

BRAIN SCIENCE PODCAST

With Ginger Campbell, MD

Episode #81

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**Interview with Dr. Patricia Churchland, Neurophilosophy Pioneer,
and Author of *Braintrust: What Neuroscience Tells Us about
Morality***

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INTRODUCTION

Welcome back to the *Brain Science Podcast*. This is Episode 81, and I'm your host, Dr. Ginger Campbell. Today's guest is [Dr. Patricia Churchland](#). We actually talked back in [Episode 55](#), so I'm very happy to have her back on the show to talk about her recent book, [Braintrust: What Neuroscience Tells Us about Morality](#).

I want to get right into the interview, but there is one bit of background information I need to give you. *Braintrust* was released in March of 2011, which was a few months after a book by [Sam Harris](#) called, [The Moral Landscape](#). Both Harris and Churchland tackle the question of what neuroscience can tell us about morality; but, as you will hear in this interview, they come up with somewhat different conclusions.

Also, I want to remind you that you can get detailed show notes and a free episode transcript of today's interview by going to brainsciencepodcast.com.

I will be back after the interview with some important announcements, including information about how you can win a free copy of Dr. Churchland's book, *Braintrust*. So, be sure to listen all the way to the end.

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INTERVIEW

Dr. Campbell: Pat, it's really great to have you back on the *Brain Science Podcast*. It's hard to believe that it's been almost three years since we talked.

Dr. Churchland: Yes, I know!

Dr. Campbell: And today we're going to focus on your most recent book, *Braintrust*, but for the sake of my new listeners, would you mind starting out by telling us just a little bit about yourself?

Dr. Churchland: Yes. I'm Pat Churchland. I'm now [Professor Emerita](#) at the [University of California, San Diego](#). For many years I was a professor in the philosophy department at University of California, San Diego; but I also had one foot in [neuroscience](#), and another foot in [psychology](#), and another foot in [evolutionary biology](#). So, it seems like I'm a many-footed creature.

Many years ago, in 1986, I published my first book, which was called *Neurophilosophy*. And the idea behind that book was that, in order to understand the nature of the mind, we would have to understand the nature of the brain.

Dr. Campbell: So, [neurophilosophy](#) has actually become its own field in the intervening almost 25 years.

Dr. Churchland: Yes, it really has. And that's owed largely, I think, to the tremendous developments in neuroscience and in experimental psychology that have meant that we can really now address, using [empirical](#) techniques, questions about the nature of consciousness, about decision-making and choice (which, of course, bears upon issues having to do with free will), issues about the nature of the self. These are all things that we now can understand in a much deeper way, using empirical strategies. So, I think many people in neuroscience are, in a way, doing neurophilosophy, as well as doing experimental brain research.

Dr. Campbell: Right. And in the last three years, you've been more focused on the social, or moral aspect of that area—or is that just one of your side interests?

Dr. Churchland: No, it's really very much a focus at the moment. The question that has long bothered me—and I think many, many people—is where our values come from; including, of course, those values that we think of as moral values.

And although I think many people have suspected—as certainly [Darwin](#) did; and before him, [David Hume](#)—that to be social is really part of our nature, it's not been easy to answer the question, *so how does that work, exactly; and what are the mechanisms whereby we are social creatures in a way in which certain other animals—like frogs let's say, or rattle snakes—are not particularly social creatures.*

So, you want to understand what it is about certain mammals—and we are definitely one, but so are baboons, and prairie voles. About five percent of mammals are really highly social; we like to be together, and we like to live in groups. And so, beginning with the question, *what makes us social—what is it in*

our genes and in our brains that makes us social, and what does that sociality consist in—is a question that now neuroscience has begun to address in earnest.

Dr. Campbell: Pat, your new book is called, *Brain Trust: What Neuroscience Tells Us about Morality*; and I guess the first thing that you come out with is, you make it very clear that your stance is that morality should be tethered to evolution and understanding the brain.

Dr. Churchland: Yes. That, I think, is where we need to start. It's clear that structures in the brain, for all animals, are organized to see to the animal's own survival and welfare. As [Paul MacLean](#) put it once, our brain is organized to ensure that we do well at the 4 F's—the feeding, fleeing, fighting, and reproduction. But in addition then, with mammals, something very different happened in the mammalian brain. And this is true, really, of all mammals.

Now, of course we don't have the intervening organisms—that is, the [sauropsids](#)—that came in between reptiles, like newts and lizards, and mammals, like rats and voles. But what we do know is that the mammalian brain is quite different. I mean everybody knows that the mammalian brain has real [cortex](#); by which we mean six-plus layers of cortex. Reptiles have a kind of a cortex; maybe two or three layers you can make out.

But something else very special happened that is of particular interest to those of us who want to understand sociality; and that is that the mammalian brain was configured so that taking care of one's self—keeping one's self fed, and warm, and safe—the circuitry expanded beyond self to others. And in the first instance, those others were offspring. So, just as the mother rat must take care of her own safety, and warmth, and food, so she gets very concerned about the warmth, and safety, and food of her offspring.

And the brain is organized to feel pleasure when the infant is with the mother, and safe; it's organized to feel pain when it's separated, or under threat. That's very new. And that basic circuitry is, of course, part of what we understand about the [hypothalamus](#) and other subcortical structures, including the reward system. The [nucleus accumbens](#) is very important, as is the [ventral pallidum](#).

And when we think about sociality in primates, and even in some rodents, what we see is that that circuitry can be tweaked in small ways to give things like attachment, not just to offspring, but attachment to mates, attachment to friends; so that the caring circle sort of expands.

So, that's the basic idea of the book. And, of course, what I do try to do is show that this is not just speculation anymore, but that we know a little bit about the neurochemicals and the circuitry that make it possible to have sociability.

Dr. Campbell: Before we talk about your hypothesis in a little bit more detail, perhaps we should address one of the objections that I think happens to everybody who tries to write in this area. I know there have been attacks on Sam Harris's attempts in this area. How do you respond to people who object to the idea that we should try to study moral behavior scientifically?

Dr. Churchland: Well, there are many ways, of course, of thinking about morality. In addition to thinking about what might be the biological basis that makes social behavior, in general, and moral behavior, in particular—what makes that possible—of course, it's possible to look at the cultural evolution of morality, and also how moral institutions change over time, and the dynamics of how they change, and what makes them change.

People with religious beliefs are sometimes inclined to think that religion and morality are very closely connected. And, in some respects, they are. That is, religious institutions—whether or not they involve a personal God, or a God that

is a creator, or a God that can be prayed to—religious institutions often foster a kind of closeness between people; because people may share and talk about their particular convictions and beliefs, and about how to solve certain kinds of social problems.

So, I think that there is an important sociological role for religions. But the idea that religions are the origin of morality has run up against quite a lot of difficulties; especially because the question you have to ask is, *OK, which religion?* And that's because there are so many different religions; and [Buddhism](#), which does not really have a place for a personal God, is very different from [Scientology](#), which is very different from various sects of [Christianity](#).

So, when you compare the moral theories across different groups, what you come out with is, first of all, tremendous diversity in the idea about where morality comes from; but, secondly, you see certain fundamental similarities that are owed, not so much to the religion as religion, but owed to our biological nature.

So, I do see a role for religions. I think many religions can offer an occasion where people come together, and they think about morality, they talk about it in a very straightforward way. It can also be a hindrance to the evolution of good social institutions; but those, of course, are things that people sometimes just have to work out.

So, the idea that religions are the source of morality doesn't really look very plausible when you scan moral behavior across so many different religions, with very, very different ideas and beliefs. It's important to remember that millions, and millions, and millions of people in Asian countries do not believe in anything like a Christian or [Judaic](#) God, or the God of [Islam](#), and yet they have a moral understanding. They exhibit moral behavior every bit as much as those in the West who do believe in a personal God.

And so, when someone like [Francis Collins](#) says, if God does not exist, then there is no such thing as morality, that tends to be very puzzling to those Asians who are [Confucians](#), and [Taoists](#), and Buddhists; because they do have a very deep understanding of morality, but they don't have a belief in a personal God.

Dr. Campbell: But, of course, in your book, you also point out that you're not claiming that science has all the answers of right and wrong.

Dr. Churchland: Absolutely! And here, I think I do differ with Sam Harris. He had a rather youthful and exuberant idea that, in the long haul, neuroscience was going to tell us answers to questions about our well-being, and to what is valuable in living a life.

And I think that that is a kind of youthful idea that appeals to one that, you know, has sort of gone through life, and realized that there is tremendous diversity amongst people and what they find valuable. Some people enjoy a very private life, living in the woods and socializing only from time to time; other people like to live in cities, and for them, the arts are a very important part of their lives; and so forth.

I think it's really just fanciful to suppose that, by looking at brains and understanding in much more detail how brains work, you would be able to say to me, 'You know, Pat, you've really made a mistake in the way that you live your life; you would be much happier if you were a bicycle rider, engaging in bicycle races; and I can just see that from your caudate nucleus.' Well, you know, I think I'd probably just offer the person a cup of tea, and let him go on his merry way.

It's also striking, and disappointing, I guess you'd say, in Sam's book, that he does not provide one single example of a neurobiological fact that bears on a moral question. And consequently, one has to be a little bit cautious when he makes

these suggestions that, in the long run, it will be science that tells us what's good for a person, and what's valuable for a person.

That is certainly not my view. And I think, for the foreseeable future, people will determine what is a good way of living a life in much the same way they've done it in the past: they'll talk with other people; they'll think about it; they'll try, and succeed, or they'll try, and they'll fail; they'll read stories about other people and their lives; and they'll muck on as best they can. I think [Aristotle](#) probably has more wisdom for us about how to lead a life, than Sam Harris.

Dr. Campbell: I appreciate you sort of addressing that to begin with, because I think he made a valuable contribution to the conversation, but I think it was also a little bit polarizing.

Dr. Churchland: Well, it was very naïve, I think. For one thing, without really understanding what he was getting into, he brought in the idea of [Jeremy Bentham](#) that ultimately what we need to do is to maximize aggregate utility—the greatest happiness for the greatest number. And it's long been known—and indeed, [John Stuart Mill](#) understood—that there were terrible difficulties with the idea of maximizing aggregate utility.

For one thing, doing the calculations is next to impossible. For another thing, it's not clear that there are not boundaries between who we should help and who not. I mean, if I'm to maximize aggregate utility, then if I have a choice between helping my two children, a lot, and helping, a little, nine children in, let's say Romania, then according to maximizing aggregate utility I'm required to help the children in Romania. And I think that's just nuts.

So, there are certain kinds of fundamental values—perhaps even deeply biological values—that run into tension with this idea of maximizing aggregate utility. And also, Sam makes the very naïve claim that you can get from the notion that

suffering is bad to maximizing aggregate utility as a requirement: here's something that John Stuart Mill agonized over, with regard to the greatest happiness for the greatest number, and finally concluded that it was, in certain ways, misbegotten.

Mill said, 'When it comes to issues where my decision might cause tremendous harm to somebody else, then of course I have to begin to take into account those consequences and their effects. But if I'm just merrily working away in my garden, but I could actually be doing more good if I was working in a soup kitchen, I don't have to do that; that infringes on my freedom.'

So, it's not that throughout life we must always be looking to maximize aggregate utility; rather it's that, especially in the case where nations as a whole must make a decision about laws and institutions, then we need to take into account the bad things that we want to avoid.

So, Mill saw a real conflict between the preservation of one's own freedom to explore and do what you want to do, and this obligation to always be second-checking, *should I really just be playing my guitar, or should I be out there helping my neighbor?* Sometimes you should just play your guitar.

And I think the problem with [Utilitarians](#), such as Sam, is they kind of see the positive aspects of maximizing aggregate utility, and they get too enthusiastic about it, and they become very unrealistic. And so, I think that it's not just polarizing; I think that it's actually a moral error, so to speak—in the way that I think Mill thought that it was a moral error on Bentham's part.

Dr. Campbell: Yes. I guess we need to get back on track; but I will recommend to listeners that John Stuart Mill's book, *On Liberty* (which happens to have been published the same year as Darwin's, *The Origin of Species*; 1859) is a fantastic book; one I think everybody should read—and it's very short.

Dr. Churchland: Yes; especially because, for all kinds of historically silly reasons, Mill is often associated with the idea that we are to maximize aggregate happiness. And in actual fact, when you read Mill...

Dr. Campbell: That's not what he wrote!

Dr. Churchland: No; that was his father's pal, Jeremy Bentham.

Dr. Campbell: I appreciate you taking the time to talk about that. It's a fascinating subject.

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Dr. Campbell: Pat, it was good to spend some time talking about the philosophical background of the issue of morality, but now I'd like to get back to talking about your book, [*Braintrust: What Neuroscience Tells Us about Morality*](#). Perhaps we could start by looking at the four elements of your hypothesis. Do you want to take us through that?

Dr. Churchland: Yes. I think when you want to get a sort of nutshell story here, there are a limited number of components that we can see go into helping us understand the nature of human moral values.

And the first really is this biological/neurobiological basis for sociality. And there we know that certain circuits are important, and that certain neurochemicals, such as [*vasopressin*](#) and [*oxytocin*](#), are very important. On their own, of course, they don't cause morality or bring about morality; but they are important.

The other thing (and now this begins to touch on culture and the evolution of social practices), human groups have always engaged in problem-solving in order to deal with certain tensions within the group. There are huge advantages to living in a group; advantages that have to do with food resources. A group of

individuals can bring down a caribou; a lone individual cannot. So, there are advantages to living in groups.

But there are also tensions that arise within the group; because within the group, individuals compete. They compete for mates; they also compete, in a different sort of way, for food. And so, there are tensions. Sometimes those tensions can spill over, and cause a threat to the well-being of the group as a whole. And so, groups have always found ways of dealing with that. And we see this also in chimpanzees, and baboons, and monkeys—that social practices arise.

A common way of punishing a miscreant, for example, in all primates is banishment. And humans do that, too; and have long done that. It's a terrible punishment, both because it's painful for the individual, but also because the individual is vastly more vulnerable on his own. And we can see this so clearly in the case of pack animals, like wolves and coyotes, as well.

So, social problem-solving, using the big, fat, frontal cortex that humans have, is a really important part of the development of social practices that help to reduce tensions, and that help to serve the well-being of the group.

The third thing that's really important (and, again, I think we can see this—perhaps less richly—in chimpanzees and baboons) is the capacity to anticipate what others are going to do, by relying on representations like 'so-and-so has a goal,' or 'so-and-so is angry;' that is, where we attribute mental states to them. Anticipation, of course, is absolutely critical in brain functioning; and much of the evolution of brain organization has been driven by the advantages of being able to anticipate. So, being able to attribute mental states to others is also an absolutely critical aspect of this.

And finally, of course, learning and the capacity to imitate. This is, again, not unique to humans—although we may see it in its most rich and highly-developed

form in humans. But, certainly, other mammals and other birds have a tremendous capacity to imitate, and to pick up, in very subtle ways, the social practices, the mannerisms, the expectations of living in a group. And that's very important that an animal can do that, in order to be able to thrive and do well in the context of group living.

So, these four components interact and come together, in a certain kind of way, in the case of all social animals. And the form that social practices take, then, is really going to depend on many factors.

It will depend on the particular ecology that the group lives in. So, we can see that the [Inuit](#) will have somewhat different social practices for easing tensions about fights over women, for example, than you might see amongst the [Aztecs](#), or that you might see amongst the [Pirahã](#) in Brazil. So, the ecology is going to make a difference.

And, of course, when groups expand—as they famously did with the advent of agriculture—then very new kinds of social practices and institutions come into play. So, in a small group—a group of 20, to 30, to 50 individuals—we all watch each other; and [moral suasion](#), and disapproval, and frowning, and rejection pretty much does the job of keeping everybody in line. But once you have very large groups, where individuals are strangers to each other, then the need for more formalized systems tends to emerge; and thus we see the formation of explicit laws, as opposed to implicit social practices.

So, those are sort of the four components that I see as important here. And each of them, of course, involves a tremendously complex subject, in its own right.

Dr. Campbell: And you've got a great deal of detail in the book, that we definitely don't have time to get into, at all. Is there one example from what we

know about how the brain works that really clicked for you; that really made you begin to look at this differently?

Dr. Churchland: Yes, absolutely there is; and this is the story of mate attachment. I first heard about this from [Larry Young](#), and then subsequently I have spent a lot of time talking to [Sue Carter](#) in Chicago.

But here's the story that absolutely got me: So, there are many kinds of voles. And, as you know, voles are little rodents that look a bit like mice, but without tails. And there's a very striking difference that Sue Carter observed, between prairie voles, who live in the open prairie, and montane voles, who live amongst the rocks in the mountains.

And here's the behavioral difference: Prairie voles, after the first mating, stay together for life. They are bonded for life; they like to be together. The male helps guard the nest, the male helps rear the pups. They are depressed if they're separated—as shown by standard kinds of tests. And it doesn't necessarily imply sexual exclusivity, but pretty close to it. Montane voles, on the other hand, are quite different: they mate, and then they separate. The male takes no role in rearing the pups, or in guarding the nest.

So, when this behavior was observed, and since these are very, very similar animals, Sue Carter thought, *what's the difference in the brain?* Now, after a few false starts, it turned out that the differences in the brain were quite striking, and identifiable.

Here's the basic result: Oxytocin is a very ancient [peptide](#), and very similar to its sibling peptide, vasopressin. And they found that the density of receptors for oxytocin was different in prairie voles and montane voles. It was much higher in one area of the reward system—the nucleus accumbens. For vasopressin receptors, the density in prairie voles was much higher than that of montane

voles; and it was in one particular place, and that was another part of the reward system—the ventral pallidum.

So, having seen this anatomically, they then did all of the manipulations, behaviorally and physiologically, that you would expect; they blocked receptors, and so forth. And it looks like the density of receptors really was a critical factor—it may not be the only one, but it's a critical factor in determining mate attachment.

So, this struck me, because mate attachment and the involvement of the male in parenting is a very striking and different behavior. We see this behavior in a small percentage of mammals. Marmosets are another wonderful example. California deer mice are also a good example.

That was the result that got me thinking that, OK, we see this major change from the reptilian brain to the mammalian brain whereby care expands to offspring; and maybe these minor changes genetically, that give you changes in receptor density (for oxytocin, vasopressin, and perhaps other things), allow for the expansion of the care circle to give you social animals like voles, baboons, chimpanzees, monkeys, and humans.

If you think about those sort of caring patterns as *values*—which I do—suddenly the whole field of morality, the whole domain of moral philosophy began to look different to me. And I went back and I read many of the books that I'd read as a graduate student, but I read them with new eyes. And it all made sense, in a very new and very different way.

For me, it was the understanding of how you get from offspring attachment, to mate attachment, to kin and kith attachment that really was the great breakthrough.

Dr. Campbell: It's striking how such a small change could make such a big difference.

Dr. Churchland: It really is.

And manipulations were done with mice—because that's where we have much more genetic information. By changing the genes for receptor densities for vasopressin and oxytocin, you can get mice that then will bond in the way that prairie voles do. And when you think about it, changing receptor density is probably a fairly small genetic change. It probably has to do with regulator genes that turn off and on the other genes that are in the business of regulating receptor production.

I think it's really very interesting. And it raises, also, interesting questions about individual variability within a population. And there, of course, we don't really have much in the way of an answer about variability in human sociability.

But some studies have been done on determining (I think this was done by [Michael Meaney](#)) whether infant rats, separated from the mother but given all of the food and so forth, what does their sociality look like over time; what do their oxytocin levels look like over time. And there is some reason to think that there is variability there; that is, that there is a loop between gene expression and environment that has to do also with density of oxytocin and vasopressin receptors.

It's bound to be a hugely complicated story. But the idea that we even know a little bit of it, I think is just wonderfully exciting.

Dr. Campbell: But we can't just jump to saying that this is the way it works in people.

Dr. Churchland: No, we can't. And, at the moment, we don't have a way of determining receptor density for oxytocin and vasopressin. So, there's an awful lot that we don't know in the human case.

But I think we are motivated to think that it's likely that substantial parts of the story hold for humans. And that's because evolution is so conservative. Yes, there can be enlargement of structures or decrease in size of other structures, but what is absolutely remarkable is how, across all mammals, the same basic structures are in play; the same organization and circuitry is in play; the same neurochemicals, and neuromodulators, and neurotransmitters are there.

So, we can learn a lot, I think, about humans, from rodents. But, of course, we have to realize that culture, in particular, does make a huge difference. I'm guessing now, but I'm guessing that 250,000 years ago, when the first human groups were roving around Africa, I bet their social life was not terribly different from that of chimpanzees and baboons; and that, over time, certain social practices would develop—albeit very slowly.

What we see now in human cultures—with institutions for administering criminal justice; with taxation systems; with systems for policing; banking systems; ways of enforcing contracts—that's all very recent. And even the idea of universal human rights is incredibly recent. So, culture plays a huge role. And I'm not a [cultural historian](#), so I rely on people like [Paul Seabright](#), for example, who does do things like chart the history of social institutions.

Dr. Campbell: Could you talk a little bit about what we know about how the [reward circuitry](#) is involved. And, again, we're back at the animal level; but this seems to be an important piece of the picture.

Dr. Churchland: Yes, it is an important piece of the picture. And I have to say that I don't think a great deal is known—that is, not a great deal is known about

exactly the role of oxytocin and vasopressin in the reward circuitry. One thing that is known is that, as oxytocin levels go up, activity in the [amygdala](#)—or, at least, in that part of the amygdala that regulates fear responses—activity in the amygdala goes down.

And also there is an effect in the [brainstem](#) that decreases the level of vigilance and arousal. And this sort of suggests that, as Sue Carter puts it, oxytocin, by kind of down-regulating fear and vigilance, allows for the emergence of social behaviors; of trusting behaviors; of my being able to groom the other animal, or allowing the other animal to groom me; and so forth.

There are other interactive effects, too. We know that there are interactions with the endogenous [opioids](#). There are interactions with [stress hormones](#), so that when oxytocin levels go up, stress hormones tend to go down. So, we're learning a little bit about that.

But I think separating out the pleasure that might be provided by oxytocin, from the pleasure that is, so to speak, provided by the endogenous opiates, we don't have that part of the story yet. And so, I really want to emphasize this; because in hearing the kind of core part of the story, there's often a response by an audience to say, 'Well, heck; why don't we just spray oxytocin around, and make everybody cooperate? Isn't that the way to do it?' And it is an interesting first response, but it, too, is actually very unrealistic; for all kinds of reasons.

First of all, oxytocin is, as we've discussed, found in the brain. It's also found in the body: it's found in the heart, in the testes; it regulates female estrous cycles. So, if you were to spray it around, and people, let's say inhaled it, this might not be the best idea—for women, at any rate; or for men, either. So, that's one thing.

The other thing is it has a very short [half-life](#). And this has complicated experiments where people intranasally administer oxytocin, and then have a

subject play a trust game, or one of these neuroeconomic games. Because of the short half-life, we actually don't know how much of the oxytocin that's sprayed in is effective.

It's also still not exactly known what the route is from the nasal mucosa to those areas of the brain where there are receptors for oxytocin. So, I think we're at a very early stage in the experiments, and a lot of care and caution—and skepticism, actually—is appropriate at this point.

Dr. Campbell: That's why, when I read about these experiments, I tend not to focus on the specific results; because, obviously, they're being generated in artificial conditions. Real life is much more complicated.

Dr. Churchland: Yes.

Dr. Campbell: It seems to me like the take-home message is that complex behaviors like cooperation are rooted in neurobiology and the chemistry of the brain. That's what we need to know—not that we have all the answers of how it works, but that it's where it comes from—because that has enormous implications for understanding both normal behavior and pathology. But we have to be careful about exaggerating the extent of our knowledge.

Dr. Churchland: I think that's absolutely right. And it is such an exciting result—the result from the prairie voles and the follow-up on that work—that people do sort of hastily begin to think in these very imaginative and creditable ways.

But, as you say, cooperative behavior is very, very complex; and the idea that it's all about oxytocin, or all about the endogenous opioids, is just not on. There are many, many interactive effects, and we're only barely beginning to realize what they are, let alone what exactly is the nature of those interactive effects.

I think the story is important for the reasons you mentioned; and that is that it gives us a feel for how it's possible to have things like cooperation, and altruism, and self-sacrifice, and so forth. But it's a very different business to understand that behavior in detail.

Dr. Campbell: But it does sort of give you some insight into why, since we're social animals, we have such a strong desire to fit in and not be rejected—so, why it feels good to cooperate and it feels bad to be rejected, that's a physical thing—and why it's so hard to take a stand against your culture, even if you happen to be in a situation where you feel your culture is wrong.

Dr. Churchland: I think that's right. Banishment is extraordinarily painful. Even those people who tend to be a little bit... we call them 'loners,' but they're still very much a part of the social group, they're just not as intensely social as other people.

Disapproval has a powerful effect on individuals—at certain times in their lives, more so than at others. So, as adolescents are trying to achieve independence from parents, the approval of peers becomes incredibly important; and it often leads them to do things which, in later life, they may regard as unfortunate.

So, it does give us a bit of an understanding about the biology of ourselves that makes us social, and really underlies the many, many ways in which social behavior is manifest in humans and in other animals.

Dr. Campbell: Maybe it can also help us to be... Sometimes we need to be more tolerant; and also maybe give ourselves a break.

Dr. Churchland: Well, I think that's actually a very good point, Ginger. There are occasions when people think that the way their group does it—their particular social practice—is the only right way of doing things.

Once you have a slightly broader view, you can see that you may still disagree, and you may come to a different conclusion about something (like abortion, or contraception, or what have you), but that there is another point of view of which you may want to be tolerant, so that you can do what successful groups do; and that is negotiate an amicable solution—that fighting over things like ideological religious beliefs is usually unrewarding, and that it's better to find a way of negotiating, peacefully and amicably, a solution which may not be perfect from the point of view of either side, but may be workable; may be serviceable.

So, I think that this particular perspective may actually—if people come to appreciate it—may have the effect of making us more tolerant.

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The *Brain Science Podcast* is sponsored by [Audible.com](https://www.audible.com), the world's leading provider of downloadable audio, including many of the books featured on this show. Unfortunately, Dr. Churchland's book is not available, so I'm going to suggest another recent book about the brain: [*Who's in Charge?: Free Will and the Science of the Brain*](#), by Michael S. Gazzaniga. If you aren't already an Audible member, you can download this or any other book for free, by going to audiblepodcast.com/brainscience.

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Dr. Campbell: That brings me to another piece of this; which is the role of learning and prediction. It seems like whatever becomes familiar to us is going to feel more comfortable.

Dr. Churchland: Absolutely.

Dr. Campbell: So, we automatically think our culture's way of doing things is right. If you go to another country and they do something...

Like I don't understand why there aren't any shower curtains in Italy. I mean that just drives me bonkers. It obviously has no moral significance at all, but it just feels wrong. And if we can make the leap to the fact that that strong feeling that that's wrong, is probably the same circuitry that's driving most of what we think is right and wrong, that we do call morality.

Dr. Churchland: I think that's absolutely spot-on: that our consciences are formed when we're very young; that often the learning is below the level of awareness (we implicitly pick up certain social practices; but sometimes we're also instructed); and that the reward system sees to it that we feel bad even contemplating certain kinds of things.

As you say, when you are in another culture and, for example, belching is considered an acceptable thing to do, you don't sort of rear back in horror; you say, *Well, you know, I probably feel that belching is really an embarrassing thing to do, but that's probably because of how I was brought up.*

I still have a sort of *frisson* if somebody licks their knife at table; and that's because my parents were very strict about table manners. But I know that it doesn't mean beans; that it says nothing about the individual's moral nature.

This also brings me to another point, which is that I tend to see morality as kind of one end of a spectrum, where conventions and etiquette are sort of at the other; and that there is no sharp division where social practices cease to be mere etiquette, and become moral. I think that moral values are the ones that bear upon issues that are more serious, like life and death, and child neglect, and so forth, whereas the social ones, we often use to distinguish ourselves, in-group from out-group—you know, *we wouldn't lick our knives, but those guys would,* and so forth.

And, truth be known, many of these social conventions are very important to give people the feeling that they belong to *this* group. And belonging to *this* group turns out to be a source of pleasure; it's a source of value. And, my God, I mean you can see this if you watch football, and the get-ups that people wear because they are Oakland Raiders fans!

Dr. Campbell: Well, I live in Alabama; so, believe me, I understand about that one!

Dr. Churchland: Oh, yes! The investment in clothes, and shenanigans, and... It's astonishing to me. But, obviously, people are deriving great pleasure from *I am part of this group, not part of that group*.

Now, of course, we worry when that gets out of hand, and people actually attack the other group, and so forth. But this feature of group bonding is obviously tremendously powerful. And being able to step back from it a little bit from time to time, and say, *Yes, my conscience leads me that way, but heck, you know, it's just a convention; the Raiders are probably just as good as any other team*.

Dr. Campbell: I hope this gives my listeners a taste of your book, because we've just barely scratched the surface. Before we close, I want to back up a little bit, and take a slightly bigger view. Since you're one of the pioneers of this field of neurophilosophy, and you've seen it go from nothing, to a vibrant, growing endeavor, I want to ask you just a couple questions about that.

What is the most surprising thing that you've seen come out in neuroscience, or its interaction with philosophy?

Dr. Churchland: Well, perhaps because I'm sort of so focused on social behavior right now, I certainly find that a really remarkable thing.

But, you know, I recently did a program with [Eric Kandel](#) and several other people, for the [Charlie Rose](#) show; and we were talking about consciousness. And I think some of the developments there are very fascinating.

I think [Nick Schiff's](#) work, for example—on the intralaminar nuclei of the thalamus, and the coordination between brainstem structures, the central thalamus, that sort of bagel within the thalamus, which kind of juices up the cortex, and provides the necessary conditions for being aware of anything—I think that's an incredible hypothesis.

It's a hypothesis that really surprises those people (and, believe me, there are many, both in philosophy and neuroscience) who say, 'Oh, the problem of consciousness is so complex, nobody will ever understand it; it's forever a mystery; blah, blah, blah.' Actually, progress is being made on that.

There's also been progress in understanding the difference in the brain when you're aware of a perceptual signal and when you're not. And we can see that more anterior regions need to be cranked up in order to be aware of a specific content. So, you have to have this background preparedness, that is the job of the intralaminar nuclei; but then, specific contents—hearing this, seeing that, feeling this, smelling that—those are the job of a coordinated pattern between the sensory areas and more anterior areas of the cortex. So, I think that's incredible.

I think the work on decision-making and the brain just gets more and more interesting—work that began in earnest, I guess, with [Bill Newsome](#) and his group, and then [Mike Shadlen](#), and others. I find that a really remarkable set of discoveries.

So, that's kind of a start, anyway.

Dr. Campbell: I noticed when you started that you mentioned the important role of [experimental psychology](#).

Dr. Churchland: Yes.

Dr. Campbell: And that really interested me, because—and I’ve mentioned this several times on the show recently—I got a comment from a listener who seems to feel that neuroscience will make psychology obsolete; and I just don’t think that’s the way it works.

Dr. Churchland: I don’t think it’s the way it works; I think we are always going to need high-level descriptions. So, certainly experimental psychology in the social domain, I think has been very important in showing that there are certain kinds of processes that are not conscious—that we’re not aware of—but that may nevertheless guide behavior. Unconscious mimicry is one particular example.

One area where I think you can kind of see this holding-of-hands between experimental psychology and neuroscience is the studies on the so-called ‘default network’ (these midline structures, that seem to be particularly active when we’re off-task, and thinking about our past, or what we’re going to do next—you might call it ‘the worrywart system’), and the on-task structures, elsewhere in cortex; and its shifting between the two of them: that is something where the study, at the psychological level, of the functions that activate the midline structures (the default network) and contrasting them to the others, is very important for those people who are doing the basic neuroscience.

And so, that seems to me to be one of those really interesting cases where you get a connection. But, of course, you also do in the case of memory. The studies, both of [spatial learning](#), but also studies of the [declarative system](#) have depended hugely on hand-holding between experiments devised by psychologists and studies performed by neurobiologists. So, it’s quite possible that, as neuroscience and psychology co-evolve, new ideas about how to describe psychological capacities will emerge.

And it may be that what some of your listeners are sensitive to is that idea—the idea that some of our psychological descriptions, like ‘the will,’ for example, may not be honored by the neurophysiology and the neuroanatomy; and that we might find different ways, or different descriptions for capturing both what the psychological phenomena are and how they are instantiated in the neurobiology.

And I know [Russ Poldrack](#), who’s now at Austin, worries a great deal about how much of our psychological vocabulary will fall gracefully, so to speak, onto the neurobiology, and how much will have to be sort of modified a little bit, in order to get a fit between high-level and low-level descriptions.

Dr. Campbell: When I was interviewing [Carol Tavris](#) recently, she made the point of the distinction between the [clinical psychologist](#) and the [experimental psychologist](#); because a lot of clinical psychologists are more interested in what they think works, and sometimes they’re not so caring about whether their model has any reality in the neurobiology.

Dr. Churchland: Yes, that’s actually true, I think, that clinical psychologists are really up against dealing with people who need help, and sometimes the models they use really don’t look terribly plausible from a neurobiological point of view. And I think sort of way out on the edge of that spectrum there can be people who use really fanciful methods; and, of course, famously, using hypnosis to suggest various things to people—to suggest that they’ve been molested in the past, and so forth. And those have not worked out well.

I mean, in one way I sympathize with clinical psychologists, because they have a very tough job. And the people they are dealing with are typically people who are suffering; and the need to find a way of helping them is over-riding. On the other hand, it always seems more productive when the models, at least to some degree, line up with, or are consistent with what we’re learning in neuroscience.

Dr. Campbell: And the flip side of that is I think that the neuroscientists need the experimental psychologists. Especially an example that is becoming more and more obvious to me, is in the use of imaging; because it is just too easy to draw conclusions from imaging that aren't really supported if you don't have good experimental design.

Dr. Churchland: That's absolutely true. Especially in the early days, when everybody was just very excited about this wonderful new technology, there were lots of pretty meaningless experiments. Again, if I may refer to this *Charlie Rose* program on consciousness, Eric Kandel—who was really wonderful in this program; it was really structured, I think, around his ideas—made the point right at the outset that neuroscience and experimental psychology need each other.

We need to know in fine-grain detail what the psychological phenomena are that need to be explained; and so, there has to be this kind of co-evolution between experimental psychology and neuroscience. And I think it's been spectacularly successful in the case of vision, where [visual illusions](#), for example, have been used, or where [binocular rivalry](#) has been used, as a way of probing consciousness in the brain.

And masking is another example, where you can use masking to inhibit a signal, so that a person is not conscious of it; and then you can compare the activity in the brain with when the person is not conscious of the signal to when it is conscious of the signal. So, that's a wonderful example—[Stan Dehaene](#) uses that—and I think it's a wonderful example where psychology and neuroscience work hand-in-glove. And you can take a wonderfully strong and interesting experimental paradigm from psychology, and apply it in the case of neuroscience, and you can get a really interesting result, as Dehaene has.

Dr. Campbell: This is really an exciting time to be following this field, because there's so much going on at all different levels. What do you think is the greatest challenge facing the field—from your perspective?

Dr. Churchland: Well... Oh gosh, that's hard. Charlie Rose asked that question, in the context of consciousness; and so, I have been thinking about it in the context of consciousness.

But I think one of the fundamental things we really, really do not understand is how information is integrated; how it is that [top-down signals](#) can affect bottom-up signals, for example in vision, such that you see illusory motion. How does that work exactly? Or how is it that signals can be integrated across modalities, so that you can see something as a barking dog, and so forth?

So, I think the question of information integration, and how then that feeds into decision-making, remains a very deep and a very compelling problem that we need to solve in order to be able to move past just these very general hypotheses that say a certain area is highly active when a person is cooperating, or whatever it happens to be. What we want to know is how that can be; how is it that stored information plus ongoing perceptual information gets integrated so that I see something as a man chopping down a tree? How does that work? So, for me, integration—information integration—is a huge problem.

Dr. Campbell: Is there anything else you want to share before we close—something important I left out from what you were trying to achieve with your book?

Dr. Churchland: I think we've really covered most of the bases, Ginger. I can't think, off the top of my head, of anything else that I want to add. Your questions are great!

Dr. Campbell: What about students that are thinking about going into this field at this point in time—any advice for them?

Dr. Churchland: In the domain of social behavior, I think there are a variety of ways that you can go. Working with a [social psychologist](#) is certainly one.

I think they work that's carried out by field [anthropologists](#) is absolutely fascinating. So, [Robert Seyfarth](#) and [Dorothy Cheney](#) were recently at a meeting I attended—a [neuroethics](#) meeting just prior to the Society for Neuroscience in Washington, D.C.—and their new data from the field, on cooperative behavior amongst baboons and chimpanzees, is really quite fascinating.

And one of the things that's beginning to emerge now is that captive chimpanzees, put to cooperative tests, may fail; and yet, the field anthropologists are seeing quite a lot in the way of cooperative behavior. They see it in food sharing; in care for the young; they see it in the hunt.

Actually, [Chris Boesch](#) has an extraordinary result, where he showed five instances—this is in the Ngogo region—where male chimpanzees, unrelated to orphan chimpanzees, nevertheless took them on, as fathers, and taught them how to crack nuts, and let them ride on their backs, and so forth. And this is something that I think we find very surprising; and yet, field anthropologists are seeing this. So, I think field anthropology is another wonderful area.

In addition, of course, the [archaeologists](#) are continuing to find remarkable things that bear upon the very earliest days of human life in Africa. The discovery that it looks like Eurasian humans mated with Neanderthals is something that I find absolutely fascinating.

Field [linguists](#) also do really, really interesting work.

And then, of course, there is work to be done in neuroscience. And neuroscience has such a wide range of programs, and topics, and problems, and so forth. So, I think there are many things, even just in the domain of [social neuroscience](#), or sociability, that a student can do. And it's all exciting; it's all fun.

Dr. Campbell: One of the most surprising things to me, from doing this podcast—which I've now been doing for five years—is the emails I get from students. That's wasn't really my original imaginary target audience.

But sometimes they're worried that their particular background, or whatever field they're already in, is not a good one. But it seems to me that the field is so diverse, that just about no matter what your background is you could have something to contribute; and there is a direction you can go that you don't have to force yourself into a little square peg. There are just so many different ways you can get involved.

Dr. Churchland: And if you want to learn a field, a sub-field, you just learn it. If you have a reasonably good mathematical background, you can go into any of these areas. And if you're determined, and you're energetic, and you're ambitious, you will pick it up. It helps to have some math. In order to analyze papers, and to understand the statistics, you really need that.

I've seen psychologists go into neuroscience and thrive. I've had several philosophy graduate students who have shifted field, and thrived—unbelievably. I had one student who was interested in existentialism, and phenomenology, and so forth; and then one summer he went to work for [Bill Kristan](#), who works on the leech and decision-making in the leech.

And Eric just fell in love with the work; and he changed fields, and now he does brilliant work in neuroscience. And he still brings, I think, some ideas and thoughts from his philosophical background; but he didn't need to have even a

biology degree in order to make that shift. I think if you're determined, and you really want to know stuff, you just work at it, and you'll learn it, and away you go.

And actually, sometimes (I'm sure you know this; but this was something that [Francis Crick](#) used to remark upon) it's the people who come from outside the field—who haven't been immersed in it from the ground up, so to speak—who bring new eyes to it, and see it in a slightly different way, a slightly different slant. And they sometimes end up doing things that are really wonderful, and wonderfully surprising.

Dr. Campbell: Just like the way younger scientists tend to make the biggest contributions, because they're not steeped in the dogma yet.

Dr. Churchland: That's right.

Dr. Campbell: I mean even science has its dogma. We're humans. I think that's part of being human.

Dr. Churchland: That's true.

Dr. Campbell: So, what's next for you, Pat?

Dr. Churchland: Well, I'm continuing to work on social neuroscience. And I have another book of a more, sort of general sort, on the go. But I don't want to bring myself bad luck by talking about it too much.

Dr. Campbell: OK. Well, I sure appreciate you taking the time to talk with me again. It's been great.

Dr. Churchland: Any time. It's always a pleasure, Ginger.

[music]

I really enjoyed talking with Patricia Churchland again, and I highly recommend her book, [*Braintrust: What Neuroscience Tells Us about Morality*](#). She starts out the book by presenting a little historical context. After all, ethics and moral philosophy are extremely old branches of philosophy. Fortunately, Churchland is one of those rare philosophers who writes in a way that makes philosophy comprehensible to the rest of us.

I think this part of her book is extremely valuable for providing a context for examining, not only her hypothesis that moral reasoning is rooted in what she calls ‘the caring mechanisms of the mammalian brain,’ but it is also helpful for understanding why many philosophers have been so critical of Sam Harris’s book, *The Moral Landscape*—which I think is still worth reading. And, of course, the rest of the book discusses the actual neuroscience, and how it supports the hypothesis that we talked about briefly in today’s conversation.

During the interview, Dr. Churchland mentioned the work of quite a few other scientists; so if you are interested in learning more, I encourage you to check out the show notes at brainsciencepodcast.com. In fact, this is the perfect opportunity for you to check out the excellent work that Lori Wolfson does with transcription. The [transcripts](#) are free, and she usually adds a link for every person that is mentioned.

Of course, these transcripts are made possible by the generous donations of listeners like you. So, I want to take a moment to thank you for your support. And if you’ve been meaning to donate, just remember that there’s a button labeled ‘[Donations](#)’ on the blue banner at the top of the website.

Even if you can’t afford to support the show financially, you can help by telling others about the show. Tweet a link to the show notes; blog about it; or leave a review in [iTunes](#). Every little bit helps.

I want to remind you that there are several ways you can post feedback about this episode. You can send me email at docartemis@gmail.com; you can post to the [Brain Science Podcast Fan page](#); or the new [Brain Science Podcast Google+ page](#). We also have a [Discussion Forum](#) at Goodreads.com. You'll find links to all these, and more, at brainsciencepodcast.com.

Thanks to Lori Wolfson, we have recently added a new feature to the website; one that has been needed for quite a while. There have always been pages that list all the episodes and all the guests, but now we have a [Bibliography page](#) that lists every book that has been featured. You can find this Bibliography if you hover over the word 'Episodes' on the blue bar at the top of every page; or you can just put 'bibliography' into the Search Box at the top of the right sidebar.

OK, now for the announcement many of you have been waiting for: how to win a copy of *Braintrust: What Neuroscience Tells Us about Morality*. Over the next several months we will be conducting an audience survey; and to encourage participation, you will have the chance to enter a drawing for one of several free books, including *Braintrust*. All you have to do is submit your email when you do the survey. Of course, you can do the survey anonymously, and that's perfectly fine; but only submissions with emails will enter the drawing.

Listener [J.j. LaTourelle](#), has been helping me put this new survey together, and I'm not sure whether it will be ready when this episode first airs. I will post a new link in the show notes and on the website as soon as the survey goes live. Just be sure that if you follow an audience survey link on the website, that it's not a link to the old Wizzard or Podtrac surveys. This new survey is on the *Brain Science Podcast* website; it shouldn't take you to another place.

Finally, since the *Brain Science Podcast* is a monthly show, I want to remind you that you can get show notes automatically if you sign up for the *Brain Science*

Podcast [newsletter](#). That way, you'll know when a new show comes out, and you won't miss an episode.

So, until next month, don't forget to tell your friends that the *Brain Science Podcast* is the show for everyone who has a brain. And don't forget to check out my other podcast, [Books and Ideas](#), which is also available in [iTunes](#).

Thanks again for listening. I look forward to talking with you again soon.

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