

# Memecosystems:

## Are animal minds suitable habitats for memes?

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### Abstract

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### Abstract

Milk-bottle opening behavior in a species of bird known as the British tit has been put forward as an example of a meme in a non-human animal. The existence of this type of case has lead some thinkers to believe that non-human minds can acquire memes. I believe that the British tit's behavior has been misinterpreted as memetic. In this ePaper, I argue that milk-bottle opening in the British tit can be explained by appealing to its innate behavioral repertoire. I then suggest that the question of memes in animal minds should be considered on a case by case basis.

### 1. Introduction

In their paper "Do Animals Have Memes?" (1999) Simon Reader and Kevin Laland suggest that animal minds are suitable habitats for memes. Their ideas come about after a critical examination of points that Susan Blackmore raises in her book *The Meme Machine* (1999). Blackmore argues that humans are the only animals with minds capable of supporting memes. Reader and Laland disagree and attempt to find some examples of memetic transfer in non-human animals.

In this ePaper, I will examine Reader and Laland's claims. I will focus mainly on their suggestion that the British tit's milk-bottle opening behavior is a meme. My objective will be to show that Reader and Laland's claim is wrong, and that the British tit's behavior is not a meme. I will start by outlining Reader and Laland's argument and will show that their claims rely on an incomplete definition of what a meme is. I will then offer a firm definition for the meme, after which I will provide an alternative explanation for the milk-bottle opening behavior exhibited by the British tit. My next point will be that the question of memes in animals should be answered on a case by case basis. My conclusion will be that examples such as milk-bottle opening in the British tit do not provide evidence of memes in animals.

## 2. Memes in the Minds of Animals

According to Susan Blackmore (1999), imitation is the primary mechanism by which a meme replicates and finds its way into a new mind. If she is right, it would seem that memes are exclusive to animals that have the capacity to imitate behavior. So far this ability seems to be found only in humans and some species of birds, members of which can mimic certain sounds and calls.

Reader and Laland agree that there is limited evidence of imitation in non-human animals, but argue that imitation should not be the defining feature of a meme (Reader & Laland 1999). They suggest that limiting memetic transfer to acts of imitation is restrictive and cuts out a significant range of behavioral transmission. For Reader and Laland, the psychological process underlying the transmission of information is not a determining feature of memetic replication. Instead, they argue that *transmission fidelity* is the key feature of memetic replication. This is to say that regardless of the means by which a behavior is replicated, a memetic transfer can be said to have taken place if the resulting behavior is a *high quality copy* of the original behavior. Reader and Laland are right to make this point. If acts of imitation were the only way that memes could spread, then it would seem senseless to speak of memes entering human minds from written material or from musical notation. In these cases information that produces behavior is transferred with no observation of the original behavior -- it is not mimicked. Music can, of course, be imitated, but most of the time musical memes are encoded in a musical score and are assimilated to new minds when the score is read.

To support their claims, Reader and Laland point to evidence of behavioral transmission in non-humans animals that does not come about through imitation. The examples used are cases of *social learning* -- learning that occurs when behavior is *influenced* by observation of other animals (Reader & Laland 1999). Perhaps the most significant example for Reader and Laland is milk-bottle opening in British birds. In some areas of Britain,

a species of bird known as the British tit has acquired the behavior of opening milk bottles to get cream. The tit finds milk bottles at house doors and pecks away at the foil bottle top in order to get access to the cream that sits on top of the milk. When other tits observe this behavior, they try it out themselves and soon learn that if they open milk bottles, they are rewarded. It is important to note that the tits are not *imitating* each other. They are simply being attracted to objects that other tits are pecking at. According to Reader and Laland, the spread of this behavior throughout the tit population in Britain shows that memetic transfer has taken place. Opening milk bottles is not innate to the tit -- it is learned -- and the behavior replicates with high fidelity showing that it is a meme. Since the British tit can have memes, Reader and Laland conclude that animals have memes.

### **3. Is this stretching the Meme too far?**

To effectively assess Reader and Laland's claims we need to know exactly what a meme is. Without a firm definition, it is possible for theorists to make any claims about memetic transmission. Reader and Laland want to relax the criteria that past thinkers have placed on the meme, but I think they are relaxing the criteria too far. If we travel down the road that Reader and Laland are opening up, we will end up describing all conditioned behavior as memetic. On the surface, this might seem acceptable, but it is only acceptable if we have a very loose definition of a meme.

Why is such a loose definition unacceptable? The reason is that it makes the term 'meme' redundant. The best way to understand this is to consider the parallel situation in genetics. A gene is a packet of instructions encoded in DNA, which directs the development of cells. Now, if someone comes along and claims that all chemical processes are genetic, then the term gene would apply to everything that goes on in the body. Not only would we describe an animal's physical and mental characteristics as genetic, we would also describe the chemical process underlying digestion as genetic. But this is not what genetics is about. Genetics attempts to explain things at a higher level than common chemical process. The same is true of memetics. Memes are used to describe high level behavior that is not an innate part of an organism's behavioral repertoire.

In this section, I will offer a firm definition of the meme and will use this definition to show why the spread of milk-bottle opening in British birds is not memetic.

### 3.1 What is a Meme?

Memes are best thought of as sets of instructions that can be followed to produce behavior (see Silby 2000c). Instructions can be encoded in a number of formats, including:

- 1) musical notation,
- 2) written text,
- 3) visible (or vocal) action,
- 4) connectionist networks such as the neural structure of the brain.

A set of instructions that produces the behavior of, say, whistling the first 4 notes of Beethoven's fifth symphony (a well used example) can be encoded in any of these mediums. When the instructions are followed, the same behavior will result. When a mind encounters an instruction set that produces behavior (say a musical score), it can reproduce that behavior by creating an appropriate neural "program". To understand this, consider a similar situation in the world of robotics. Imagine that a robot is developed that contains a number of built in programs. These programs provide it with behavior essential for its survival. The robot's behavior might include walking, avoiding obstacles, grasping at objects, and the production of certain vocal sounds. Suppose that engineers also give the robot a program that gives it the ability to write small behavioral routines. In effect, this program gives the robot a means by which it can alter its own behavior by writing new programs. Suppose that a feature of this innate behavioral program is that it allows the robot to *observe* the behavior of other robots and write programs that produces the same behavior. In other words, the robot can *imitate* behavior. Now, the question is: what, exactly, are the programs that the robot writes for itself? They are not a part of the robot's innate behavior and they are produced primarily through imitation. They can be translated into different languages and written down on paper. They can also be transmitted to other robots who read the instructions or who imitate the behavior and write their own programs. These behavioral programs are what we are talking about when we speak of memes.

This is precisely the sort of process that goes on in humans. At some point in our history, biological evolution provided our ancestors with a capacity to imitate behavior. This meant that when humans observed the behavior of others, their brains would create the neural wiring needed to produce the same behavior. Such neural wiring patterns are lists of instructions, which can be translated into other mediums such as written language, outward behavior, or computer code. A list of instructions that produces behavior is the thing that spreads into the minds of others. A list of instructions that produces behavior is a meme.

### 3.2 Why do British Birds not have a milk-bottle opening meme?

Given the above definition of the meme, it would seem that British tits do not have an 'open milk-bottle' meme. This is because British tits have not acquired any new behavior. Blackmore (1999) suggests that the British tits already knew *how* to peck and it was simply a matter of one tit being attracted to another -- who happened to be sitting on a milk bottle -- and then carrying out its innate pecking behavior. I think it is also possible that a tit would be attracted to a milk bottle even if no other tit happened to be around. Most birds have an innate attraction to bright shiny objects, and milk-bottle-tops are usually made out of a silvery foil. Milk-bottle-tops must stand out like bright beacons for passing birds, who feel compelled to land and carry out their innate pecking behavior. Encountering cream beneath the silver foil would *reinforce* the behavior and make it more likely to occur in the future. However, because no *new* information has entered the bird's mind and no *new* behavior has been produced, milk-bottle opening in birds cannot be counted as a meme.

Reader and Laland believe they have an answer to this objection. Their answer draws a parallel between the British tit's milk-bottle opening behavior and the behavior of a human tennis player. For Reader and Laland, a tennis player acquires tennis playing memes by observing other tennis players. These memes carry information about the appropriate location to play, the objects a player uses, and how the player should move in a certain way to hit the ball. They go on to suggest that the tennis player does not learn any new motor behavior such as running, holding, waving arms, or hitting, because these are already a part of their behavioral repertoire. The tennis player is carrying out innate behavior in order to achieve a non-innate goal. Reader and Laland then state that "*Exactly the same logic applies to milk-bottle-top opening birds*" (Reader & Laland 1999). The tits are not learning how to peck at milk-bottle-tops, just as the tennis player is not learning how to run or swing her arms around. They are, however, learning to peck a *particular* object to get cream, and this is a behavior and goal that is not innately defined. Therefore, milk-bottle opening in the tit is a meme.

The problem with Reader and Laland's suggestion is that they are glossing over important differences between the two cases. It is true that tennis players are carrying out innate movements, and it is true that the British tit is carrying out innate behavior. But the difference is that the tennis player's movements are combined in a non-innate fashion, whereas the tit's behavior is exactly the same as it would be if it was landing and pecking at any object. We would not be surprised if we saw a tit land on an apple and start pecking at it. Nor would we be surprised if the tit started pecking at the ground. So what is so special about a tit pecking at a milk bottle? Pecking is simply something that the British tit does. Also, consider the different reasons behind the tennis player and tit's behavior. The tennis player behaves in a specific way in order to win the game,

which is a *socially defined* goal. The goal of the tit is to feed, and regardless of what food it happens to find, feeding is an innate objective.

There are also important differences in how the behavior is learned. The tennis player learns through imitation and verbal instruction, which are methods of passing on information that the tennis player does not already possess. The tit's primary method of learning is through behavioral conditioning. When a desirable outcome occurs (getting the cream), the behavior of pecking milk-bottles is strengthened. But this is not a memetic transfer of information, because no *new* behavioral information has been assimilated by the tit. No information (or instruction set) is being moved from one mind to another so no memes have been copied. At most, the case of the British tit is an example of innate behavior being *triggered* through observation and *reinforced* through reward.

### 3.3 Does this mean that animals don't have memes?

The quick answer to this question is, no! All I have shown is that the spread of milk-bottle opening in British birds is not an example of memetic transfer in animals. There may be a number of animal minds that can support memes, but I think caution is needed before we make any definite claims. Because of the diverse range of cognitive ability among species on Earth, we should consider the evidence on a case by case basis. The case of milk-bottle opening in the British tit is not a meme, but there are cases of bird behavior that definitely point to the existence of memes. For example, certain species of bird can imitate sounds ranging from the calls of other birds to the sound of a telephone ring. The production of such sounds is not innate to the bird, so we must conclude that some sort of memetic transfer takes place. Something in the bird produces the neural wiring required to enable it to reproduce the sounds it hears in the environment.

One way to check if memes are involved in animal behavior is to see if the behavior is spread through imitation. For example, if a dog (Fred) watches a person (Roger) jump through a hoop and then copies the behavior and jumps through the hoop himself, we could suppose that the *idea* of jumping through the hoop was passed from Roger to Fred. The hoop jumping meme would have copied itself into Fred's mind through the process of observation and imitation. I think it would be unlikely for this to happen. Dogs do not seem to have the capacity to observe and then copy behavior. Getting a dog to jump through a hoop requires a long period of behavioral conditioning. Furthermore, it is possible that coordinated jumping is actually innate to dog behavior, so we might not be correct in suggesting that jumping through a hoop is a meme.

There are some examples of animal behavior that look memetic. Some dogs can be trained to balance and walk on a moving ball. I find it difficult

to believe that such behavior is innate, so it might be accurate to consider 'walking on a ball' behavior to be memetic. Of course, a dog cannot learn to balance on a ball by watching another dog. The only way that a dog can learn to walk on a ball is through extensive training and reinforcement. It seems that if walking on a ball is a meme, then it is a meme that has a very limited potential for replication. Since dogs cannot copy each other, the 'walk on a ball' meme can only replicate when the behavior is viewed by a human and then implanted into another dog's mind through a similar process of training.

Other possibilities of memes in animals include the choreographed walking of dressage horses, the transmission of directional information in honey bees, and food washing in Japanese macaques (as mentioned by Reader and Laland). The important point to note is that the *possibility* of memes in these animals is not enough to conclude that there *are* memes in these animals. Each case must be assessed independently. Perhaps the best way to test whether a behavior is innate or memetic is to isolate a member of the species in question. If, for example, a Japanese macaque was isolated from birth we could observe its behavior and find out if it has the compulsion to wash its food. The result of this test would settle the question for the Japanese macaque, but would leave the question of other animals open.

#### **4. What have I shown?**

My goal has been to show that milk-bottle opening in the British tit is not a meme. To accomplish this goal, I offered a firm definition of the meme and worked with this definition to show that the spread of milk-bottle opening behavior in the tit does not exhibit the features of memetic transmission. According to the definition I offered, a meme is a collection of instructions that, when followed, give rise to behavior. These instructions can be encoded in a number of mediums including the neural pathways of the brain. The most important feature of memetic transmission is that the instructions transferred are new, and did not already exist in the mind of the receiver. In this way, we can say that the acquisition of a meme gives rise to a new, non-innate behavior. Since the British tit has an innate attraction to other tits, and since pecking at objects is innate to the tit, we must conclude that milk-bottle opening is not the result of new behavior and is therefore not memetic.

I cannot show that non-human animals do not have memes. In fact, I have offered some possibilities of memes in non-human animals. I have however, shown that milk-bottle opening in the British tit is not memetic, and that the existence of this behavior is not sufficient to conclude that animals have memes. Because of the diversity of cognitive ability among animals, I do not believe the question of memes in animals can be answered definitively by pointing to a few cases. Some animals may have

memes while others do not. We must proceed cautiously and take a case by case approach. By doing this we will be able to construct a catalog of animals whose minds have memetic compatibility.

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