WHAT IS IT LIKE TO BE A (VIRTUAL) BAT?

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In the half century of responses to Thomas Nagel's philosophical question of 'what is it like to be a bat?', exploring the question from multiple metaphysical and scientific perspectives, none have questioned the immutability of the categories of 'human' and 'animal' themselves. In the majority of responses, the transitory state between the mind of a human and the mind of a bat is ignored in favor of cognitive and philosophical leaps that suddenly throw the reader into one state or another, with no attendance to the long history and traditions of similar thought experiments having been conducted in various shamanic practices.

THE INTENSIVE VIRTUAL MULTIPLICITY OF HUMANS AND ANIMALS

Bat's have figured as important spiritual intermediaries between people and spirits amongst the Navajo of North America, while shamans in the ancient Mayan culture were able to shapeshift into bats with the Taino cultures of the Caribbean considering bats as messengers from the realm of spirits and ancestors. A variety of shamanic practices and techniques are used to shift

human perception into the realm of the ‘more-than-human’. In anthropologist Eduardo Viveiros de Castro’s reading of shamanistic practices in relation to *perspectivism*, he examines how specific practices are linked to the shift between human and animal states. In his interpretation of the Northern Amazonian Yanomami culture, shamans are figures who are able to commune with and enter the spirit world through the ritual inhalation of the powdered bark from the yãkõanahi tree. The ritual must be repeated numerous times in order to overcome the deliriant effects of the drug, which the Yanomami shaman Davi Kopenawa compares to the amount of effort the ‘white man’ expends to gain mastery of the written word. Viveiros de Castro analyzes how Kopenawa makes explicit the parallels between the process of acquiring knowledge of and access to the spirit world with the practice of mastering a symbolic system like written language. However, in the Yanomami culture, the words are images and the images are spirits and those spirits are granular, mirrored intimations of the *xaparipë* or animal ancestors which are perceived by the shaman, hidden within the phenomenal depths of human forms. Within the cosmology of the Yanomami culture, to enter the spirit world is to enter a world of ‘intensive virtual multiplicity’ in which spirits, animals, shamans, the dead, whites, myths, dreams, drugs, hunts and forests are entangled together and yet infinitely differentiated. The homeostatic states between the various entities in the world of the living eg. human and animal, are dissolved into a ‘dynamic distribution of identity and difference between the dimensions of animality and humanity’. For the Yanomami culture, the animals they hunt are in fact the spirits of human ancestors from the pre-cosmological period of myth when the differences between humans and animals had yet to be enacted. In these terms, the human resides behind the animal form as the animal is an emanation of the human. Viveiros de Castro uses Kopenawa’s account of Yanomami cosmology to interpret the difference between human and animal ontology as a relational immanence that moves between the perspectival relationships of figure and ground between human and animal bodies and spirits. In these terms, it is difficult to discern whether a jaguar is a ‘block of human affects in the shape of a jaguar, or a block of feline affects in the shape of a human’. In consequence, in the shift from one ontological state to another, the emphasis should not lie in how the subject transforms from an immutable ‘human’ state to a similarly static ‘animal’ being, but rather on the ‘process’ of ‘heterogenic becoming’ in which human and animal states mutually give birth to each other through *autopoetic* metamorphosis. Within this constellation, the shamans' mastery of symbolic navigation between these perspectives is crucial for guiding the participants' access to them. Part of the problem of anthropomorphism is that to undo it requires effort. So when Deleuze and Guattari spoke about ‘becoming-animal’ in ‘A Thousand Plateaus’ and ‘Capitalism and Schizophrenia’, it was a deliberate attempt to unravel the comprehensible definitions of the human in order to substitute its form and functions with affects, intensities and flows of movement as descriptors for the process of living. When Viveiros de Castro speaks about humans and animals as merely a block of affects which can be interpreted differently according

to your perspective, it is no so far from Deleuze and Guattari's proposal that, 'a becoming animal always involves a pack, a band, a population, a peopling, in short, a multiplicity. We sorcerers have always known that.' Donna Harraway widens the lens even further, to acknowledge the 'becoming *with*' as the importance of recognizing the shared contact zones of vulnerability between the interdependent subjectivities and identities of the human, animal, material and spirit worlds which flow and feedback in circular looping formations.

ABSENT QUALIA, FADING QUALIA...FLYING QUALIA?

Moving from one set of cosmological beliefs to another, Nagel's seminal 1973 essay 'What is it like to be a bat?' introduced the problem of *qualia* to philosophy by similarly analyzing the relations between human and animal. Nagel's essay was one of the first to address the 'hard problems of consciousness' concerning how subjective experience is not obviously reducible to any physiological function of the brain, but rather that there is an 'explanatory gap' between how we understand the brain works and how the world is experienced consciously in our minds. For example, how can one describe what pain feels like or the experience of seeing the colour red, without using synonyms and adjectives which stubbornly refuse to communicate its qualitative experience outside of the sensory faculties through which they are mediated? Nagel asks whether the mind is reducible to an emergent faculty of the brain and human physiology or if an aspect of the 'raw feels' of consciousness, the subjective quality of experience, is irreducible to either the bodily experience of the senses or the material structures of the brain. His eponymous question, formulated elegantly and simply is, *what is it like to be a bat*? Nagel chooses the bat because it is sufficiently different from humans to ascribe a fundamentally alien character to its conscious experience, though not so different phylogenetically that we would consider it incapable of consciousness at all. If it is possible to understand what it is like to be a bat, then it would suggest that consciousness is not mysterious and perfectly replicable which opens the possibility for artificial intelligence. Conversely, if the subjective experience of a bat cannot be ever fully understood by a human, since the subject cannot ever embody the cumulation of life and bodily experiences of being a bat, then it means that consciousness is essentially a phenomenon closed off from human understanding. Nagel's thought experiment suggests that even if one can imagine having wings, being able to fly around and catch insects in one's mouth and navigate the environment by receiving feedback from ultrasonic screams, one would only ever be mediating those experiences though a set of human experiences. For Nagel, the ability to imagine the consciousness of an animal is limited by our inability to experience that consciousness without becoming that other being. At a more fundamental level, Nagel's essay addresses the long standing mind-body problem in western philosophy; the dualist and physicalist position which proposes that the brain creates the mind and is impossible without it versus the idealist perspective which suggests that all material matter is created by the mind itself and cannot exist without the perceiving subject. It is a question about the nature of

reality, and whether we construct it through our consciousness or we are ourselves the mere illusory products of a material universe. The responses to Nagel's proposition in the subsequent fifty years have ranged from the profound to the acerbic to the absurd. The celebrated philosopher of the mind Daniel Dennet addressed the question in his seminal book 'Consciousness Explained' by suggesting that it would be possible over time to understand every possible facet of the neurophysiological experience of a bat to the point that one could make a objective conjecture on what it is like to be a bat. Dennet's argument follows the same functionalist reasoning as that applied to the problem of 'Mary's Room' proposed in Frank Jackson's 'Epiphenomenal Qualia', in which a person who lived their entire life in a black and white room, given all the scientific information regarding the physics of the color, when shown the sky for the first time, could correctly identify a colour it had never seen before. A more critical response to Nagel's question was developed by neurophilosopher Kathleen Atkins in her essay 'What is it like to be Boring and Myopic?'. What Atkin's questions in Nagel's essay is the assumption that there are limits to what the scientific understanding of a bats neurophysiology can illuminate about the character of its consciousness experience. While Nagel only describes in the most general and basic terms the sensory and behavioral experience of a bat, Atkin's takes his proposal for an 'objective phenomenology' of subjective experience at face value and examines all the available scientific knowledge about a bats sensorimotor systems and neurological processing to make informed judgements about what it is like to be one. For example, Atkin's examines the actual mechanisms employed in the bats echolocation system by describing how it uses common frequency (CM) and frequency modulation (FM) sonar to navigate its environment in search of prey. The common frequency is a single frequency emitted at a constant speed which is used to determine the relative velocity of the bats to its object of pursuit while the FM signal involves a 'sweep' through a range of frequencies from highest to lowest in order to determine the range or relational distance between the bat and objects in its field of view. The sound field of the bat is circular in shape with its highest intensity at the center, which emanates from its target like a sun, around which the ultrasonic screams of the bat circulate with gradually decreasing levels of audibility and can be compared with the visual field of the fovea in the human eye. At the same time, noise and interference must be blocked out from the bats own screams as well as extraneous signals from other bats and sound sources so that it does not become disoriented, and this is achieved through the simultaneous retraction of the middle ear muscles with each ultrasonic cry, rendering it temporarily deaf and blind. In view of this detailed understanding of the bats auditory system from a physiological point of view, the question of what it is like to be a bat can be answered more clearly and precisely. To be a bat is to be intermittently deaf and blind with objects only appearing in detail within 3 meter proximities, while objects further away or behind the bats flight path literally disappear from view as they are outside of the sonar sweep of its echolocation system. Atkin's claims is that, given this understanding, the very notion of a bats *point-of-view* and the idea of

seeing images or *objects* can only be conceived as representational props which have no equivalent in a bats perception. Simply put, greater empirical understanding of what it is like to be a bat, does indeed afford a deeper understanding of what it is like to be one, which can operate in parallel with imaginative conjecture. At the same time, Atkin's concedes that this 'objective phenomenology' does not really address the subjective inner world of the bat and what it might be like to be one, which only a sensory embodiment could provide.

VIRTUAL REALITY AND ANIMAL EMBODIMENT

The phenomena of presence in virtual and augmented reality systems has been defined by Mel Slater as 'the strong illusion of being in a place in spite of the sure knowledge that you are not there' which he follows with the qualification that, 'since it is a qualia there is no way to directly measure it.' Since the 1990's when virtual reality first began to be used in an experimental setting, the technology's somewhat mysterious ability to generate feelings of presence in virtual environments has served researchers attempting to simulate experimental conditions impossible in real life. Despite Slater's early comment on the immeasurability of presence, in the subsequent decades, techniques for recording increases in heart rate, blood pressure and galvanic skin response indicate involuntary responses in the autonomic nervous system that signal strong feelings of presence in a virtual environment, despite the users cognitive understanding that it has no material reality. One of the key factors determined to induce feelings of presence in immersive virtual environments is *embodiment.* Embodiment is generated at a base level through a number of technical features in a VR system such as head, eye and hand tracking, the graphical fidelity and processing fluency of the visuals, which generate a convincing analogue between the users sensorimotor experience of the virtual world and their proprioception in real life. While the technology is primarily visual, the phenomenological experience of virtual reality can encompass a wider array of sensory engagements. The virtual system in fact creates a simulacrum of the sensorimotor relationships one experiences in daily life, which is enough to trick the body, though not the mind, into believing it is actually experiencing virtual stimuli presented in that environment. So for example, when asked to walk across a plank laid over a hole in VR, the body produces involuntary signals such as increases in the electromagnetic conductance of sweat on the skin, as if one was really in danger of falling. However, this phenomena has been explored in ever wilder configurations by researchers, to allow perspectival changes where users can embody the avatars of different ethnicities, genders or body shapes to generate empathy through embodiment in the perspective of another. Most recently, an emerging field of animal embodiment using VR has allowed users to experience the bodies of spiders, scorpions, rhinos, tigers and hummingbirds. The stated goal of this research is to generate greater senses of empathy between humans and non-human animals by allowing users to embody the perspective of those beings. The over-hyped notion of virtual reality as an 'empathy machine' is

exploited in this research, using a technological system to literally shift one's conscious and bodily experience onto the non-human. Anthropologist's Alex Gearin and Oscar Calavier Sáez have described how the use of ayahuasca amongst Amazonian shamans is used to shift individual perspectives from the 'true human' to the jaguar, anaconda or peccary. The visual hallucinations which accompany rituals utilizing psychoactive preparations, sit alongside a range of "ocular and bodily transformations" such as body painting, mask wearing, changes of attire and diet, used to create the bodily conditions for this transformation. The simple question we ask is whether VR, as a technology which engages the senses and the body, can serve as an additional method for traversing between human animal ontologies?

I AM A STRANGE (SENSORIMOTOR) LOOP

Behind the practical application of virtual reality and the illusion of presence it generates is another theory of consciousness and cognition which can also provide a theoretical framework through which to approach Nagel's question. In the early 20th century, German biologist Jakob Johann von Uexküll first described the autonomous coupling of sensory and motor systems across all organisms and animals, which is the basis for our understanding of sensorimotor integration. Uexküll observed that every species uses its sensory apparatus, or *sensors*, to gather the available data from its environment. This information would in turn produce certain automatic responses in the motor systems of the animal, which he called its *effectors*, with those motor actions producing consequent changes in the environment. Uexküll called this the *function-circle*, which in embodied and enactive models of cognition have been renamed the *sensorimotor loop*. In human beings, the sensory system refers to the sensory receptors connected to the nervous system which are responsible for our senses of touch, taste, smell, sight and hearing integrated with the motor system controlling movement actions in the body. Sensorimotor Contingency (SMC) is an influential theory of the relationship between the sensorimotor system and consciousness developed by psychologist Kevin J. O'Regan and philosopher Alva Noë. It proposes that cognition occurs outside of the brain through our active sensorimotor exploration of the world which is determined by the sensorimotor contingencies governing our sensory apparatus alongside those defined by the environment. A more nuanced approach is provided by the aforementioned enactive and embodied models of cognition developed by biologists Francisco Varela and Humberto Maturana which proposes that cognition occurs through the body's actions in its environment in a 'structurally coupled, communicating system'. In other words, cognition is embodied and there is no thought or experience independent of that body, which cannot be disentangled from the environment in which it operates. Conversely, to replicate the sensorimotor contingencies of the body is to recreate the consciousness experience of that being. Sidestepping the central assumption and philosophical problem at the heart of Nagel's question related to the division between body vs mind and subjective vs objective reality, an embodied approach suggests that consciousness is a

property of the body and its interactions with the world and that it exists as a quality of that interdependent and entangled relationship rather than an emergent or mystical property of the brain. For our purposes, to simulate the *bodily* experience of a bat and its interaction with the world is to generate the *embodied* consciousness of what it is like to *be* a bat.

The aim of our project is to explore Nagel's question utilizing new technologies and create a virtual reality system which generates illusions of presence by simulating the sensorimotor contingencies of a bat. We attempt to overcome the conceptual limit of Nagel's thought experiment, by taking an embodied approach to the liminal horizon of differentiation between human and animal states and create the technological conditions for metamorphosis from one set of bodily functions to another through the process of sensorimotor mastery. In other words, in simulating the physical properties of being a bat alongside imagining them, we ask whether this can bring us closer to the subjective qualitative experience of being one. The question we would like to explore further in this project is whether the notion of symbolic mastery integral to the transition between heterogeneous human animal states contained in Viveiros de Castro's account of shamanic practices can be paralleled with the mastery of sensorimotor contingencies required to become embodied in a virtual reality system that seeks to simulate non-human ontologies.