PROFESSOR: So we're at the end of the Alcock book now. And I just want to go briefly through that chapter. And then we will start talking about Lorenz and his review of learning, which we didn't do much of when we talked about Konrad Lorenz and his treatment, his review of ecology earlier in the class.

So I think the first paragraphs of the book are a very nice summary of a major argument of the book. Why would he call it the triumph of sociobiology? What's the basic idea here? It's been so heavily criticized, but it's basically-- it's withstood the criticisms. It's argued for this type of study.

And if you look at actual publications, you can see there's been a big shift towards adapted reasons for behavior, basically tests of sociobiological theory, tests of Darwinian theory applied to social behavior of various sorts.

But I want you to think about this sentence in that summary. He was talking about there are arguments about genetically determined behavior, accusing sociobiologists all the time of being genetic determinists. So then Alcock says, in fact, they could not study genetically determined behavior-- he means the sociobiologists. They couldn't study genetically determined behavior even if they wanted to, because it does not exist.

And I want you to think about that. Is that a little extreme? I think it is. First of all, behavior is only indirectly influenced by genes. We know that it's determined by activity of the nervous system. And that nervous system developed according to genetic information, but with a lot of influences from the tissue and external environments.

But I think the statement is still too extreme, because some behaviors have very

little variation that you can attribute to learning or other influences of the external environment. For example, look at things like sneezing and yawning and withdrawal reflexes, grooming patterns in mice.

They're not reflexes, they're fixed-action patterns. What we're seeing is the fixed motor pattern that's a major-- the final piece of a fixed-action pattern. The social signals in geese, various insect behaviors. There's a lot of things like that studied by ecologists. They're either reflexes or, on the output side, they're fixed motor patterns, which are basically genetically determined behavior patterns.

So I think we can say that some behaviors are largely genetically determined. That's where I think Alcock is wrong. And he's an animal behaviorist. And he was an animal behaviorist before he started doing-- his research, like that of many animal behaviorist, shifted toward sociobiological questions in more recent years.

Let's just remind ourselves the explanations for fitness-reducing behaviors that have been offered by a sociobiologist. Many of them are altruistic. Most altruism has been shown to be adaptive, either directly because it involves genetic relatives, or indirectly with unrelated people. We call that-- because of reciprocal altruism because of the likelihood that if you're nice to somebody, they're more likely to be nice to you. And that's what reciprocal altruism is.

But there's also maladaptive altruism without doubt. And there, they have two basic kinds of hypotheses. One's called the byproduct hypotheses, behavioral byproducts, approximate mechanisms that evolve for adaptive reasons. So that's often been applied to pet love and love for dogs, for example, in spite of all the problems that it has caused people.

And also, we have the novel environment hypothesis, that they were adaptive and they evolved in the environment where they evolved, but the environment has changed and made them not so adaptive. And we've talked about a number of those things.

So why have many social scientists and people in the humanities ignored

sociobiology? And this is from Alcock. He says evolutionary biology, not just sociobiology, but evolutionary biology in general is alien and disquieting to many social scientists, including some psychologists and cultural anthropologists, as well as many philosophers and academicians in humanities.

The real cost of the continuing assaults is the resistance to incorporating evolutionary theory in other disciplines. People prefer to retain a worldview that's familiar and comfortable.

Let me check page 221 and find that quote. It was a pretty interesting little episode there. Well, I said it was here, and I thought I had marked it. Oh, yeah.

Sanford was the guy arguing sociobiological points at a meeting. And he was told, apes are mere animals. People alone possess culture. And only culture, not biology, not evolution can explain humanity. And that is still actually fairly common.

So why is it so alien and disquieting? First of all, it's because of the perception that it conflicts with ideologies, including religious doctrines, but other ideologies as well. Another among scientists is that they think sociobiologists are going to take over their field. You know, stay out of my field, this is my backyard. And also, in America especially, the extreme environmentalism, rejection of nature, with an exclusive emphasis on nurture. That is on learning. We've talked about that several times in the class.

So what are the causes of extreme environmentalism in America? More extreme in America than Europe? This has come out several times near the beginning of the class. One was the opposition to attitudes in European aristocratic society because of the elitism based on inheritance, still common in European countries.

In America, ideas of democracy included the belief that all are equal. And that should mean, of course, equal opportunity under the law, but it is often taken to mean we're equal at birth, with everything possible to anyone, to everyone who has the will and can find the opportunity. Many of us were brought up that way with, I hope, very good effects. And this was applied to the education system with, I think,

good outcomes despite the inaccuracy of the beliefs.

And then there's a very brief chapter that he has a very interesting appendix to. It won't take you very long to read the chapter. You should also look at these Appendix questions. I've picked this question, question three about the arguments of Ian Tattersall. He's arguing against sociobiology.

He describes how women in a surviving hunter-gatherer tribe breastfeed their infants for four or more years, a practice that blocks ovulation during this time and prevents them from becoming pregnant. He writes that their genes hardly seem to be screaming out for replication, and economic considerations is virtually always [INAUDIBLE].

For hunters and gatherers then, it's fertility not at slack that is the enemy. Individual San women show no sign, conscious or unconscious, of wishing to maximize their output of progeny. So he thinks he's identified a major weakness of sociobiology.

So how do you deal with that? First of all, we know that individual awareness concerns proximate mechanisms, not evolved adaptations. And we've also-- I think I talked about this before. There are fitness-enhancing advantages of spacing of offspring. So he's certainly wrong about fertility itself being the enemy.

There are other benefits of breastfeeding. Mother-child bonding, which promotes the welfare of the child, and thereby increasing his potential for reproduction. In fact, various problems occur in children that aren't able to bond with a parent, like children in homes where the caretaker is changing a lot, so they don't have a stable caretaker. Many of those people have great difficulties forming strong bonds later on in their lives.

There's also a transfer of immunities when the infant's immune system is not yet mature. Very important for survival.

This is actually for Chapter Nine, but I didn't deal with it then-- Defending Sociobiology Against the-- defended against the following charge. Sociobiology predicts that only immoral or amoral actions can evolve. And when sociologists are

confronted with the existence of true altruism and moral behavior by true altruism-- he means not with genetic relatives-- and moral behavior, then they change their tune to say that these cases illustrate that human beings are able to resist evolved impulses.

Why would we resist if our actions really have evolved by way of natural selection? Well, first of all, sociobiologists argue that morality itself has evolved with proximate causes. And sociobiologists have studied the adaptive values of altruism and moral behavior and may have found explanations.

And finally, I would point out that we've evolved with multiple proximate systems in our central nervous systems, each for adaptive reasons, but these can conflict. In fact, conflict's common among these systems, because we didn't evolve to be happy, we evolved to pass on our genes. And so we have conflicting conflicts. And the mechanisms in the nervous system for handling those conflicts, interconnections are only partially successful at doing that.

Now, Alcock, in this final chapter, brings up the area of evolutionary psychology. I will say a little bit about it after this slide. But I've also posted on Stellar an extra credit project. You don't have to do it. But some of you have talked to me. You're concerned about thinking your grade might be in between, you know, the high end of the B's and you want an A, or at the high end of C and you want a B.

If you want to do the project, you would have to read at least two articles. And they can be online, but there's plenty that you can find. You can find the article I'm going to cite next, for example. A good article by David Buss on evolutionary psychology.

And I want you to write a brief review, including the definition and origins of the term. I want you to distinguish between sociobiology and evolutionary psychology. And also, describe a couple of the controversies that this field has generated. I posted it. I had it listed as Posted a couple of days ago, but I guess I didn't. So I posted it this morning. But I want you to get your report ready first, so don't worry about this right now. Get that report done before you do this.

And if you want to propose other extra credit based on, especially, these questions at the end of the Alcock book, you can do that. Just talk to me about it. Because if you decide to do it, then I would post that anybody else could do it also.

This is the David Buss article. Listed at the top, he published it in '95 on "Evolutionary Psychology-- A New Paradigm for Psychological Science." And in it, he includes a critique of one aspect he perceives in sociobiology.

He says, "to quote one well-known sociobiologist, humans are inclusive fitness-maximizing blobs. I have labeled this view the sociobiological fallacy"-- he did that in 1991-- "because it conflates the theory of the origins of mechanisms"-- that is inclusive fitness theory-- "with a theory of the nature of those mechanisms. If men had, as a goal, the maximization of fitness, then why aren't they all lined up to give donations to sperm banks? Why do some individuals decide to forgo reproduction entirely?"

It reminds me of the-- they were advertising a new movie that there's this guy that's found out he's the father of 250? Anyway. So some people do. So he continues and quotes two very well-known evolutionary psychologists. They were early into that area and helped get it going, really. Tooby and Cosmides.

"The nature of mechanisms as end products should not be confused with the causal process that created them. The sociobiological fallacy has led to some dubious speculating about how, if one really looks closely enough, we will see that person x really is maximizing fitness even though the behavior seems anomalous with respect to the goal." That is, like, suicidal behaviors, schizophrenic behavior, dysfunctional behavior.

"Evolutionary psychologists see humans as adaptive executors or mechanism-activators rather than as fitness strivers." But actually, that's pretty similar to what Alcock has been arguing in the book. He says pretty similar things, distinguishing between ultimate causes and proximate causes and mechanisms.

This is a little more from that Buss paper. "Selection cannot produce mechanisms of

the domain-general form of fitness maximizers for the simple reason there's never existed any domain-general way to maximize fitness. An implication of the sociobiological fallacy is that many sociobiologists have skipped or neglected the psychological level of analysis.

Many go directly from principles of evolution to patterns of social organization, such as the nature of the mating system, polygyny versus monogamy, or the social system, like male dominance, or the legal system without a description or account of the psychological mechanisms on which these aggregate end products are presumably founded. In contrast, evolutionary psychologists see psychological mechanisms as central to the analysis, not something that can be skipped past over or omitted."

And so some evolutionary psychologists that you see, they consider themselves psychologists, not sociobiologists, because they don't think you can really jump over the study of approximate mechanisms. But they're influenced in what things they choose to study by evolutionary adaptations.

Anyway, this finishes our discussions about sociobiology. And what I want to do now is review the various types of learning, using Konrad Lorenz's book, *Foundations of Ethology.* It's his third part, is called "Adaptive Modifications of Behavior."

And then on Friday and the following Monday, we'll see videos of field studies of great apes and talk about some of that. But mostly, we'll see the videos.

And then I've canceled next Wednesday's, not this Wednesday but the following Wednesday, because many of you like to leave early for Thanksgiving. And some of you will still be struggling with your reports. So another good reason to cancel that class.

So then the plan is, which I mentioned before, each of you will go to one of three classrooms-- I still have to get that arranged-- to hear reports. So you'll always be in the same classroom. Each of you will hear about a third of them that way. That's the only way we can do it with a class of this size, because we can't fit more than four

into one session.

A key point made in each student report should be learned, as I will ask you something. You will have some choice, but I still expect you to listen and learn a little bit from those reports.

So we have a little time. Let's start going through. The view of learning by Konrad Lorenz, which is a broader view than you will find in most textbooks of learning, most general studies of learning. When I was a graduate student, I got a textbook on learning, and it was almost everything was on classical conditioning, and instrumental conditioning, and maybe a little bit about some observational learning, a little bit on mimicry.

But some of them even admitted that they were very non-ethological. Lorenz felt the need-- he was aware of all that. And before he wrote this book in the late-1970s, published in 1981, he made sure he included an ethologist's view of learning. And rather than just put them online and go right to the videos, I want to go through them, so you have a chance to think about them and discuss them with me if you want to.

He emphasizes the various, specific forms of learning have each evolved in order to produce what are normally adaptive responses. And he emphasizes especially that you cannot reduce all learning to one or two types.

So here's the major types of learning as he classifies them. Learning without association, learning through association but without feedback, reporting success. That is without reward or punishment. Learning affected by the consequences of behavior. So there, you have rewards or punishment. Then motor learning. And finally, the kind of learning you get with exploratory behavior, learning motivated by curiosity. So he goes through each of these.

Let's start with learning without association. There's two types of learning without association that he describes. Facilitation and sensitization he groups together. And habituation. So in one, a response is becoming enhanced, but not because of any

associations. In another, there's habituation. With repeated presentation of the stimulus, the response decreases. And he treats habituation very broadly. He includes stimulus adaptation with it.

So first of all, facilitation. We'll deal with facilitation and sensitization separately. So by facilitation, he means things like the prey-catching response of newly hatched squid. It's performed with flawless coordination when it's first released for the first time. It's preceded by intention movements for several seconds. All the characteristics of a fixed-action pattern.

But the response is lower at first, and then it speeds up. It's facilitated just with repetition. And then with maturation, there's improvements in the way this functions. But it appears that it's due just to the maturation. And there's a number of things like that in behavior. They change with maturation. The nervous system takes time for all levels to mature, and the responses can change.

Another example is the pecking by recently hatched chicks. There's been a few nice studies of this. In this, they peck at seeds, but their pecking is very scattered at first, and then it becomes more and more focused. And it doesn't matter whether they're being rewarded or not.

You can put displacing prisms on them, so they're pecking at the wrong place than where the seeds actually are, because they see them in the wrong place. And yet, you still get this more and more focused pecking. So it doesn't depend on feedback, but only on repetition.

So then we go on to sensitization. Take the escape response in the earthworm. If a blackbird has just pecked the worm, the response the next time he gets pecked at, he responds much more quickly. And it's triggered with a lower threshold. Again, it doesn't involve feedback. It changes with repetition. Again, becomes sensitized.

There's this phenomenon called a feeding frenzy, especially in fish, that they feed on species that occur in swarms or schools. And you will see, when they encounter prey in such a group, they seem to go wild. And their responses-- they're sensitized

to respond more and more strongly. In fact, they seem to be-- before very long, they're totally dominated by their feeding.

You see it in sharks, you see it in tuna. And it's certainly a phenomenon exploited by fishermen, because it brings together a lot of these predatory fish, especially tuna. And there's a few other fish that are like fish like that also.

The lower thresholds are probably also due to social facilitation and of course, specific key stimuli from the prey objects. But the point is there's a sensitization. It is a simple form of learning. If you don't like to call it learning, you can call it plasticity. But it's just as well to call it a simple form of learning without association.

And then finally, the second major type, if we lump the first two together, habituation. And here, he includes stimulus adaptation. But the studies of it often separate these. And he gives us examples. He gives several examples in this slide and the next.

First, reflex habituation in hydra. It responds to contacts by, say, water movement, touch, or any shaking of the substrate just by contracting its tentacles and body. You know what hydra looks like? It looks like a tiny, little octopus. It's got the tentacles it uses in its movement. A very tiny, little cnidarian.

Well, if it lives in fairly turbulent brooks, it does habituate. It's not constantly responding to that moving water. Those responses decrease. So the stimuli of the flowing water lose their releasing properties, but the thresholds with all the other key stimuli, like being touched by another animal or something, they stay unchanged. Just that particular stimulus, the moving water, stops eliciting that reflex response.

And then he has several properties of turkeys, their response to novel sounds. They start gobbling if they're exposed to any novel kind of sound. It habituates with repeated presentations. It's very specific to the sound frequency. So you can actually plot a generalization gradient.

You'll see that if you move the frequency of the sound stimulus, the further you move it away from the original stimulus, the more strongly they will respond. So you

can show that the habituation is very specific to a tone. And then it loses its-- the habituation gets less and less when you get further and further from that frequency.

So even if you suddenly reduce the amplitude of the sound, they will start gobbling. They just use that to demonstrate that the habituation isn't stimulus adaptation but a real habituation. They're responding to the novelty, and they are able to detect, in a fairly sophisticated way, the novelty of the sound, as do humans.

And then he goes on and talks about the flight responses in turkeys, flight responses to aerial raptors, so birds of prey when they appear. Of course, they can be very dangerous to turkeys. And you remember, when we talked about this, talking about ecology, and people tried to show that they respond specifically to particular shapes.

Like they don't respond to the goose- or duck-like shape, but they do respond to the hawk-like shape. But it's been shown that most of that, or perhaps all of it, is just explained by stimulus novelty.

They habituate the frequently occurring stimuli. So they habituate to buzzards, because they see them all the time. They habituate to a fly on a white ceiling even though they respond to it like it were a predator at the beginning. They habituate to balloons in the sky, which, again, they respond to them initially like they're a predator.

So the least frequently occurring stimulus from a raptor is probably that of a bald eagle. Now, he's talking about the turkeys in Seewiesen, Germany, where Konrad Lorenz, under the auspices of the Max Planck Institute, established a behavioral laboratory for field studies of various sorts and experimental ethological studies of animals.

And he was joined there by a number of very good scientists. And the whole series of ethological studies have been reported that were done there at Seewiesen. I actually visited there a long time ago. Didn't meet Konrad Lorenz, but I did meet some of the people that worked with him.

So the only stronger response than the response he got to a bald eagle was to something even more novel-- a dirigible. It flew over Seewiesen about twice per year. And that led to this vigorous flight reactions of the turkeys they kept there. The blimp, the most novel stimulus.

So then he discusses learning through association without feedback-reporting reporting success. And these are the types. This is what he calls them. And this is where we will talk about the conditioned reflex. Simple learning through association without feedback reporting success. So it's not instrumental conditioning, it's not problem-solving. He includes imprinting there. Avoidance responses acquired through trauma. Condition inhibition.

Let's deal with, first, habituation to associated stimuli where animals habituate to the background, to the environment. And so for example, when we tame a bird, for example, there's habituation to flight-eliciting stimuli that is normally associated with humans. The tameness can just suddenly disappear if you move the animal to a more novel environment or the environment suddenly changes.

I've noticed this a number of times in hamsters. Even if the sound environment changes in the lab, there are strange sounds, strange people talking around, the animal, it's like he just gets nervous, and his whole behavior changes.

His habituation to me, for example, the stimuli I provide changes, and he starts responding very differently. And this can be a real problem for your pet, for example. If you move them to a very novel environment, their behavior can change drastically.

He talks about mobbing in wild geese. They do habituate to particular dogs. In the film, I think, we saw a dog and the way the geese responded. Well, that was clearly a novel dog, because they will get used to a dog like that and they'll stop mobbing. But the mobbing can reappear to the same dog if the environment changes. And that's the point here, that the environment, the associated stimuli, stimuli associated with the habituation do make a difference.

And then he talks about a problem that some flight responses appear to habituate too much. It doesn't seem to be adaptive. But he concludes that this may be due to an unnatural constancy of the environment in this when we study animals. And he talks about the way all chaffinches respond to owls, something studied by Robert Hinde.

Studies of gosling using the warning call of parents. And this was studied by Lorenz. I put it in brackets here, because this didn't come from Lorenz. With hamsters in the laboratory, again, they appear to habituate too much to the stimuli that can cause flight movements. And because of the importance of anti-predator behavior, it's a big puzzle.

But I found that if you can set up a simulated natural environment-- so you eliminate their constant exposure to humans walking around in the laboratory-- then you can get very powerful responses to predator-like stimuli. But I found that's necessary in some form. You have to simulate aspects of a natural environment to get-- because they do habituate to the associated stimuli as well as the specific stimuli of the human.

Another thing related to that is if you just move a hamster cage-- of course, in the laboratory, again, it's very artificial environments. We keep them in these little cages. And the cages are transparent. They can't get out of them, but they-- unless you give them a lot of time, in which case they were able to chew a hole right through the cage and eventually get out.

But if you just move the cage across the room or you even just rotate it, you can totally change the behavior, because the novel positions of visual stimuli with respect to the gauge stimuli, it can cause the hamster to rearrange its cage just to regain the orientation of the nest and food horde with respect to visual landmarks.

So they're very responsive to the entire environment, not just of the things that are immediately around them. And they can respond very differently to humans when you do that. You'll have a tame animal. You rotate the cage or move the cage across the room-- like animal caretakers will do this sometimes. Cleaning up, they'll

move the racks. It changes the behavior of the animals.

I just point out that this kind of habituation involves a kind of spatial learning. They use visual landmarks for knowledge of where they are in the local environment. An important kind of learning. And if we have time, I will go through some sort of a neuroscience-based view of the learning, because we've learned a lot about some of the brain mechanisms that involve this and other types of animal behavior.

So then we have his category, adding stimuli to key stimuli. So now we're dealing with fixed-action patterns, key stimuli that elicit fixed-action patterns. But animals become accustomed to-- if certain other stimuli always occur when you're eliciting these action patterns. They don't become substitutes for the key stimuli, but they affect the way the response is being elicited.

So you take, for example, the human smiling response and its role in social bonding. It was studied by Rene Spitz. It's mentioned in the book. And the response over time becomes more and more selective. When a baby is born in a very early period, it will smile in response to just a dummy stimulus.

You just construct a little face with just eyes and a smile on it. That's all you need. And they will smile back. You thought he was smiling, because he thought you were funny or he liked. Sorry, it's a fixed-action pattern response to your smiling mouth and eyes.

Then that changes over time. They will respond to live humans only. They will stop responding to your dummy stimulus. And later, they'll respond just to familiar humans. In fact, the response to strangers can become quite opposite. Rather than smiling, they will start crying.

He points out that their emotional problems-- you see in children raised in hospitals. And I mentioned this before. Because of the caretaker changes, they interfere with the bonding, which is crucial for formation of later bonds of friendship and love.

And in imprinting, there's always stimuli associated with the stimulus that the animal is imprinting. And this leads to individual recognition in geese and actually in

humans as well. And I point out here that in studies, they show that the critical stimuli for human individual recognition are the eyes, eyebrows, and nose, the parts covered by a carnival mask.

Very effective in concealing identity unless people have a very prominent mustache or beard or something that characterizes them. Then you might learn to recognize them that way. Because it's mainly eyes, eyebrows, and nose. I've never been totally convinced of that, but I guess that's what the studies have shown.

And then finally, conditioned reflexes. He calls this conditioning with stimulus selection. Pavlovian conditioning. It's also called type S conditioning, stimulus conditioning.

And he talks about Pavlov's bell, the use of the bell as a conditional stimulus. Such regular sequences normally occur only when there's a causal connection. And here, you're exposing him to a very abnormal connection, but you're making the animal-- you're putting him in a situation which in nature, these correlations normally indicate some cause.

And it was first studied by Pavlov in a situation that doesn't actually fit this ethological definition of a stimulus condition. And I just remind you of Hasenstein's very specific definition. If there's a reflex, it's not being subject to changes in internal readiness.

In other words, there's not an action-specific potential. There's not a drive that builds up. That's why we say we wear a mantle of reflexes. It's always available. So it's based on built-in mechanisms underlying the reflex.

And I also point out that some reflexes are impossible to connect with a conditioned stimulus, like a tendon reflex. When you learn it, you'll have a class in learning that talks about classical conditioning. And there's no reason why some reflexes couldn't be conditioned, like the tendon reflexes. But try as you might, when you try to get them associated with a new stimulus, it doesn't work. So they're quite specific.

I think I talked about conditional reflexes once before. You remember what I said--

what was actually conditioned in the dog when the dog starts salivating in response to the bell in Pavlov's experiments. It was conditioned appetitive behavior. And so we will get to that a little later. It wasn't really stimulus conditioning and what's become known as conditioned reflexes, or classical conditioning, type S conditioning.

We'll come back right to this point next time, starting with avoidance responses acquired through trauma.