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**PROFESSOR:**

I'd like to try to cover two chapters in the book today-- not too much more of the sociobiology book. But some pretty interesting things still to talk about. So what does what's the brain to a sociobiologist? They say it's a reproductive organ just like every organ that any living thing is born with because they evolve by the processes of natural selection largely. And that's based on the maximal transmission of genes. So that's what they assume.

So what would be the long-range evolutionary outcome if most people really had blank slate brains at birth? What would happen? If you take a society where everybody had blank slates-- everything was learned-- a common assumption when people have babies.

So Alcock goes through a little thought experiment and he argues, I think pretty well, that they'd be taken advantage of. They'd be exploited by variants who had more targeted brains evolved to basically be more selfish and so forth. And so with genetic variation totally blank slate individuals would decrease and disappear. He talks about how that would happen and why it would happen. And he quotes Noam Chomsky there, "The blank slate brain is a dictator's dream." Yes, you would have dictators arise and take advantage of such people. Just educate them the way you want.

All right, so let's go back to a topic from Scott's book about conditional strategies. And they say they are common in humans. Do you remember a conditional strategy in an insect that Scott-- I think Scott talked about this one? No, maybe he talked about a different one. Alcock talks about a dung beetle. It shows that the pre-programming of behavior is not rigid. It can be conditional.

So he talks about the rove beetle that he actually did some studies of. He went to Costa Rica with another scientist and did these studies. It feeds on flies that collect at dung on the forest floor. The large males are territorial. They have very big jaws. And the smaller males seemed like they wouldn't stand a chance. They can't really fight with those big males.

So what they do is they mimic female behavior. And they're actually courted by those big males. And while they're being courted, the catch flies and mate will females. The very same males though as they get bigger can change their behavior. They can change to male behavior. So it depends on the situation.

In other words, they're programmed the same way. But it's conditional upon how big they are-- how much they've grown. And we've seen that in iguana. We've seen that in other beetles. This is the rove beetle. And see the dung beetles are very appropriate. They look like a piece of dung and the one on the left especially.

But they're called that, of course, because that's how they see they feed on the flies that come to be dung. OK, so this is just what we said. Now, what about learning mechanisms? People like to think we learn everything. But learning mechanisms themselves have evolved in order to increase fitness. And so as a result, there's many different kinds of learning. And they've evolved too.

And we can give examples of a kind that has evolved that's very different from other kinds. This was again in Scott's book. It's called conditional taste aversion or the poison bait effect. It just proved. And it actually caught a lot of attention when Garcia, who lived in California and made this discovery when it was first reported in the literature because it showed that Skinner's universal laws of enforcement learning are violated.

It just doesn't work the way other the kinds of learning. You should know how it's different. The unconditioned response is they are getting ill from the effects of the poison. You know? And it doesn't have to occur right away whereas in experiments- - Skinner's and other people that did research on this-- it has to occur quite quickly.

And one way to show that is that there's different kinds of negative reinforcement or negative reward that can have very different consequences on the learning of food preferences. So if every time they ingest something you give them an electric shock, you should be able to create a food aversion, right? It actually doesn't have very much effect on their future preferences.

But if you take the same food-- a neutral food-- something that they normally would eat. But you then expose them to X-rays that make them feel sick. You do that after they eat or drink something. It results in avoidance of that substance subsequently-- very different effects. It's that feeling of nausea-- a feeling of illness which doesn't have to occur immediately that makes them avoid that food.

It works best if it's a novel food. And we talked about that when we were discussing the Scott book. So we want other examples of channeled nature of learning abilities specific for humans and see if they're similar in animals. By channel, we mean specific kinds of learning that have evolved in the species. And these are the ones I could think of.

Some of them are very obvious-- language acquisition-- our ability to anticipate the actions of others with a sense of other's intentions based on what we attend to and learn-- often studied in this department by Laura Schulz and other people. Learning of faces for later recognition? Yes, it's very special in humans. And we've evolved a special part of the brain that specializes in face learning.

So do we share these abilities? Well, language acquisition-- the only animals we know that have something similar is the song birds in their learning of singing of songs. And that's not the kind of language we're talking about when we talk about humans. But it does have some similarities in the nature of brain mechanisms-- hemispheric dominance, for example.

What about this ability to anticipate the actions of others? Particularly important in social life. We have a sense of what other people are intending to do. Are other animals like that? Well, certainly the other primates-- the social primates and apes are able to do that very well. And there's some evidence that in fact many other

mammals can do that. But it does require neocortex or in birds the neocortical equivalent homologous structures-- the hyperpallium and nidopallium.

And learning of faces-- there have been studies now of those particular areas of the primate-- the infratemporal cortex seemed to be involved in face learning-- learning human faces and monkeys faces. There's other specific abilities that have evolved much more in some animals than others-- bird song is one example in the sparrows and finches. Some birds that cache their food and have to remember where they put it that's evolved very differently in different bird groups.

Even in the same genus, you find birds-- some do are very good at it. Some are not. And they don't do it in their food foraging. And their brains are different. The hippocampus, in particular, is different. You could say maze learning in rats is something they've adapted specifically for so well that they often outperform college students in maze learning. And they just have that pretty small little brain.

So why do humans engage in behaviors that seem to reduce fitness? And this has led to a lot of arguments. Some of them against-- are taken to-- they take the arguments to be against all of sociobiology. But remember, we talked about these things as Darwinian puzzles. And that's one of things that sociobiologists have done a lot of research on, assuming that they did evolve to increase fitness. But they may no longer do so in the current environments because we didn't involve the major period of our evolution.

It's very different from modern life. And we talked about pet love previously. What about alcoholism? Why do so many people have a propensity to overindulge in alcohol? Not everybody does. And there are genetic differences in the people that have the tendency to become alcoholic. But why would that have evolved? Why would there be a gene that effects it? It must have had an adaptive function.

Well, alcohol didn't used to be available in concentrated doses that you can go down to a liquor store and buy it-- or even at your grocery store. Those weren't the conditions that were present in most of our evolution . And what did alcohol mean to those people living in small groups and during hundreds of thousands of years?

Well, it meant ripe fruit that produced some alcohol. So they ripen-- it means sugar and ripe fruit that provides good calories and energy.

Altruism, of course, as we've talked about studied by Trivers and Alexander and other people, especially they talk about reciprocal altruism, which gives a reason why it would evolve supporting reciprocal altruism in genetic related people, but in unrelated people too. And that's why the reciprocity seems to have evolved because people that benefit from others help are more likely to return that later. And also there's a value in reputation for being charitable.

What about use of spices and an even more difficult one, reductions in family size? Something we call the demographic transition where fertility rates have declined in some countries since the late 1800s. In some sense, the early 1900s. So let's talk about those two things. Many people thought for a long time that spices seemed to be a human luxury. It was treated that way. And yet, they are used-- they have such a widespread use. And people place great value on spices so much that it led to some of the early trade routes between East and West.

It was treated as a Darwinian puzzle. But then studies were made. And there's a nice figure in your book that shows their antimicrobial properties. It's a very interesting table. You see on page 179 huge numbers of spices that all have-- some of them kill almost 100% of the bacteria there. The one at the top of the list is garlic. You kill everything in the food.

It's as good as cooking. So if you cook and add garlic, you don't have to worry about bacteria. But there's many others that are pretty high on the list there. And at least a dozen that kill more than 75% of the bacteria in studies that have been done. And I just wanted to point out there's other things besides anti-bacterial actions of things that people consume that are additives, nevertheless, and not necessary to get energy from the food.

The Masai and Batini tribal peoples in East Africa use additives that lower cholesterol. They add saponins and phenolics that reduce their cholesterol and reduce that harmful side effect of very high fat diet that they eat. All right, so let's

talk about the other problem-- the greater one really-- the demographic transition. It was a big Darwinian puzzle. There's been a lot of arguments-- big literature on it.

It's the decline in fertility. They looked at a number of different European countries that have been keeping records of births in their whole population in census taking for a long, long time. And the interesting thing about the demographic transition is that change to reduce fertility began well before birth control-- modern birth control methods developed.

It's not that there were no birth control methods. They were available in ancient times. There were herbs that could be effective. But the availability of all the convenient ways we have for birth control did not develop. And, yet, we still had this population decline. So this is the way people have tried to deal with that-- sociobiologists.

There were evolutionary advantages of timing of pregnancies. Getting pregnant too soon after a birth could reduce the chances of survival of the earlier born individual. And spacing had a great advantage. And, of course, there were advantages of acquiring wealth to pass on to children and grandchildren and increase their chances-- their genetic fitness-- their chances of surviving and reproducing.

Alcock doesn't deal at all with the effects of overcrowding. And there's a lot of overcrowding in these parts of these countries that he's talking about. And certainly the animal studies of that, which have not been common. The best studies were done many years ago on rats that showed very clearly reductions in fertility and effects on the immune system in general so that they had more illness.

And, also, I think it's probably important to realize that humans evolved under conditions of limited communication-- relatively small group sizes. So with the coming of rapid, long-distance communication and awareness of population sizes and their consequences, which has happened only very recently in evolutionary time. It certainly in highly educated peoples has an effect or at least could have.

Then Alcock goes into another area that's been really controversial-- stirred up a lot

of anger and everything. The way sociobiologists have studied rape. And this is an appendix question. And he quotes an argument against sociobiological ideas that rape is not very common. But it's common enough to assume there has to be some adaptive value or it would not exist at all.

So this person argues that a substantial proportion of rapists failed to ejaculate in the victim. So does that refute sociobiological explanations of rape. This is a feminist-- Barbara Ehrenreich. She says that children sired by rapists in the past surely were more likely to die than those of paternal non-rapists. So rape cannot possibly be an evolved adaptation. She was quoted in the popular press for that.

So was she right? And why would she make such a claim? Well, actually, well, think of the two-thirds that don't fail to ejaculate. So it's certain that argument certainly does the argument that a third of them don't doesn't refute sociobiological explanations at all. And as far as Ehrenreich's comments, the fact is many of them do survive. She may be making the claim because she does not want anyone to consider rape as natural.

So we will deal with that. What does it mean to say something is natural? And is that any argument? Is that any moral argument? We'll certainly argue that it is not? Of course it depends on what you consider natural or not. So first of all, it's not a natural behavior in that it's common. It's practiced by only a small minority of men-- usually men-- an occasional woman. Hence it's not natural in the usual sense if by natural we mean common in a species.

In some species, forced copulation is very widespread. And, in fact, some of the literature on this does call this rape. We talked about that-- forced copulation and traumatic copulation in many animals. But I also note, and Alcock notes, that it becomes more common in humans under certain conditions like wartime-- wartime conquests. So it could in that sense be considered a conditional strategy, however abhorrent that may seem. All right?

So another issue is another appendix question. If men and women differ in how much they invest in parental care, is it strictly because of the nature of societal

influences they experience when young? Which is what has been argued. Hasn't that shape their view of appropriate sex roles? How would you test it?

This is what you'd have to do. For one thing, you could do-- we want to know if all male-female differences in parental care are learned because the statistics are overwhelming. Women spend much more of their time in parental care. Cross-cultural studies-- why is it that nearly all cultures are similar in this? I didn't say all, but most. There are a few exceptions.

What about twin studies? Are variations in parental care genetically influenced? See, I don't know the answer to that one. And there are also-- in fact, this has occurred in scientists there's a deliberate attempt by caregivers to influence children-- to care more about taking care of children. What do you think the outcomes has been? Actually it doesn't make much difference? There is still big male-female difference.

Another appendix question-- the reactions against the hypothesis that men have a predisposition to seek out multiple sex partners of high fertility in Lewontin. He simply gives his own example. I am a man. I don't go around screwing young girls. I am human. So I have to be explained.

So what does a sociobiologist say? It's not about exceptions. It's about the more general rule. And some men claim loudly that they are monogamous. How do you deal with that? We already dealt with Lewontin. Why might he do this? Well, that can be helpful to him. It can convince his mate to be monogamous too. He wants to have-- she'll have only his kids. It may give the man more influence or power in social groups.

And when these people that talk loudly about it, you begin to get suspicious. And we see examples of this in the news too often. They do it because they're covering for something they actually are doing. I know some of these things would be nice to explore a little further. But I want to go through both chapters.

So let's deal with a few of the practical issues in thinking about and collecting data



on adaptations. Let's first talk about the misuse of scientific findings or claims in service of political goals, including things concerning sociobiology or Darwinian theory. And sociobiologists, of course, are Darwinian theorists who are using Darwinian theory as their major tool.

So we have the eugenics arguments. The Nazis claimed that their racism and even genocide was based on genetics. And then in the 19th century, there was Social Darwinism-- lot written about it. It was used to justify dominance and superiority of the rich. And then, of course, the claim that infidelity is natural, therefore understandable, therefore justifiable.

We'll come back to that. Similarly, claims justifying the subjugation of women. All of these arguments have been made using scientific findings. But the arguments have always been flawed. So let's talk a little more about this. First of all, I want you to be able to see that just the way things are stated makes a big difference.

Let's summarize sociobiological findings stating, first of all-- make it sound like people ought to behave in a certain way. And then restate the finding in a more objective way because there's more objective and less objective ways to state these findings.

So, for example, take this statement. It is natural to being male for men to want to have power and dominance over others, including women. You say it like that. It sounds like it's approval. You approve of that or justify it in some way. But you can restate the actual finding. Men more than women have a tendency on average to strive for positions of power and dominance.

Perfectly true, OK? But now it doesn't sound like-- you're being neutral. You're presenting a finding. A related thing using equating natural and good. I often tell my kids you go through a supermarket. And you read in these big letters all natural. It doesn't make it good. You know?

Well, evolved traits have helped keep certain genes in the gene pool not because it was good for the individual, good for the group, or good for the species as a whole,

but just because possession of these traits happen to be correlated with success in gene propagation. So no moral lessons can be drawn from the unfeeling blind process of natural selection. Come back to that one too.

Medical issues-- an example of medical issue-- medical issues that can be illumined by sociobiological ideas-- take an adaptation approach. And these are things I can think of. Alcock discusses morning sickness. And there it's probably a little easier to understand how that could be adaptive. It seems horrible. Why should the woman get pregnant and have to go through this horrible thickness is much greater in some women than in others?

But when they get morning sickness, for most of them, it's in the early period when that fetus is most vulnerable to the things she eating. And this keeps her from eating any really strange foods or particular kinds of foods. They also have very particular taste and probably signal some nutritional need.

So that's the first one. And there have been studies of this that indicate that this is true. What about fever and pain? First of all, there have been some studies of fever. And we get fever when we have an infection. All right? Is that benefiting the body? There is some evidence-- there have been some studies that in fact it does improve the ability of the body to fight disease.

But, yes, it can get out of hand. What happens say if a child gets a fever that runs up to 105 and higher? You know what can happen? I used to run fevers really high. And every time I got sick when I was a little child. What did my parents do? Well, they start putting cold packs on my head. They tried to cool me down. And I don't think they realized why they did it. They did it because it was a tradition in their families do this when you got very high fever.

But what can happen? Seizures-- febrile fits. OK? And febrile fits in the very young can cause brain damage. They can wipe out part of the temporal lobe-- the amygdala in particular. So they get dangerous. But fever did evolve before biological, adaptive reasons.

What about pain? Why do we have to suffer so much? Pain can be horrible, right? Well, take someone who has a congenital absence of pain. What are they like? They usually don't even survive to your age because they keep getting injured.

They don't even change positions. They don't become comfortable enough to change positions when they're sitting or lying down. So they end up with circulation problems one after another. It takes a lot of extra care and help from others to survive that condition-- the absence of pain. It serves a very useful functions. I wonder sometimes when it comes to tooth pain. [LAUGHS] Pain in general is very adaptive.

So let's talk about how studies-- we brought this up before. How do comparative studies help us understand some of these issues? Why are studies of the behavior of the white-fronted bee eaters, birds, relevant to human behavior. These are birds that have helpers at the nest.

Both species have families that persist over long time periods. So they had similar selective pressures. Helping by helpers at the nest is by offspring, usually full siblings sharing about 50% of the genes with the ones that they're helping take care of. So they are improving their genetic fitness in that sense. So we can ask questions like, well, how beneficial is the helping? And this has been studied extensively in the white-fronted bee eaters.

And in that species because of the habitat they live at-- there's a figure on page 198 that goes through this. Just to get one surviving chick it takes three adults to bring enough food for it because the adults have to feed themselves too. So they don't have much extra to give to the baby. And that's why two adults usually can't succeed in keeping one chick alive. And it takes five adults on average to have two surviving chicks.

So two and a half for one-- that means three. But there's conflicts that arise. And this happens in the birds. It happens in humans. The fathers have conflicts with the male offspring that are helpers at the nest. And this can vary a lot. But it does happen.

And what happens if the female mate dies? And there's a helper at the nest. Well, if the male gets another female mate, what does his male-- how does his male respond? Well, he will continue to take care of chicks if there still is full siblings. But when he starts having more, it's very common for the male helper at the nest to leave-- go off and form his own nest.

They generally don't like to take care-- on average they don't stay around to take care of siblings where they share less than half the genes because it goes down like 25% if they're step-brothers and sisters. So the answers to all these questions have parallels in human behavior.

And one of the ways I think you'll be interested in the studies of human marriage and step families-- predictions from the kind of thinking we've been using and they found that, for example, there's more conflict within step families-- a lot less stability at least in the cases when children are involved. They're not saying there's generally more conflict. But when children are involved, there's generally more conflict.

The most dramatic thing I think is studies of child abuse. Sociobiologists have examined the records of people in families where child abuse has occurred. And they've looked at the frequency of criminal child abuse in families. So if you separate then the child abuse in families where the children are the genetic offspring of both parents and ones where only one parent, they're related to only one parent-- so they have a step parent-- there's much greater child abuse by step parents. And there it's mostly by step fathers.

You'd have to look at the curve there on bar graph on page 202 because the differences are really dramatic. They are huge. And then finally, you can look at divorce records and the more stepchildren there are, the greater the divorce rate. So these are just things you can collect by doing statistics on these records. And these are the findings.

Alcock also goes through male-female differences in various abilities. And I'm

asking here what differences aren't mentioned by Alcock. So I just want to mention a few of these differences in verbal abilities where women tend to have greater verbal ability on average. Spatial abilities-- and, again, you're going to find clear exceptions. But they are on average-- they're greater in males. Linear logic, quantitative analysis, computer programming-- tend to be greater in males.

There's a nice study at MIT of this because about-- the study female programmers compared with men. And they examine the programs in detail. And they found out that, yeah, women don't use quite the same logic and so forth in their programs. But their programs work just as well. And then differences between social and emotional intelligence and other kinds of intelligence generally social and emotional intelligence and sensitivities are greater in women. I've talked about it, briefly, we'll talk about again when we talk about primate social life.

So what is the naturalistic fallacy? I eluded to it earlier today. It's often made by people, including some scientists, who are opposed to sociobiology. The naturalistic fallacy is when they assume that any evolved tendency is natural and, therefore, it's acceptable and justifiable. And that is a clear fallacy that we've already mentioned. And you should think of clear examples of it because it's very common in the way we talk, the things we discuss within our families, and so forth.

A related thing is this is we talked about rape. But here's what particularly feminists have argued. And you hear it all the time. You still hear this on the TV. All rape is an exercise in power. It's not about sex. It's not about sexual desires.

It was first argued strongly in this book by Susan Brownmiller in '75 called *Against Our Will*. The whole book was on rape. And her views became very widespread. They've been taught to students at many universities, even in the high schools. It's led to perpetuation of various myths about rape.

So is it true that all rape is an exercise in power and not about sexual desires? It's not true. It's also widespread among animals so certainly not in all species. It's used quite successfully in many animals. So what are some of the actual findings of studies that have collected real data on this? And he gives-- Alcock gives them on

these pages in the book.

And he's got to figure on it where he-- here's the age, for example, age distribution of rape victims. It differs very significantly from homicide victims. You just take rape victims and homicide victims-- female in both cases. The peak age for rape victims was 22 to 23. The peak age for murder victims was 32 to 33. And the distribution of that in that curve falls off with age a lot less steeply than for rape victims. That's just one of the pieces of data that have supported this. And we gave some of the earlier findings before.

We mentioned this-- also maternal instincts being greater than paternal instincts on the average. Is the sociobiologist being irresponsible since people may misuse his conclusions? It's been argued that they should shut up about this. But I'd like to make this very clear. And I'm going to go to page 215 to make sure you understand what sociobiologists themselves actually believe about their science and about their morality.

Richard Dawkins says, "My own philosophy of life begins with an explicit rejection of Darwinism as a normative principle for living, even while I extol it as the explanatory principle for life." It's not about morality. It's about the way evolution occurs.

Remember George C. Williams who wrote the paper in 1966 that led to basically a revolution in thinking about the nature of natural selection and evolution. He's even more emphatic. "With what other than condemnation is a person with any moral sense to respond to assist in which the ultimate purpose in life is to be better than your neighbor at getting genes in the future generations." And he goes on and has very strong statements about that.

"The fact that interactions among the members of the same species are also guided by adaptations of various sorts is no guarantee of happiness and harmony as dysfunctional step families and couples in sexual conflict demonstrated all too clearly." This is Alcock now he says, "If more people realized how are naturally selected brain acts in the service of our genes, then perhaps they would be less inclined to endure the consequences of natural selection-- a blind process that

cares not a whiff about human beings or anything else."

In fact he proposes-- he would like to see the establishment of a sex education class. And he argues how this could be effective. So I'm asking here this question. It's based on sociobiology. And I think it's a fantasy. Would it actually work? This is what I think. I think it would work only for true intellectuals, very rare, because those are people whose knowledge and reasoning actually influences their behavioral choices and their social life. They're very rare. And they're sort of like Sheldon on the *Big Bang Theory*.

And so I think the class would most likely be a failure at most schools, if not all. That's the way I will leave it with Sheldon. That's all I want to say today. I'd like to know if anybody has any questions about what you've been working on. It's only a few people I think who are not here because they had other things that we let them delay their turning in of their topics.

Most of you had the topics a week ago . But many of you didn't. So does anybody have any questions? If you don't want to make it public, then please come to me after class. I will stay here and talk to you about it. Do y'all have a topic? Do y'all know what you're going to do for sure? Because now you've only got until just before Thanksgiving to get that report. Yes?

**AUDIENCE:** We will at least get feedback on the--

**PROFESSOR:** Oh, yeah, we will look at all those. And if we have a strong opinion about your choice, we will let you know. In most cases if you have a good understanding of that assignment, there won't be a problem. I don't want a neuroscience paper. Remember that. This has got to be focused on the topics of the class.

We will go a little further in the class mostly with primate social behavior and with Konrad Lorenz's view of learning, which is much broader than modern studies in neuroscience and in behavioral studies too of learning. So I would like to go over some of that with you. So just a few more topics like this. And then it will be your turn.

And I do expect people to come and here these talks, even though you'll only hear a third of them and because there will be major points. And I generally figure out some way to ask you about that a little bit on the final exam just so make sure you paid attention. If you come to the talks and read the slides, you won't have any trouble with that.