects so-called *scientism*, which might be understood as the use of science for the explanation of things that are none of science's business: to understand morality with the help of neurophysiological research concerning questions such as what makes people and other animals social beings does not mean to substitute humanities normally dealing with them but to overcome their vulnerability as shown, for example, in philosophical "speculations" on moral intuitions. Here scientific aspects of how social problems are solved, social navigation works and neurons perform evaluation are supposed to make the difference. Depending on the context, that is the social community, one behaviour will count as legitimate or moral and the other not.

The book understands ethics or morality as a combination of *four social elements* whereby underlying brain processes are responsible for their connectedness: (a) *care* (for relatives and friends originating in attachment), (b) *recognition of others' mental states* (originating in the benefit of predicting others' behaviour), (c) *solving problems in a social context* (e.g. how to distribute rare goods etc.) and (d) *learning social practices* (by analogy, by mimicry, by conditioning, and so on). On these social values stand moral values, says Churchalnd, who puts her aim in this book somewhat differently: "… to understand what it is about the brains of highly social mammals that enables their sociability and thus to understand what grounds morality" (10).

The book is therefore about the *biological approach to human morality.* The author modestly points out that this strategy is not completely new: it can be found in Aristotle and later in Hume, A. Smith and Darwin. However, the rapid development of neuroscience, biology and social sciences in recent years, which have illuminated connections between the brain and morality, has enabled a more precise elaboration. The central argument is developed through eight individual chapters: the first chapter is a brief introduction; the second chapter outlines limits of the research of social behaviour in the light of evolution; the third chapter offers a detailed picture of the evolution of the human brain and *care* (for ourselves and for others) emphasizing the role of a hormone *oxytocin*; the fourth chapter examines human cooperation and trust; the fifth chapter carefully

states what is known about genes for morality; the sixth chapter points out the social importance of ascribing mental states to others; the seventh chapter analyses the essence of rules and their roles and the last chapter deals with the relation between religion and morality.

The second chapter, entitled "Brain-Based Values", explicitly emphasizes that moral practices originate in social practices, that is, in attachment to relatives and friends. Within these social values, conflict between our needs and the needs of others results in problems that threaten our existence and must be solved immediately. Some solutions are better and some worse, some long-term and some short-term, but all lead to the emergence of a cultural practice. Within the cultural practice intuitions about what is right and what is wrong are formed and children adopt them in the process of growing up. The question the author poses is "how is it that brains care about anything?" (13).

Neurobiology does not have a finite answer to the question just yet. Nevertheless, it can be said with a great deal of certainty that the most primitive value, care for ourselves and our own well-being (self-care), is based on brain processes. Otherwise, we would not survive and therefore fail to complete our mission, i.e. passing on our genes. However, it is not that clear why we care for others, that is, why there are social values. Churchland thinks that they too increase our chances of survival as being simply energetically wasteful and dangerous they would not have evolved. It is probably the case that the price we pay when taking care of others is lower than the reproductive profit we get. Neuroendocrinological evidence indicates that at some point the organization of our nervous system changed in such a way that we started to take care of others, first of those to whom we are closest (offspring, relatives, friends), and then even strangers. The author says that from this extent of care, which marks social behaviour and for which, at least according to our present data, an ancient peptide oxytocitin (a chain of aminoacids) is responsible, morality has emerged.

She points out that two other evolutionary changes in the evolution of the brain have also contributed to the rise of morality: the first was the occurrence of negative feelings (fear) in the case of separation from offspring or threat of danger, and the occurrence of positive feelings (pleasure) in the case of being reunited or when the danger has passed, and the second was an increased capacity to learn sponsored by an improvement in our memory which enabled prediction of problems and more effective planning of behaviour. The idea is that "attachment, underwritten by the painfulness of separation and the pleasure of company, and managed by intricate neural circuitry and neurochemicals, is the neural platform for morality" (16). Churchland adds that we do not speak of a new gene re-

sponsible for the realization of new social behaviour, e.g. other-care, but merely of a modification of the existent gene material. It is true that with time new genes emerge but they do not produce changes in social cognition or social temperament, they affect smaller changes linked to how organisms work, such as the ability of an adult human to digest animal milk. However, at the present time there is no compelling evidence for the claim that changes in social behaviour require new genes.

The third chapter, entitled "Caring and Caring for", brings an insight into the neurochemistry of *attachment* and *bonding* (call it AB) of mammals – humans, in which morality is supposed to be rooted. The first and most elementary component of AB is *self-preservation/self-caring*. Despite their complexity, as yet not entirely understood, it is beyond doubt that it is the underlying neural mechanisms that are leading to it: the experience of fear, which is supposed to keep us alive, and the appropriate behaviour securing it are the result of adjusted actions of the hypothalamus, subcortical, insular and cingulate cortex. "Integrating signals from both the inner milieu and the body surface, the brainstem-limbic circuitry is the foundational organization serving self-preservation, and therewith a minimal sense of self" (30).

The second part of AB is *other-caring*, which can be explained, as mentioned before, by the increase in our chances of survival and gene preservation. Our homeostasis depends in the first place on the well-being of our closest relatives followed by friends, colleagues and even complete strangers. A crucial stage in the extent of care to others has been the so-called *mammalian female brain maternalization* brought about by the changing roles of peptide ocytocine, arginine vasopressin and other hormones. Mammals equipped in such a manner had better chances of survival compared to mammals in which the role of the mentioned hormones remained unchanged, e.g. to motivate females to feed, cultivate and defend their offspring. Brain maternalization occurs during pregnancy when the placenta makes arrangements that the hormones progestin, estrogen, and prolactin that affect the neurons in the subcortical part of the brain come into blood. Oxytocin is responsible for the contraction of the fetus at birth, the expressing of milk during lactation, and the suckling of the new-born child. Pain is also important for the emergence of mammalian social behaviour. An organism understands it as a signal to protect itself. Through modification of the underlying neural mechanisms, evolution has extended the necessity to protect to others. It is not by chance that oxytocin and vasopressin are responsible for the described extent of care; in their earlier versions they were involved in reproduction processes even before mammals appeared.

The third part of AB also used for a survival and well-being is *prediction*. With its help mammals avoid predators as well as social conflicts. It is very useful for humans to estimate how things will develop in a certain situation and take all necessary precautions. This is nicely illustrated by human relations in which predicting the mental states of others that could be brought about by our behaviour or actions is desirable. Since we feel safe in a domestic and known environment that reduces fear and pain and which enables us to, as Churchland says, "rest and digest", it is vital for us to judge correctly how our behaviour affects those that are close to us. The author states once again that evolution does not create a new brain mechanism in order to adapt an organism to new needs but changes the existing one step by step. "Social emotions, values, and behaviour are not the result of a wholly new engineering plan, but rather, an adaption of existing arrangements and mechanisms that are intimately linked with the self-preserving circuitry for fighting, freezing, and flight, on the one hand, and for rest and digest, on the other" (46).

The fourth part of AB that evidently shows that some mammals have extended attachment also to individuals beyond the narrow family circle is *mate attachment*. This is not something exclusive to humans: 3% of other mammals also commit to long-lasting partnership. It is a very sophisticated form of social behaviour governed once again by oxytocin and vasopressin extracted from the hypothalamus and travelling to those subcortical parts of our brains that regulate reward, sexual behaviour and parenthood. In addition, the neurotransmitter dopamin is also important in the expression of social behaviour, playing a crucial role in neuron changes in the system of reward and punishment and prediction of others' behaviour, both crucial to how animals learn about the world. However, Churchland's belief that social and moral behaviour are in fact actions of the same kind is to a certain extent supported by neurophysiological evidence showing that in both cases, when individuals see a certain action as moral and when they see it merely as social, the same area of prefrontal cortex is active.

The fourth chapter, entitled "Cooperating and Trusting", considers a neurobiological basis for the extent of cooperation and trust that is morally relevant for social behaviour toward friends and strangers. So far, Churchland has discovered that the extent of care, from children to complete strangers, which is essential for humans as social beings, is a result of neuron connections in which oxytocin plays a crucial role, even though a clear and final picture of the exact processes at play is still out of reach. The question is whether cooperation depends on the same hormone (peptide), i.e. oxytocine, as well. First, she tries to find a definition that would cover all actions described as cooperation, and finally ends up with the one mentioned in the *Oxford English Dictionary*: "The action of co-oper-

ating, *i.e.* of working together towards the same end, purpose, or effect; joint operation" (68).

If the central hypothesis of the book holds, i.e., that morality originates in the neurobiology of attachment, which is supported by the modification of oxytocin and vasopressin that causes the extent of care to others, cooperation and trust should be sensitive to different levels of oxytocine as well. The results of various neurophysiological tests (the "Trust" game, the "Dictator" and the "Ultimatum" game, or the "Reading the Mind with the Eyes" test) show that this is true. In all the mentioned tests, subjects with a higher level of oxytocin showed better results: they were more trusting, more sensitive to the feelings of others, and better at predicting their mental states. It is interesting, however, that, the last test at least, the "Reading the Mind with the Eyes", shows a difference between men and women. Do not think, Churchland says, that it would be useful to spray oxytocin around in order to decrease social tensions since its negative implications in the case of long-term use are still unclear (besides, "to be trustful all the time" is clearly not an appropriate survival strategy). In addition, it is also too soon to use it for therapeutic purposes. It is true that patients with autism spectrum disorder, after being treated with oxytocin showed better results with respect to social behaviour but this still has to be further documented.

However, cooperation and trust are not affected only by a higher level of oxytocin. Experiments show that pain, reputation, punishment, and a group's social structure also play an important role. When punishment was allowed in games cooperation increased; likewise players were prepared to cooperate more with persons known to be trustworthy. As shown by research between bonobos (formerly called pygmy chimpanzees) and regular chimpanzees, a social system with less fighting, competition, aggression, and rivalry also contributes to the growth of cooperation. Bonobos were ready to cooperate more than chimpanzees, allegedly because of their food richer habitat, which has enabled them to evolve a more tolerant character. Despite everyday social catastrophes people seem to be closer to the former than to the latter, and we are tolerant to others who are different and often even enjoy their company.

The fifth chapter, entitled "Networking: Genes, Brains, and Behaviour", answers the question of how genes affect our social behaviour. The impressive level of human cooperation suggests that this ability is "in our nature", which raises speculation as to a special gene for cooperation. Since much social behaviour can be explained also as non-biological or non-evolutional, Churchland emphasizes that we have to be careful in stipulating causal links between cooperation and a genetic base. She suggests that cooperation is like aggression, a result of attachment and

care which makes the existence of a special gene for cooperation highly questionable. What are the conditions that have to be met in order for X to be the gene for Y? "If gene X has a strong, specific association with a behavioral trait or psychiatric disease in all known environments and the physiological pathway from X to Y is short or well-understood, then it may be appropriate to speak of X as a gene for Y" (97).

The non-existence of genes for social behaviours is also supported by the latest research. The problem is that according to the current results relations between genes and behaviour are not one-to-one but one-to-many. *Pleiotropy*, as it is known, means that one gene performs many different tasks, and this is not an exception but rather a rule. This is nicely illustrated by serotonin which is, among others, involved in respiration, appetite, aggression, pain-sensitiveness and sexual behaviour. If, for example, serotonin were the gene for aggression its level in aggressive fruit flies should be higher than in normal fruit flies. Results have shown that with respect to serotonin there was no difference. However, the aggressive fruit flies differed from normal fruit flies in 80 genes (but not in serotonin) among which are many involved in a bunch of phenotype changes; in this case they somehow in combination produced the aggressive behavior in fruit flies. The idea, Churchland says, is not simply that things are complicated but that one gene has many different jobs and that interactions among them are non-linear. It is unlikely that there is a causal connection between social behaviour, such as aggression or cooperation, and one or some genes because changes in gene expression can be a result of the gene's interaction with its environment.

In the light of this, psychologist Marc Hauser's presumption that there are universal moral principles which are innate, that is based on a similar general strategy that we apply when solving similar social problems, e.g. cunningness at hunting or readiness to consolation, is controversial. He says that the universality of moral intuitions, for example that incest is wrong, is strong evidence for the claim that they are innate and produced by their neurophysiological foundation, some kind of *moral organ*. Churchland, her semantic difficulties with "innate" and "universal" aside, rejects the idea with the fact that moral behaviour seems to be a consequence of explicit religious or governmental requests rather than a result of the so called moral organ. Moreover, we know how to make boats, we recognize types of cars, we eat with our hands etc., but do not have a special gene for making boats, recognizing types of cars or eating with hands, respectively. Her idea is simple: to tell the truth, which is undoubtedly an universal moral value, is compatible with the existence of the innate organ but it does not imply it. "Without a doubt, genes have a huge role to play in what we are, but exactly what the role is remains to be clarified" (109).

The sixth chapter, entitled "Skills for a Social Life", deals with the neurobiology of how we understand our own mind and that of others. Neuroscientists assume that intelligence in human social behaviour is due to the prefrontal cortex of our brain and that its size is supposed to be proportional to its ability to predict social behaviour. It is labeled "the organ of civilization"; unfortunately, however, the neural mechanisms that produce the array of its physical and social functions are not yet clear enough. It is known, though, that in interactions with other parts of the brain it affects emotions, feelings, sensations and drives. Churchland admits that she cannot give an explanation of brain mechanisms of social actions on a micro level but can, nevertheless, explain them on a macro level. The problem is that the same activity of a neuron of the prefrontal cortex can be explained in different ways, i.e. it can be linked with sensations, attention, emotions, prediction, and so on, or even with a combination of these mental states.

The method currently used to establish how the prefrontal cortex works is *functional magnetic resonance imaging* (fMRI). How does fMRI work? Details aside, by the help of a *difference* between the magnetic properties of the blood carrying oxygen and that whose oxygen has been taken up by cells (*the blood-oxygen-level-dependent contrast – BOLD*) when performing some task we infer that the part of the brain properly coloured on the monitor is active. Despite its exceptionality fMRI has limitations that have to be taken into consideration: the mentioned differences between the bloods can be extremely small, so it is nearly impossible to conclude solely by the colouration on the screen which part of the prefrontal cortex is active and which is not; it measures only the average activity of all neurons (100.000) in one cubic milimeter of brain tissue, rendering it impossible to see which operations neurons of the active part of the brain have carried out, or which neuron connections are so long that they exceed the coloured area of the prefrontal cortex.

However, social knowledge in terms of social prediction is crucial for survival and prosperity, that is for well-being and reproduction. One important way to learn social skills is *imitation*, together with other forms of learning via the reward-punishment system, in which a theft is followed by an unpleasant punishment whereas honesty is followed by a pleasant reward – mimicry provides a child with conscience. Predicting the behaviour of others is useful because it enables us to avoid problems that might be caused by our actions, and it is more effective when explained in terms of internal intentions and feelings than merely in terms of certain movements with typical consequences that turn out to be deceptive (thumbs up, for example, carries a range of meanings). The question is whether the so

called mirror neurons provide a neurophysiological basis for understanding and ascribing mental states to others.

Mirror neurons have been discovered in G. Rizzolatti's lab in rhesus monkeys; they are a subset of neurons of the prefrontal cortex that are active in both cases, when a monkey sees another monkey grasping an object and putting it into her mouth and when she herself does the same thing. Moreover, there is a small difference between grasping-to-get and grasping-to-eat, i.e. in the first case other neurons are active as in the second case, from which neuroscientists have inferred that these neurons *code* for action understanding, that is, these neurons represented a goal or intention. The idea that mirror neurons could code for intentions developed in 1998 into the so called *simulation theory*, which says that my neurons simulate your movement (for example, grasping for food), and if there is a match of neuron activities when simulating and when really doing the movement (grasping for food) I know what your intention is (from when I do the movement I intend to eat I infer that so do you). Later the view has been further elaborated, but Churchland rejects it, claiming that my simulation of your doing does not imply that I know what your intention is, e.g. from you raising a hand I cannot infer what you intend to do: you might say hello to someone, you might be stretching your hand, you might be voting, you might want to ask a question, and so on.

Another similar account that also rests on mirror neurons when ascribing mental states to others claims that a simulation of emphatic reactions represents a better way of determining the intentions of others than, simply said, the simulation of their movements. The point is that the imitation of mental states of others works via the nervous system of our brain, that is, a simulation of your sad face in my brain makes me sad, which implies knowledge of your feelings on my part. Churchland has doubts about this project since neurophysiological results have shown that the activation of the same neurons in observed and felt sensation is not necessarily the same. When they see the same facial expression different people can feel entirely different things: when she sees someone who is angry the observer can really feel anger, but also shame or even joy, which means that we recognize an angry person by another means than the simulation of emphatic reactions. These problems, which concern every simulation theory are not new; sadly, the introduction of mirror neurons does not solve them.

The last but far from complete account for ascribing intentions, which Churchland seems to be in favour of, states that empathy is extended to relatives and then friends and strangers by analogy with care, for which no simulation mechanism is needed, as the changed role of hormones in our neural network will do.

The seventh chapter, entitled "Not as a Rule", evaluates the role of rules and norms in morality. Among moral philosophers there is a prevailing opinion, Churchland says, that morality is a set of rules guiding our actions. Perhaps the most prominent within this group is John Rawls, who has tried to formulate universal rules of fairness that were supposed to be a moral foundation and that could act as a guide to what is right and wrong in any situation. She does not agree with such an approach and introduces reasons that reject the idea of rules and their rational use as being the core of morality.

However, the first rule that is supposed to be exceptionless and thus, with regard to morality, universally applicable is the so called Golden Rule rooted in the Bible (Mathew 7:12) which says "Do unto others as you would have them do unto you". Unfortunately, the Golden Rule cannot serve as the first principle and the moral guide in all circumstances because it allows exceptions: in war, I want to kill my enemy but do not want that he kills me; in medicine, I want someone to donate a kidney to me if I need one, but it does not mean that being healthy I have to donate mine to someone who needs one; in business, I fire an incompetent employee but I do not want that this happens to me, and so on. The classic mistake in the Golden Rule can be, moreover, described as follows: sometimes you want to do to me what you really want that I would do to you, even though I do not want that you do that to me at all. Obviously, the Golden Rule does not always hold and moral judgments for which it is used also depend on something else, that is, context.

A known proponent of the exceptionless rule for moral behaviour was Kant and his categorical imperative. It served as a filter to determine which universal rules would be adopted by all members of society without contradiction – in his opinion those that would contribute to my own well-being – and it was those rules that have then miraculously become moral rules. That the idea about a consistent universal rules is false can be shown by conceiving an universal rule, which is clearly immoral, but would be accepted by all persons without being irrational, e.g. "All patients with painful terminal cancer should be euthanised". Besides, Kant's basic idea, Churchland says, about eliminating sensations and feelings from the process of determining what are our moral obligations seems to be, mildly put, strange.

The next defenders of the universal moral principle introduced in the book are Jeremy Bentham and John Stuart Mill. Bentham is famous for his unconditional rule which says that one ought to act in order to produce the greatest happiness for the greatest number; today the rule is known as *utilitarianism*. Otherwise, *consequentialism* is the more general name for all accounts stating that it is consequences that morally matter. Mill differs

from Bentham in that the only thing that is desirable as an end is happines. For him some action is not right or wrong on the basis of how much happiness it produces, i.e. on the basis of some maximization rule, but on the basis of being or not being harmful to others and whether or not it requires restrictions on personal liberty that are still acceptable. As a matter of fact, his theory warns us, Churchland says, that Bentham's maximizing aggregate happiness is problematic.

Peter Singer is one of the contemporary maximizing consequentialists who claims that when calculating consequences all persons should be treated equally, which means that the well-being of my children must not be put ahead of the well-being of an unknown stranger. Churchland does not agree with him: in her opinion he demands from us more than is needed to be moral. Consequentialism is useful, she says, if it refers to a set of *exemplary moral prototypes*, i.e. cases leading to good/right consequences – well-being, which are then by analogy extended to other cases where their individual constraints are taken into account. Sensitive people know what is the right thing to do without looking at rules. Her argument rests on an analogy between prudential (everyday) and moral cases. It seems to her that in our everyday life, in order to react correctly, we do not have to know any rules and our decisions depend on context or case: "Case-based reasoning involves drawing on a remembered prototype that resembles the case at hand, and filling in the similarity with a similar response" (182). And why would this not also hold for moral cases? If my neighbor is not at home and I see that the deer will eat up his young cherry trees, and I know that he does not want that, I will chase the deer away and fix a hole in a fence through which they have come in. In this case, Churchland says, I certainly did not act upon the universal rule "Always help neighbors". The idea of always following unconditional general principles which help us to produce our moral behaviour is, therefore, weird.

In the final part of the chapter Churchland mentions a distinction between *descriptive* and *normative* on which a contemporary morality is based. The distinction states that *what is* – descriptive (facts) has nothing to do with *what ought to be* – normative (values); to the former belong, among others, social and neurophysiological facts and to the latter a rational or intellectual quest or endeavour. This is an important issue because the distinction makes her book, which defends the naturalistic approach to morality, irrelevant. Churchland argues that the distinction rests on a mistake known as *the naturalistic fallacy*. Its point has been expressed by G. E. Moore as follows: if a naturalistic property being happy were identical to a moral property being good then the meaning of 'happiness' and 'good' would be the same, that is, they would be synonymous. The problem is, according to Moore, that this would make the sentence "hap-

piness is good" equivalent to the sentence "happiness is happiness" which is uninformative. Since the sentence "happiness is good" is, nevertheless, informative, there must be something seriously wrong with identifications of natural and moral properties defended by naturalism. His argument has merely reinforced the opinion of many philosophers that values are something completely different from facts, and that the latter cannot tell us anything at all about the former. Nowadays moral philosophers interpret this in the following way: "because science cannot tell us anything about what is valuable it cannot tell us anything about how we ought to live".

In Churchland's opinion, Moore's argument fails because it states that when we say *A is B* we mean that *A* and *B* are synonyms, but this is certainly false. Take the sentence "light (A) is electromagnetic waves (B)". In this case it is surely not true that light is a synonym for electromagnetic radiation: we speak merely of two identical properties measured in two different ways. Take another example: when I say pain is the firing of neurons I certainly do not mean that pain and the firing of neurons are synonyms, but only that these are two identical properties described in two different ways. Since, in general, identifications do not require synonymy of concepts there is no reason to demand that in morality. This does not mean that science can solve all moral dilemmas, it suggests merely that a better understanding of our sociality's nature – social practices and problem-solving – can contribute a lot to a better understanding of our morality.

The eighth chapter, entitled "Religion and Morality", discusses the so called *supernatural approach* to morality. Since we usually do not have problems with recognising morally right actions some people think that this is due to our God-given conscience. Conscience will always tell us what is right and what is wrong because it is the same in all of us and we all have it by birth. Granted, we have reliable feelings about what is morally acceptable, but it does not mean that there is some metaphysical entity with moral knowledge who takes care of that; to know what is right and what is wrong is entirely compatible with the neurobiology of learned social practices, i.e. with brain-gene-environment interactions. In addition, our inner voices do not always give us the same advice in similar situations, they differ among persons and even within ourselves. Conscience seems, therefore, only an auditory imagining of what is going to happen produced by our brains in the process of problem-solving rather than an ontological entity completely independent from the brain.

Another similar and probably the most dominant account says that morality originates in god, i.e. good is what God says is good, and bad is what God says is bad. But this is problematic, as Plato warned us in his dialogue *The Euthyphro*, because it leads us to the following dilemma: (a)

something is good because God says it is good, or (b) God says something is good because it is good. For the defenders of morality grounded in God none of the horns is acceptable: on the first horn, whatever God says can be moral (e.g. kill your son and feed your pigs with his body), and on the second horn, a source of morality is not God (he only transmits what is right, whereas this is right for some other reason than God). Socrates elegantly avoids answering his own question about the source of morality, but he seems to suggest, Churchland says, that what makes an action just or right is not hidden in an imaginary god but in the human nature and social community that we live in.

Does this mean that morality is an illusion, that is, if God is dead everything is allowed? Her answer is clearly *no*, morality is as real as it can be: it lives in our social behaviour which is rooted in the neurobiology of our brains, i.e. in activities of neural mechanisms or neural networks of different parts of the cortex. "It is a false dilemma because morality can be – and I argue, *is* – grounded in our biology, in our capacity for compassion and our ability to learn and figure things out" (200).

The book makes a valuable contribution to the naturalistic approach to the origins of morality, it cites the latest results of neurophysiological research and interprets them in combination with evolutionary biology, experimental psychology, and genetics. By explaining and understanding our social practices via scientific research Churchland tries to provide a neurobiological platform for morality and thus illuminates the usually neglected account that moral properties are in some sense natural properties. Again, the naturalistic approach in its most general form says that moral properties are natural properties of the same sort and studied in the same way as properties investigated by the science. She is aware that this is not the whole story with regard to human moral values, as well as the presently limited powers of neurobiological explanations of social, and consequently, moral behaviour – the complex neural mechanisms of our brains are still not clear enough.

Still, there is one thing worth mentioning: Churchland seems satisfied with the claim that moral properties *are* (via social properties) natural (neurobiological) properties, because she does not specify in *what sense* the former are the latter. The identification of moral and natural properties could be, namely, explained in, at least, two ways: (i) in terms of strict identity, where moral properties are nothing 'over and above' neurobiological properties, which provides a reductive basis for morality, i.e. the links between morality and neurobiology are reductive and a moral vocabulary only a shortcut in our communication, and (ii) in terms of loose identity, where moral properties are merely dependent on natural proper-

ties in the sense of supervenience, which, however, allows morality to preserve its status of being a genuine entity.

However, Putnam's rejection of Moore's naturalistic fallacy which says that in the case of scientific discoveries we deal with reductive identifications of properties that are not synonymous, e.g. water is H_2O, seems plausible only from the metaphysical point of view. If, for example, good is what is pleasant, i.e. 'good' is identical to 'pleasant' (and in the final reductive phase to the activity of neural mechanisms of our brains on the biochemical level), how do we know that good is exactly what is pleasant? If knowing natural synonyms of ethical terms is not enough for moral knowledge, as Putnam suggests, how do we acquire moral knowledge at all?

Moore's answer to this epistemological gap which says that our ethical knowledge rests on intuitions is to the ethical naturalist, or more provoking, ethical reductionist, of no help at all. We clearly do not know by intuition that water is H_2O, we know that on the basis of experimental evidence. Therefore, when defending the epistemological component of her view the ethical reductionist has to appeal to the idea that knowledge of our moral facts is acquired in the same way as knowledge of our natural facts, i.e. by the help of empirical evidence. (Sturgeon 2006: 97) This looks like a descent and acceptable belief, also supported by Churchland.

Moreover, it seems that Moore assumed that every ethical naturalist has to be ethical reductionist, i.e. moral terms, such as 'good', have to be identical to clearly non-moral terms, e.g. 'pleasure', which could be given the current scientific research described in the book in the final step substituted for the bio-chemical activity of brains' mechanisms. As to our still insufficient knowledge about neural processes in our brains and the complexity of known synaptic networks representing merely a handful of the whole brain activity, and a common aversion to reductionism of any sort even if we had a full experimental data about the life of our brains at hand the wide acceptance of such a reductionism seems less likely if at all.

Finally, the book is excellent reading which explains complex neurophysiological mechanisms in a highly accessible way, making it interesting to those who favour the biological approach in the study of morality as well as those who prefer rather more orthodox ways.

Reference

Sturgeon, N. L. 2006. "Ethical naturalism", in D. Copp (ed.), *The Oxford Handbook of Ethical Theory* (Oxford: Oxford University Press), 91–121.