Bat Simulator: Discourse Edition

What's it like to be a bat? A number of ethologists and philosophers would be inclined to tell you that, while we can know how a bat's abilities evolved and operate, it will never be enough to understand what it's like to *be* a bat. In fact, philosopher Thomas Nagel wrote the essay "What Is It Like to Be a Bat" just to say that we can't know what it's like to be a bat, ever, because the question is too subjective and grounded in the concept of anthropomorphism—or the assigning of human characteristics to non-humans. I am inclined to disagree. For all the time I can only assume many ethologists have spent in the great outdoors, they may have missed something from the great indoors: video games. Playable, interactable simulations of varying robustness and distance from our reality, video games are capable of granting experiences that would be otherwise intangible to most people. As a gamer and aspiring game developer, I believe we *can* know what it's like to be a bat—or any creature, for that matter—by building interactive, digital simulators based off of empirical data; additionally, these simulators or video games may even be of some research and commercial use.

Marc D. Hauser, an evolutionary biologist with additional education in the field of cognitive science, would probably reject the idea of video games allowing us to experience and understand animal lives. This is because parts of the game would still need to involve some degree of anthropomorphism, thus delegitimizing the simulation. In his book *Wild Minds: What Animals Really Think*, he encourages healthy skepticism towards anthropomorphism's use in scientific study, and concludes that while animals certainly have thoughts and feelings, we will never be able to know for certain what those thoughts and feelings are. In opposition to anthropomorphism, he argues, "To discover what a dog or any other animal feels and thinks, we must carry out systematic observations and experiments, guided by the theories of evolutionary

biology and cognitive science" (Hauser 10). Essentially, because anthropomorphism is innately subjective, it therefore has no place in scientific study—an interesting justification, considering that thoughts and feelings are also, by nature, *subjective*. It seems almost silly to completely outlaw a method of hypothesis development simply because it was incepted from a subjective place, namely someone's own experiences, thoughts, and feelings, reinterpreted to match the animal's.

On the other hand, in the introduction to primatologist Frans de Waal's book, *The Ape and the Sushi Master*, de Waal sides in favor of anthropomorphism as a legitimate basis for conjecture. He is especially supportive of this type of interpretation when it is used for animals that are evolutionarily similar to us, such as the chimpanzee. In stark contrast to Hauser's point of view, de Waal argues, "Isn't it far more economical to assume that if two closely related species act in a similar way, the underlying mental processes are similar, too?" (de Waal 70). If the parts, actions, and evolutionary stimuli closely resemble one another, it stands to reason that the thoughts and invisible mental operations are similar, too. Anthropomorphism can be used as a way to interpret observations and form hypotheses surrounding the thought processes of animals closely related to humans with very little alteration. Follow-up is obviously still necessary; the interpretations could be wrong, which is why anthropomorphism is used to form questions, not answers. Therefore, with education as to where differences stand between humans and evolutionary cousins, anyone could imagine what it's like to be a chimpanzee in much the same way they could picture what it's like to be another human. All it takes is a bit of background information—a bit of *world-building*, in game design terms.

However, I do concede that this only takes care of the animals that are closest to us, leaving the problem of how to address those further away in the evolutionary tree. For this, de

Waal stresses the importance of a specific kind of anthropomorphism, which he refers to as "animalcentric anthropomorphism," which is where someone takes the animal's perspective when evaluating the world and deciding how to respond to it (de Waal 77). For instance, while humans might think insects are gross, an ethologist working with an insectivore species could understand that, from the animal's perspective, insects are delicious. De Waal also details a very important point about the proper use of anthropomorphism:

> Ideally, we understand animals based on what we know about their *Umwelt*—a German term introduced in 1909 by Jacob von Uexxküll for the environment as perceived by the animal. In the same way that parents learn to see through their children's eyes, the empathic observer learns what is important to his or her animals, what frightens them, under which circumstances they feel at ease, and so on. (de Waal 75-76)

Again—and this is especially important when working with species that aren't closely related to us—in order to use anthropomorphism to understand an animal, you must first understand the animal's reality, in terms of both individual and evolutionary history. What especially interests me is the concept of *umwelt*; while it might take an ethologist significant mental effort and time to imagine being an animal going through the motions of its daily life, the process could be greatly facilitated by building a simulation of the animal and its environment. The simulation itself could act as an *umwelt* tool by accurately representing the physical environment as well as the abilities involved with perceiving it.

This, in my opinion, directly addresses one of the main issues many animal scientists have with anthropomorphism, which is that humans are not evolved to have the responses to the same stimuli nor abilities that other animals have. All of these are problems can be addressed in a simulator. Within computer-generated reality, we can alter the abilities, the environmental

stimuli, and even the thinking processes of the person interacting with the simulator. I'll go ahead and illustrate how this already works within video games.

Within the user interface of most games, there is usually some sort of value associated with your ability to continue playing the game. This value is commonly referred to as "health," and is usually represented as a bar or meter. This meter can be any color—though usually it's green or red—and the length of that bar at any given moment has the ability to instill me with absolute *panic*.

Not discomfort, not even launching me back to a state of "Well this isn't real anyway so whatever," *no*—it causes profound and unadulterated terror. Despite the fact that I don't walk around in my normal life with a health statistic actively displayed, I respond to that bar going from an inch to a millimeter as if I was literally about to die. You would think that the resulting fight-or-flight response would tell me to leave the simulator, because it's the quickest way to end dangerous situation. And yet, nobody seems to ever put the game down and walk away like evolution theoretically tells us to; instead, we respond *within the game*, with whatever abilities have been granted to us in that scenario. If you have the ability to run, you sprint away from whatever made your health-bar drop to such a low amount; if you have the ability to heal, you heal yourself; if you have to fight off an attacker, you strike back with whatever you have, be it swords, guns, teeth, claws, or venom; if your health is low because you're "hungry," you frantically search your inventory or your immediate surroundings for food.

Video games and simulations, when built properly, are capable of altering more than just your reality: they change your actual *thought processes* when deciding how to act within that reality. Again, to be completely clear—especially for people who have never played video

games before—you do not think along the lines of what is literally real; you think along the lines of you're capable of within the simulated reality.

With that in mind, what would be needed to build a bat simulator? First you need a specific type of bat. After gathering information about the species, you could then create a system of value-relations based on known facts; for instance, an energy system could be designed to incorporate the known metabolic rate of bats, and replenished accurately using the known value of calories provided by different food sources. The environment would be created to model real environments within the species' known range. The more difficult aspects to render—which also have a higher chance of involving anthropomorphism—would be the simulation of the bat's abilities, particularly echolocation. While designers could potentially try and create a sound-based system where players emitted a wave then actually listened to its return, it may be easier for players to understand the echolocation mechanic if it was instead represented with visuals. This is because a human's primary sense for navigating the world is sight, while a bat's is sonar; while it is an anthropomorphic interpretation, it is a necessary one that provides for a better understanding of the bat's world. One possible visualization is to represent sound waves as a series of contour lines: when emitted, the lines would travel away from the player uniformly, then parts of the line would change shape and bounce back as they encountered resistance. When hitting a stationary object, the lines would return smooth; when hitting a bug or other moving target, the lines might change to be fuzzier or show a difference in color. One the basis system had been established, you could incorporate other factors known from objective, empirical data to affect echolocation and the travel of sound waves.

Provided that the simulator has been crafted with all the necessary parts—namely the environment, abilities, and "goals" of a specific bat species—people could then play the

simulator and explore the world. When the player's hunger meter dwindled, they might think, "Oh! I need to find a bug to eat!" Players could quickly review options available to them, possibly deciding to fly and use echolocation to search for a meal. If they had experience with the simulator, they might even be able to remember which areas of the map had the best or easiest bugs to catch, and what flight maneuvers were needed to catch their food. When their echolocation indicated there was a bug nearby, players might even be *excited,* because they were getting closer to their goal. If a predator or rival bat showed up, those feelings might switch to one of panic, fear, or ferocity. In this way, people could not only be a bat, but could even begin to think like one.

This process could be repeated with nearly any animal. First you build the objective environment and system relations between known resources within the ecosystem. Then you craft abilities that can be easily altered to perfectly match the animal's, such as terrestrial movement or monochrome vision. Then, to the best of your knowledge, you create a representational or anthropomorphic version of non-human skills. For a dog, you would need to simulate smell, and your best bet would be to create a system that relied on a combination of colorful visuals and intriguing sounds. For a bird, you might show historical migration patterns as a map the player can access, or highlight landmarks in the player's vision to draw their interest. For insects, you might represent their incredible reflexes as the player perceiving the world in slow-motion. The abilities do involve anthropomorphism, but it is permissible because they interact with and rely on a world created with objective knowledge.

I'm sure Hauser and Nagel would still be skeptical—the thinking processes and general reality have been altered, sure, but the emotions are only approximate, and most of the abilities

are representational out of necessity. And they're right; emotions can only ever be approximate. But they can be a very *close* approximation, and therefore, still useful.

The concept of building a simulator for an animal just to get some semblance of what it's like to be one can admittedly come off as a bit gimmicky. However, it can actually serve a very important purpose in research, as well as have some worthwhile commercial entertainment value. The best way to learn is through experience—something that is, quite literally, impossible to do in regards to being another animal. You can throw a dinner party that turns into a disaster, learn to give speeches and overcome stage fright, or practice playing an instrument until you've perfected a song; unfortunately, however, the ability to shapeshift into another creature continues to elude us. This is where the simulation can be potentially vital to an ethologist's research: they can have a way to experience "being" an animal. Learning by experience is important because it allows you to pick up on nuances and tackle obstacles that you may not have predicted while imagining a scenario in your head. In the same way, ethologists will have an increased ability to pick up on the nuances of the life of an animal by "being" one, which is an experience that could provide the key to some aspect of their research.

Finally, I think it would also be an interesting way for the scientific community and general public to interact with one another. Provided the simulator is built well enough, even someone totally unfamiliar with a species will be able to gain knowledge about the animal and its environment. They may even become so invested that they decide to contribute to research or conservation in a way that is meaningful, which could help the scientific community, the animal's species, and even the animal's environment. Aside from education, I honestly think it would be fun to be an animal. Who hasn't at some point in their life watched a bird fly and wished that they could fly, too? Who hasn't wanted to experience being a tiger stalking their

prey, a monkey swinging through the trees, or a dolphin gliding through the ocean? I know I have, and as a developer, I see a viable market for these types of video games.

Nagel and Hauser say that we can't ever know what it's like to be a bat; I say that they just needed to build a better bat simulator.

Works Cited

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