

(introductory orchestral music) (faster paced music) [Narrator] The University of the Air, Michigan State University Continuing Education Service in cooperation with the Department of Psychology of the College of Science and Arts presents: A Psychologist Looks at Animal Behavior with Dr. Stanley C. Ratner. [Dr. Stanley Ratner] The topic for our discussion now will be the social behavior of animals. When we see groups of animals together we notice that they often tend to bunch up even though they're in a rather wide expanse this is called aggregate behavior (writes on chalkboard) and is characteristic not only of higher forms such as animals and the primates, but also seems to be characteristic of much lower forms. As a matter of fact, it's even observed with bacteria and creatures that are somewhere between animal and plant life. A rather interesting question, unless you just want to assume that animals are together because they're together, would be exactly what conditions do lead creatures to cluster together? In a sense we could ask, what is there to gain from it? One of the reasons we notice that there is aggregate behavior or one of the gains from aggregate behavior so to speak, is the increased (writes on board) ability of the animals to come to their own defense when they are in groups as compared with when they are working all by themselves. This general observation I think you could agree with. That is, a large number of animals would be harder to kill or get rid of than any single animal all by itself. This observation however, is so general that we even notice, again, with creatures that we almost don't think of as animals, namely bacteria, that being in groups allows them to live better than living alone, or in small groups I should say. By that I mean if you put a small group of bacteria together giving them adequate food and such they do not seem to reproduce as fast as a large group of bacteria giving them also the proper amount of food. Now this becomes a little hard to imagine with the bacteria. But we can perhaps understand it and picture it a little better when we think of white mice. It has been shown, for example, thinking of defense in a very broad sense now, that is how the animal survives and takes care of himself. If we graph the age of the animals, and here we're talking about white mice, up to about 20 weeks of age and if on this axis we graph or we plot the percent of increase in weight, from a- from zero percent up and if we now have groups of mice living together starting out first with a mouse living all by himself. He's born, he's taken away from his mother, and he lives all by himself, and we get a growth curve something like that. Conversely, if we take groups of mice and keep them together, in groups of two to six, we get a growth curve something like this. That is they reach their maximum growth at a much earlier age and they reach it at a much faster rate, that is as they're on their way. This would be the animals alone. This is the animals in groups from two to six, and if you increase the size of the group now don't want to give the impression that the more animals we have the better off everybody is but if you increase the size of the group beyond some optimum number, even though you keep enough food available, you will notice that that group doesn't prosper quite as well as a group with what we could think of as an optimum group size. These were animals this data was obtained from animals that were kept in groups of from about 9 to 12 little mice in a group. Now remember, enough food was given to them and such as that, but when the group got a little too big none of them seemed to fare very well. Conversely, when they lived all alone, they still didn't fare very well. As a matter of fact this was the the most undesirable condition for shall we say the life of a mouse. I understand as a matter of fact, that this is one of the reasons that certain states have prevented the sale of little chickens and little ducks at Easter time. As- they've done it in indirect way, they say you can no longer color these animals and so they no longer become interesting Easter gifts. And as I understand, the reason for the- one of the reasons, is a humane reason. Most people will ordinarily only buy one little chick or one little duck and, well if you get kind of personalistic about it, you kind of get the

impression that they just pine away and slowly die. Living by themselves. And apparently what's happening is something like what was observed in a very careful experiment, where we manipulate the size of the group and observe that differing sized groups has different effects on such things as how well the animal can care for itself in a biological way. Now grouping also occurs for other reasons or to put it in other words at other times. Grouping occurs during the time of mating, this is a if you have a dog you know what I mean. A female that is. As the females come into heat, that is as they are receptive, we see another big flurry of grouping behavior, and so in the mating process or I should say around it, is the phenomena of aggregate or group behavior. This is noticeable and we will have a film in a few moments that was taken of ducks in the water, or ducks during mating season I should say not in the water, and we'll observe here that they are sitting- this is an extremely large field in which these films were taken, and the ducks could have been as much as a hundred yards from one another, and yet they sit close together. Here's a little female these are mallards that have in a sense become domesticated, and live on the Michigan State University campus. There's a male resting. Now notice the animals move together. One moves, the other moves close by him. These are males, there's a female, at the far side of the picture. Notice the male squatted beside a female, as I've reported this is in the spring. Now here's another very common grouping. Males and females together, oftentimes you observe in the spring there are two males with every female. The female is the one with this sort of checkered coat. She has her two escorts, they work together. Even though this was at no time necessary. Here's a film, again showing some group behavior. It's mating time in this instance we have two males working together. Oho, now we notice the female is in the middle of this group as she moves, the others move. (duck film plays) Again let me emphasize, we have another sex- a sex pairing there, this is a very common behavior. So we observed, the common pattern of males with females. Most noticeable during the mating season, which for most fowl in this continent is in the springtime. It's been shown, again thinking of mating, that the larger the size of the group, up to a certain point, the greater the chance of getting offspring. This in a sense, make- this makes considerable sense, if we have many males and many females, the chance of having a large number of offspring is increased considerably. Now notice, throughout this explication of- or the description of these principles, we've been talking almost as if the animals know about these things. We're not assuming at any time that they know that if there are six of them together, they'll do much better than if there are only two. But what we're saying is that these things just seem to happen. And the reasons for them are something else. One general theory that is used to explain, or at least describe this whole set of observations namely that animals tend to group together, they group together for mating and such, is of course the theory of- Darwin's theory, that suggests that animals that do in a sense the right thing, animals that do the thing that tends to help them live, are then selected out in the mating. Those animals that don't cluster together get killed, and they have no opportunity to mate so, Darwin's notion, and the sort of explanatory concept we use here, is that there is selective- (writing on board) selective mating. (writing on board) Now, we don't mean selective in the sense that some farmer or animal fancier of some sort, goes out and makes the judgment. The judgment, in a sense, is made by the facts of life. Namely, an animal roaming around by himself is one, liable to be killed, and two, has a very small chance of ever finding a mate to have offspring with. So this is the general theor-theoretical concept. To repeat again, we are not suggesting that the animals know this, we're not suggesting that the little mice understand that if there are three of them together they're going to be much better off than if they're only one or two. Now, another instance in which we find animals together, something I'm sure you would all predict,

is of course at dinner time, or when they're eating. (erasing and writing on board) When there is a source of food available it makes considerable sense to imagine that animals will come in, if this is the food supply here, animals will come in from a number of directions, to that food supply. And we have another film again with our friends the ducks, on the campus, showing them as we were feeding them. Now small little pieces of bread are being thrown to them. (ducks eating bread) Notice they stand still, looking, as I happen to know, I was providing the bread, they're looking at the source of the food, waiting expectantly. Now notice the competition for the food, that is they tend to race with one another, and notice also that the females, the ones without that nice collar around their neck, the females, are in the fight, and in the scrap as much as the males are. The little male who seems to be losing out there, is a slightly lame in one leg, and this is the reason, that he isn't doing as well as he usually does. So, we observed that there is aggressive behavior- there is grouping around food, but we also, I hope noticed one other thing from that film. There is also another characteristic of group behavior, that is evident at that time. Namely, that each member of the group is not equal. It is not a democratic society in the usual sense of democracy, where we provide a little something for everybody. But rather, there seems to be an order. (writing on board) And if we could watch that film again, notice that some of the animals seem to get more of the food than others. Well we'll see that in just a moment. Want to mention, that this order, is an order where some animals are very dominant, (writing on board) some are less dominant, and now we will have an opportunity to watch, now watch to see who gets the food, and notice that some animals are more timid than the others. They can literally almost take it out of one another's beak. They're waiting for their food. That was a nice scrap. The animal that's farthest to the left is the one who seems to be winning, at least when she's not busy swallowing her food. (ducks eating) Oh! (ducks eating bread) This is our lame duck now, right in the center, notice one leg is splayed out a bit. He doesn't even fare very well with females. All right, now we notice there, that the animals are not equal. They tend- one tends to push the other away, that is one tends to be more dominant in the relationship than the other. We notice this with ducks, I'm sure you've noticed it with your friends. The point that we're making is that, this observation of dominant-Let me start spelling that again. (writing on board) This observation of dominant and submissive (writing on board) animals is quite general. We observed it with ducks. As I said, I'm sure if you were very honest with yourself, you would observe it with your own friends. It is also noticed with other animals. Among cattle, there is what is known as a hook (writing on board) order. That is, when they're watched carefully, the same animal is always at the front as they're let into the barn or very nearly always. None of these behavior sequences involving a couple of anim- a large number of animals is immutable or unchangeable, sometimes even the oppressed rise for a few moments. But, the hook order among cattle is a very common observation. The fact that dogs fight with one another, and the fact that there is often a systematic winner in that. The dog that wins the first battle is very liable to be the one who wins each battle thereafter. It has been observed with mice. A colony of mice gets organized in such a way that there is a dominant animal in the group and what this means is that she eats first, she pushes the others around, and things as I say, the best way to think of it I think is to imagine how things work when there is a very dominant person in a group when you're having a club meeting. Their behavior is very much like the behavior of our dominant animal. They make the decisions, they go first and, they push the others away. Now, I'd like to show you in a few moments, a film showing the details of this sort of a relationship between animals that are very commonly used in this study, namely chickens. (writing on board) They're used in research on the question of social relations because they're available, that is they live well in almost

any climate, they are not too expensive, and they show this behavior in an almost extreme way. So if we can see those birds, we'll observe them in a small pen. Here we have two chickens, who have very little relationship with one another. Now we see another scene where one is pecking. The one whose head is up higher is pecking down on the other one and will drive her into a submissive posture. As soon as the lower one's head comes up, the other pecks it down. This is an extreme exhibition of the dominant and submissive relationship. There she- the one with her head higher pecks her down again. Almost any instance the head goes up, it's pecked down. Now here we see another type of relationship, a rooster, noticeable with a big comb, of course, and the hen. This is the same hen who was very very dominant before and you will notice that there there's sort of a standoff, that is the male and the female among chickens do not seem to bother one another at all. The rooster is crowing periodically, we are near some other birds and and he could hear other roosters crowing. It's another characteristic of social behavior. Well, now we noticed in that film that we had a relationship where we had one bird let's call her bird one, and bird two, there was a standoff. The very first few moments there was a standoff. They almost paid no attention now these birds were in this case hens. The second thing we saw, bird one was paired with an animal whom we shall call bird three, we know her affectionately as blue bar. We had painted a blue bar on her back and she just took an awful beating. That is, blue one was a completely dominant animal with blue bar. Whenever blue bar's head came up, it was pecked down again by blue one. As a matter of fact we rarely could keep them together more than two or three minutes because the interaction was so ferocious and it was all one-sided. Lastly we observed, bird one with rooster one, and here again almost nothing happened. That is, the thing we observed they almost didn't pay attention to one another is a very characteristic observation when we put males and females together. They rarely fight. Now of course there are other things that they do, but fighting is not among them. All right. (erasing board) The problem is, what determines this? As why was it that one bird had to stand off with another, she just beat the daylights out of the second one, and such as that. Is this a chance occurrence or is it handled simply because, that bird whom we called bird one was so fat, and strong, or what was it? Well it turns out, that the explication, or explaining, or determining who wins these battles is not a straightforward obvious thing. It becomes almost like a prize fight. It is a little hard to say, exactly what it is that leads one fighter to beat another. Oftentimes we can see the knockout blow, but we're not talking about that. We're talking about what things in advance of the fight, can we use to predict, that which animal is going to win. Considerable research has been done on this problem, and there are certain things we know that are not related to this. One: the weight of the animal. (writing on board) A heavy bird is as liable to be a loser in the social relationship as she is to-to be a winner. Well, this is a factor that has very little effect, what factors do have some effect? The thing that has been shown to be of great importance is whether the bird has had a series of wins or not. It's the thing that might help you bet with a fighter let us say. If he has just had 14 knockouts in a row, it's a fairly good bet, assuming he stays within his class, that he might have another one and so it is with the birds, if they've had a long history of winning, (writing on board) they have a more than even chance of winning again. But it isn't completely general, because the birds seem to like certain arenas more than others, or in other words, if they win in a certain situation they're quite liable to win again there. But if you change their situation, if you put them with another set of birds, they are- they may not win. And so for example, some research was done with flocks of birds, where individuals were were rotated from one flock to another, and the interesting thing was, that in some flocks they were at the very top. They were the most dominant bird. They pecked all other

birds, they ate first, they laid the most eggs during that time and such as that. As they rotated them into another flock, the same bird, a week later, might be in the middle of the next social group, having been beaten down by a series of others. Now the most interesting question was what happens when we put her back in the first flock? In the first flock she acted just like she did in the first place. She is the boss, and so, we find that the animals in a sense, win in certain places, in certain circumstances, do not win in others. This is, to look at the relationship between the individuals, but it's been also noticed that there are characteristic arrangements of animals, even when we have more than two about whom we're talking. As if you have a large number of birds together, and this is true I think in many other contexts, the army, and perhaps the university. There is what we call a peck order. (writing on board) There is the number one bird, who pecks all others. Under her is a number two bird, she pecks everybody else but number one. Under her is a number three bird, who may peck four five and six, but does not peck two or one. This is known as the peck order which is observed very commonly, as I say among people, it's observed among birds. There's one other order that's is somewhat interesting I want to mention, which is called the triangular order. Here bird number one pecks number two, two pecks number three, and three pecks number one. But it just goes around in that circle. Well this is the kind of order. It's shown to have an effect on egg production, that is, the bird highest in the order lays the most eggs. She probably gets the most food also. Well I'd like to thank the poultry husbandry department for their cooperation in providing the birds whom we photographed and we'd like to thank the photographic staff for an excellent job in their work. (instrumental outro music) [Narrator] This evening the Michigan State University Continuing Education Service has presented Social Behavior of Animals with Dr. Stanley C. Ratner. University of the Air is directed by Al Murphy and produced by Dr. Lawrence McKune. (instrumental ending music)