Neuroplasticity, Nagel and nn-DMT: Where Neuroscience and Evolutionary Biology Meet Mystical Mathematics and Theoneurological Models of Consciousness

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#### ABSTRACT

Explaining the neural correlates of consciousness appears to be the easy problem of consciousness; as seen in the numerous studies on neuroplasticity cited by Norman Doidge in The Brain that Changes Itself, intentional action on the part of a self rather than the brain seems to be responsible for these changes. This refutes reductive materialist views that brain activity equals consciousness. The hard problem of consciousness is explaining the mechanisms that create qualia and experiences of a selfconscious moral agent; this; seems to be more of a mystery. In this paper I would like to discuss some logical options that don't seem to be seriously considered by the community as a whole in the hope that we may close the gap between the mysterious hard problem of consciousness and empirical understanding. Thomas Nagel shows us that teleological arguments for the existence of the laws of physics as we know them (reductive materialism) or divine command or intelligent design (dualism) do not hold up to scrutiny when trying to theoretically reproduce them without historical accounts. The remaining alternative is monism of either a neutral or panpsychic leaning. Nagel defines a neutral leaning to monism that implies that the mechanisms of consciousness are known unknowns not made intelligible by current science, while also leaving room for unknown unknowns. In this paper I would like to explore a few alternatives that can be at least conceptualized within our current scientific framework that could shed some light on how philosophers, theologists and scientists alike can work towards understanding these known unknowns.

#### **KEYWORDS**

Consciousness, Reductive Materialism, Dualism, Scientism, Neutral Monism, Panpsychism, Neuroplasticity, DMT, Psilocybin, Religious Experience, Neo-darwinism, Theoneurological Models

## NEUROPLASTICITY

For Norman Doidge neuroplasticity is the brain's ability to alter the pathways in which it uses to execute particular functions. The standard doctrine in neuroscience preceding the studies that Doidge highlights in The Brain that Changes Itself was dogmatic and presented the brain as a set system of pathways that were triggered in a predetermined way based on sensory input. Under this view, the statistical mapping of neurological pathways is assumed to be a sufficient method of explaining behavior and there are standard models that can be used as blanket explanations, or rather presets. For instance under this doctrine, the brain should have a preset pathway that is specialized for determining sensory inputs of the hand; the individual fingers ought to have their own specific correlates when looking at fMRI images and would not function properly when the pathways deviate from this preset. Another example would be to state that there are specific preset pathways in the brain that allow the sensations of sight, sound, taste, smell and touch to occur under the umbrella of a physical consciousness housed in the brain. Unfortunately for this doctrine, there is a plethora of evidence to the contrary (Doidge 2007, 218).

Scientists in the 1960's discovered that there is a "critical period", a period of time in which all of these perceived qualities of consciousness are molded into their functional pathways. Rather than being born with preset pathways, the brain's activity develops in a manner that coincides with sensory inputs. Two researchers, Hubel and Weisel had kittens that were blind in one eye because the scientists had sewn one eye shut during the critical period of visual development only to reopen it after the critical period had ended. It seems that since the eye was not used, the kittens' brains failed to develop the pathways needed for vision, and the brain imaging of the time supported this (Doidge 2007, 42-69). This is evidence that during the critical period the brain is not concrete, but instead *plastic*; instead of having preset capabilities the brain is molded through development .

With the critical period established as a period of great neuroplasticity early in life, the question of whether or not the brain retains this quality later in life arises. At first this idea was met with great criticism, and even supporters of the critical period were skeptical. However, numerous studies that indicate the brain images of primates and human beings alike have made it apparent that the brain does in fact rearrange its pathways when it is primed to (Doidge 2007, 64). In cases ranging from amputees to stroke victims or people with learning

disabilities, neuroplasticity has been shown to be present in many forms. These neuroplastic changes are often adaptive and allow for a better interaction with the world, such as a stroke victim that regains motor function to a degree after rebuilding the connections between their limbs and brain or a child with autism that uses educational material to reinforce pathways related to their auditory comprehension and language skills to improve socialization. Since brain imaging technology has expanded there are more and more studies being produced that show the incredible restructuring powers of the brain in great detail and give us an idea of how neurotransmitters interact (Doidge 2007, 84).

These changes are still ordered to a degree, as the axiom "neurons that fire together, wire together<sup>1</sup>" (Doidge 2007, 50) implies it's not random, but rather fluid and produces practical results, such as a missing finger having its neural correlate mapped to the neighboring finger. As Doidge digs deeper into the mechanisms and implications of neuroplastic change it becomes apparent that there is another mechanism that puts our conscious experience into motion. There is something that is in charge of ordering the brain and directing it to make these neuroplastic changes; this would be the self. All of the human cases discussed in The Brain that Changes Itself have something in common, and that is their interaction with the culture around them and the ability to form new pathways (Doidge 2007, 207-208). I will discuss later that this cultural interaction is good reason to suspect the presence of a self-conscious moral agent (SCMA) that uses sensory input from the entire body and intentionally reflects upon past experiences and knowledge in order to interact with the world in ways that are meaningful to the SCMA's experience . Self-consciousness (cognitive self- reflection) and awareness of morals and values emerge from mind-brain interactionism, I will explain later that there is further evidence that panpsychism should be considered opposed to dualism or reductive materialism.

# NAGEL AND THE DOUBLE MIND PROBLEM

Nagel sees the divide between conscious experience and cognitive selfreflection as the "Double Mind Problem" and holds that it cannot be explained thoroughly by the natural sciences, namely brain imaging and the adherence to a reductive materialist paradigm. In *Mind and Cosmos* Nagel poses the question "in

<sup>1.</sup> The axiom is attributed to neuroscientist Carla Shatz, although it's thought the original concept could be attributed to Sigmund Freud.

what way or ways is the world intelligible?" (Nagel 2012, 19) as a benchmark for the goals of both science and philosophy. Intelligibility is to be taken as the ability to be understood by the "double mind"; being not just consciously experienced but also cognitively reflected upon. Using this definition as an anchor Nagel discusses the verificationist and logical positivist roles played by science as one of the most aesthetically pleasing and useful methods of gaining intelligibility (Nagel 2012, 37-38). It consists of empirical evidence that builds off of it self and explains just about every perceivable aspect of the physical world . The lack of understanding exactly how the relationships between the physical world, the conscious mind and the self-reflecting cognitive mind function is where the natural sciences fall short in presenting intelligibility (Nagel 2012, 41). Since self-reflecting cognitive activities appear to be so central to an SCMA's experience it is not proper to claim contemporary neuroscience or neo-Darwinian (Tallis 2011, 147-182)<sup>2</sup> paradigms as being sufficient theories of everything. Nagel does make a concession that if a theory were developed that allows us to accurately and thoroughly explain the exact origin and nature of self-reflecting cognition (or lack thereof) in addition to the biological elements of any physical being it could shed some light on how the process works, although still does not explain the initial emergence of selfreflecting cognition (Nagel 2012, 85-88).

# **NEUTRAL MONISM**

Nagel takes the position of neutral monism which he outlines in the words of Tom Sorell:

Even if the mechanisms that produced biological life, including consciousness, are, at some level, the *same* as those that operate in the physical universe it does not follow that those mechanisms are physical just because physical evolution preceded biological evolution. Perhaps some transmental concept is required to capture both mechanisms.<sup>3</sup>

Tallis describes neo-darwinism or "Darwinitis" as a perverse misrepresentation of Darwin's theories popularized by Richard Dawkins and other prominent evolutionary biologists. Darwinitis is seen as a form of scientism.

<sup>3.</sup> Tom Sorell, Descartes Reinvented retrieved from Nagel

Nagel and Sorell believe that physical things and mental things could both exist in the physical universe but ultimately leaves open a claim to the mystery of the most fundamental levels of the emergence of consciousness in biological organisms. Some theistic arguments are in fact more compelling for Nagel than materialism, however he does not believe that they hold any more legitimacy as candidates for theories of everything on a grand scale (Nagel 2012, 65-67). A theory of everything that does not have gaps in intelligibility; one that accounts for consciousness, quantum mechanics, the origin of or multiplicity of the universe, the existence of deities, or unknown unknowns . It is the nature of the teleological claims made by both theists and materialists that Nagel objects to (Nagel 2012, 91-93). The laws of physics are assumed to be self evident truths and deterministic, but Nagel is only comfortable in accepting this if there is also understanding of why the laws are what they are other than referencing historical accounts. He would instead accept an explanation only if it could account for how those laws would be employed in an alternate universe where the physical reality is empirically measurably different (Nagel 2012, 88-92). The same objection holds for theistic dualism where there is no account of how a God or gods interact with the construction of the physical universe and the experiences of SCMAs on a fundamental level (Nagel 2012, 95).

Under neutral monism Nagel lays out the framework of value realism to refute neo-Darwinian ethical naturalism. He introduces Sharon Street's argument that in Darwinian terms there is no evidence to relate awareness of mind-independent moral truths or concepts of good and bad to the process of natural selection and the end goals of reproductive fitness (Nagel 2012, 105-111). These are just either ethical egoist or relativistic and subjective moral views, noting that even altruism doesn't equate for awareness of "good" but rather can be explained as only self-sustaining behavior to ensure reproductive fitness. This stance against the existence of ethical realism is often extended into also reducing many of the humanities to reductive materialism, however as I will discuss later on there are also evolutionary reasons to think otherwise (Tallis 2011, 213-229). Nagel welcomes Streets criticisms of ethical naturalism but wishes to impose a belief in value (ethical) realism; this being the belief that human beings have the ability to detect value as an attribute of self-conscious awareness (Nagel 2012, 105-111). Thus defending the existence of real morals and concepts such as good and bad as parts of biological order falling under the scope of Darwinism. However the ability

to detect them does not equate to intelligibly understanding (with the "double mind") exactly how these values came to be for the same reasons that detecting the concrete physical laws of the universe or will of a theistic commander does not equal understanding how they came into place .

Subjective feelings based on perceived, but not true understandings of value, such as the violent teachings and cultures of cults and religious extremist groups are a prime example of why ethical naturalism is not sufficient in explaining morality. While the underlying beliefs across world religions regarding the existence of omnipotent benefactors and measurable evil among other facets are similar in extensive ways, there are startling deviations of interpretations seen in the world; all of which claim knowledge and true understanding of moral principles. While this can be seen as the failure of religious practises to bring about a truly intelligible understanding of morality I believe the commonalities between certain historical religious accounts and some modern neuroscience and mathematical revelations can shine some light on how to fill in some of the gaps in Nagel's neutral monism.

# FILLING IN THE GAPS WITH THEONEUROLOGICAL MODELS

Nagel does not commit to a mechanism in which consciousness, cognition and values come into existence. In not sufficiently closing this gap his support of panpsychism is incomplete, even as thoroughly as he explains the hypothetical manner in which we conceive of certain types of matter arranging in specific ways to unleash their intrinsic capabilities of consciousness in all animals, and cognition and values in human beings by carefully constructing models with scientific evidence. I would like to argue that there is perhaps some evidence that can be used to show that psychedelics, namely n,n-dimethyltryptamine (DMT) and psilocybin are at least in part related to the emergence of self-aware consciousness, cognition and values in human beings.

Before proceeding I'd like to note that I am not necessarily arguing for or against the existence of a God or gods, merely presenting a theory of where self conscious reflection and value realism may come from. However, it is true that some of the remaining sources I wish to cite are in fact written from a theoneurological perspective or focus on the importance of spiritual or divine properties. Just as Nagel embraces the importance of skepticism against scientific dogma, I will proceed in the tradition of many materialists in being skeptical of these theistic claims, only instead through the lens of neutral monism. It is also worth noting the

great stigma surrounding these substances; while drug abuse certainly is an issue that is detrimental to society, the research described in the following section is not to be mistaken as such.

The likeness of individual psychedelic experiences dating back to prehistoric times spanning cultures around the globe when compared with contemporary accounts (Strassman 2001, 153-247) suggests values exist. Many researchers believe cave paintings and artifacts depicting sacred geometry or depictions of cultural events as well as the stories of prophets, omens, oracles and diviners to be connected to the psychedelic experience of altered consciousness (Abraham 2015, 3). The subjective themes of these experiences include introspection, a separation from the ego, a sense of being one with the world, contact with divine beings, and overwhelming experiences with infinity as well as complex visual hallucinations and distortions thought to often have mathematical significance (Abraham 2015, 13-18). To a proto-conscious mind these experiences would perhaps be both the beginning of religious experience and the mechanics of mathematics in human minds, and to Terence Mckenna they were (Abraham 2015, 14). These experiences were seen to have intrinsic value and may have been the driving factor of crafting the roots of written language, as evident in early cave drawings being interpreted as depicting the psychedelic experiences. Neuroplasticity would allow for the realization of these concepts to perhaps be shared to a degree without the first person experience of the psychedelic state, so how ingrained is this process in the realization of consciousness and values? Religious storytelling and teaching could be a means of culturally transmitting these neuroplastic changes and instilling realization of values. It's also very important to note that there are numerous reports of similar experiences involving such existential themes being completely unrelated to psychedelic use and rather the product of any one of numerous meditation or divination techniques or even more seemingly mundane activities such as dancing rituals or social gatherings, which no doubt also have neurological models to be explored (Winkelman 2010, 25-28). The question is then to what degree are psychedelics responsible for meaningful progress in human evolution? There are many findings that indicate how important the intake of different compounds, mind altering or not affect human and primate populations and it can have profound effects (Winkelman 2010, 251-253). It's important to note DMT's presence in many plants, early use would have been completely coincidental due to DMT's need to be mixed with

a monoamine oxidase inhibitor to be active when consumed orally (Strassman 2001, 42-56). When this combination of plants was discovered, awareness of it could have likely spread quickly leading changes in social customs.

In his "Stoned Ape Theory" Terence McKenna, popular figure from 1960's counterculture, outlines his beliefs that low dose psilocybin intake from wild mushrooms. He posits that their ingestion would have greatly affected the hunting abilities of early hominids by increasing their visual accuracy and stamina; in larger doses he suggests they would have also increased reproductive fitness with the effects as an aphrodisiac and the spiritual experiences would have suggested a more compassionate societal structure. Of course these claims are wildly speculative, McKenna places a lot of emphasis on ideas that don't hold up to an intelligible understanding of evolution and rely on the existence of extraterrestrials or deities (Lycaeum.org 2015), Interviews with Terence McKenna); certainly these gaps should not lead to the immediate dismissal of all psychedelic models of evolution. Naturally "the hunt" as a human ritual is depicted in cave drawings quite often and shows a level of self reflection purely for the sake of documenting their conscious experience (Abraham 2015, 34). This is to say that upright walking, the freedom of the hands, the ability to hunt over long distances and the imagination to draw their experience on a cave wall, the will to bury and celebrate the dead and innate existential wonder; all of these things we think of as human (Tallis 2011, 213-229) on some level could be related to the presence of psychedelics in the diets of these individuals over the tens of thousands of years it took to develop these certain humanities. After all the if this is the sort of reflection that leads to complex languages and writing like we see today it has the potential for quite a bit of intelligibility. This sentiment is expressed quite well in a quote from the 1975 novel *Ragtime* by E. L. Doctorow; "it is proposed that human beings, by the act of making witness, warranted times and places outside their existence other than the time and place they were living through"; "the hunt" was a ritual of great importance for these early humans, and they took it upon themselves to document the experience.

Ralph Abraham a Mathematics professor claims that his work developing dynamic systems theory and contributions to chaos theory in the 1960s and 70s that were important in developing computer graphics were directly influenced by his use of psychedelic compounds and marijuana (Abraham 2015, 19-23). In this case the evident truths he found were related to mathematics and preceded

by his already established thoughts about particular equations and geometric (or not) designs. He illustrates this point with a set of complex numbers known as the Mandelbrot set (Abraham 1993, 1), which when rendered on a computer create infinitely repeating fractal patterns akin to the hallucinations experienced on DMT and related chemicals. Fractal, though often not as brilliant or precise as a computer generated Mandelbrot set appear nearly everywhere in nature (Abraham 1993,1). In my opinion these images are not far off from deep space images of large cosmic bodies, and even with a little imagination I would also liken Mandelbrot images to fMRI images. In functions such as this we see instances of infinite recursion, perhaps in the realm of the complex and imaginary numbers that play a part in creating these images some further intelligibility of the universe can be uncovered. Curiously, there are even some mathematical functions that reproduce images of themselves in 2 dimensions when certain rules are applied; one such function is known as Tupper's self-referential formula, and when calculated, transcribed to binary and graphed will display an image of itself (Parker 2014, 358-361). Perhaps, Nagel is looking for a self-referential theory of everything.



<sup>4.</sup> Computer rendering of a Mandelbrot set. Image from Wikipedia.

In the case of the origins of spirituality, religions and concepts that are shared universally between them it could be argued that intrinsic values seen in the psychedelic experience arose from established thoughts seeking to explain the driving forces of the conscious experience and the psychedelics perhaps filled in some neuroplastic blanks. Did the psychedelic experience prime the human mind to think in such a way as perhaps McKenna and Abraham would readily suggest? Either way, it is not unfathomable to infer that the interactions between compounds like DMT and the brain fostered in one way or another the layer upon layer of neuroplastic self reflection and decision making that goes into the double human mind; one end consciously perceiving and the other side cognitively reflecting. Further, it is also disingenuous to write off the psychedelic experience as a lens looking into human nature, keeping in mind the many cultural events that exist surrounding altered consciousness (Winkelman 2001, 25-28).

I believe that further research into the mechanisms of consciousness and how it can be mathematically altered by chemicals, such as the work of Strassman is warranted. In 2013 Strassman and his team successfully extracted DMT from the pineal gland of a rat, proving his long standing hypothesis that DMT can be endogenously created in the pineal gland of mammals (Smith 2015, 34). Shawn Smith of Liberty University presented a thesis in 2015 in which he is critical of Strassman's possible position as a "DMT zealot", or a position of putting too much emphasis on the importance of the psychedelic compound in terms of proving the existence or nature of spiritual properties, this goes in tandem with the earlier statement that spiritual experiences and Shamanic rituals are not always related to psychedelics and that perhaps there are other ways to access them. Smith's thesis focuses partially on proving the genuine nature and significance of the spiritual experiences documented in Strassman's work and ultimately defining "spiritual qualia" and whether or not spiritual qualia is reducible to the physical world (Smith 2015, 51-57). He ultimately concludes that Strassman's model is not sufficient in answering the question of spiritual qualia because he cannot necessarily prove whether a given experience is genuinely spiritual or a hallucination of something perceived to be spiritual (Smith 2015, 62-65). I find Smith's objection similar to Nagel's objections to neo-Darwinism; where Smith would be asking "is this experience actually spiritual?", Nagel would be asking "is this representation of an experience actually scientific or intelligible?" . The difference of course being Smith's belief in theology, and myself and Nagel's agnostic leanings. I believe

that Smith's objection could also apply to Abraham's claims of obtaining spiritual knowledge and mystical mathematical principles from the psychedelic experience in the same way he does Strassman; Abraham isn't necessarily experiencing any spiritual qualia either, just the perception of such.

### CONCLUSION

One of the previous front-runners for a working theory of consciousness was computational mind theory, and it was rightfully given attention given the complex network of neural activity that can be observed thanks to the great endeavors of neuroscience. However, it is of course the intentionality of the human mind that separates it from a computer, after all it was the intentional human mind that developed the computer. Perhaps all of humankind's achievements can be attributed in part to a little panpsychic push from altered consciousness and massive culturally induced neuroplasticity from experiences with psychedelic compounds and will one day help achieve concrete intelligible understanding of consciousness and the physical universe; or perhaps alternatively there is a workable theoneurological model yet to be developed, in either case, the infamous chess match between theists and atheists fraudulently calling "checkmate" and demanding their opponent's burden of proof still remains in progress. The future of the understanding of consciousness, it appears, will be hinged on further interdisciplinary study and a strict non-adherence to either reductive materialism or dualism.

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