



Cognition & Evolution: a Reply to Nagel's Charges on the Evolutionary Explanation of Cognition

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Abstract: In this paper, I examine one of Nagel's arguments against evolutionary theory, that the evolutionary conception of nature is incompatible with our understanding of cognition. I reconstruct Nagel's two charges that the evolutionary conception of nature is at odds with our ability to acquire objective knowledge of the external world and that evolutionary theory is insufficient to explain logic's absolute reliability. I reply to the first charge by suggesting that we should understand our ability to logically reason as a by-product instead of a direct product of the evolutionary processes. Then I reply to the second charge by denying that logic's reliability is an appropriate subject of inquiry the evolutionary theory.

"This paper wasn't afraid to get its hands dirty. It dug deep into the details of a difficult source text and presented clear, uncompromised claims about the shortcomings of seeing everything as an evolutionary product."

Ben Slightom
Content Editor

Introduction

Nagel takes a strong stand against the materialistic evolutionary theory in his book *Mind and Cosmos*.¹ His aim is to show that materialistic evolutionary theory is certainly false. Although this book has received much criticism informally, few academic refutations have been given, apart from a handful of book reviews. Nagel provides three main arguments in his book: 1) evolutionary theory does not give an adequate explanation of the emergence of life (i.e., conscious beings), 2) evolutionary theory is incompatible with moral realism, and 3) evolutionary explanation of cognition is incompatible with the reliability of reason. The objective of this paper is to provide a more structured criticism to the third argument. Nagel deals with this issue exclusively in the fourth chapter, "Cognition," of the book *Mind and Cosmos*. Roughly, he points out that there is a tension between a) reason's capacity of attaining objective truth and b) its being a product of evolutionary history filled with contingency, and it is this tension that makes evolutionary theory's explanation insufficient. In this paper,

¹ Thomas Nagel, *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False* (New York: Oxford University Press, 2012).

I argue that Nagel's charges that evolutionary theory is in conflict with human reason's reliability can be resolved within an evolutionary framework. By "cognition," Nagel and I both refer to the reasoning faculty. We should distinguish the "cognition" mentioned in this paper from the same term commonly used in psychology, where it also contains perceptual faculties in general.

I divide the paper into two sections. The first section represents Nagel's two charges on evolutionary explanation. We can call the first charge "the incompatibility problem": human reason's capacity for reaching absolute objectivity is not compatible with its being a product of an evolutionary history and being determined by relative fitness. The second charge can be called "the insufficiency problem": evolutionary explanation fails to sufficiently explain logic's fundamental reliability as it appeals to the relative fitness of logical reasoning. In the second section, I criticize these two charges separately. I argue that the evolutionary theory can resolve the first charge by treating logic as a by-product of evolution. Then, because logic is an evolutionary by-product, it cannot be the target of evolutionary inquiry in the sense that evolutionary theory cannot provide a genealogical description of it. However, this does not prove the evolutionary theory wrong; it merely shows that logic is not a subject for evolutionary inquiry. Therefore, Nagel's second charge is weak, as well.

In the end, I conclude that Nagel's criticism of evolutionary explanation for cognition is not strong enough and can be rejected.

I. Summary of Nagel's Argument

The problem is raised as such: how can we base our reason's exceptional capacity for getting out of subjectivity and reaching the objective world in the evolutionary framework, which is filled with contingencies? Evolutionary theory understands biological traits in terms of adaptation (i.e., in terms of the traits' functional roles in the life of the creatures). This function is not to know the world. Instead, it is to enhance an individual's fitness, a propensity or probability of offspring, which describes the individual's ability to spread its genes. Traits' functional roles are maintained or evolved by means of natural selection as one result of the interaction between the mutations of genes and the environment.² Therefore, evolutionary explanation of a trait implies two things: 1) the final end of an adaptive trait is biological in the sense that it exists only to enhance the reproductive success of a creature; and, 2) a trait's existence is highly contingent (i.e., it is not determined to exist and can be otherwise) in two ways—it depends on the mutation of genes as products of chances and the environment genes happen to be in.³ However, when it comes to human cognition, it seems that it goes beyond this functional role and leads

us to objectivity. First, we believe that through reasoning, we can find out objective truths about the world such as physical laws. Second, even if we can be skeptical about particular scientific theories, as Nagel observes, we believe in the rules of reasoning—logic—as absolutely and objectively true with no hesitation.⁴ Nagel believes there is a tension between adaptation-oriented evolutionary theory and reasoning's ability to grasp the objective world. This tension is not yet obvious, for we can still ask, "In what way are there tensions between functionality and objectivity?" From my understanding, this is what Nagel tries to explicate, and, in the end, Nagel wants to say that it is this tension that makes the evolutionary theory problematic when it tries to explain human cognition. I will try to illustrate these tensions in the following paragraphs.

First, Nagel claims that evolutionary theorists have to believe in scientific realism, the doctrine that states science could produce true descriptions of the world.⁵ This is because if evolutionary theory stands against scientific realism, it will have to deny the truthfulness of itself. This is self-defeating. To believe that science can provide us with true descriptions of the world means to admit our ability to penetrate through our subjective perceptual experience to obtain knowledge of the objective, mind-independent reality.

There are two senses in which our perception is relative. Nagel gives an example of vision. As Nagel puts it, our visual system "allows us to continue to rely on the prima facie evidence of our sense while recognizing that the evidence will sometimes be misleading, selective, or distorted and that it bears the marks of our particular biological ancestry."⁶ For instance, we tend to be anxious in the dark when we see a rope-like item outdoors—not because we know that it is a serpent but because we have an evolutionary history that prompts us to be anxious. We thereby get the first sense of relativity: despite the reliability of our visual system most of the time, we could still be very skeptical to what it has shown us. Furthermore, as Nagel stresses, our visual system bears a mark of biological ancestry—it is in a process of development, reshaped by natural selection, and its structure shows a gradual modification.⁷ Therefore, besides the misleading or distorted information perceived by our visual system, the truthfulness of the visual system is relative also in the second sense: it is influenced by the environment because it is shaped and reshaped to enhance fitness in response to the environmental changes.

Now the problem appears to be clearer: functionality tends to imply relativity, but, at the same time, we need to account for cognition's ability to reach objectivity. As Nagel

2 Daniel C. Dennet, *Darwin's Dangerous Idea* (London: Penguin, 1995), 35-41.

3 Peter Godfrey-Smith, "Three Kinds of Adaptationism," in *Adaptationism and Optimality*, ed. Steven Hecht Orzack and Elliott Sober (New York: Cambridge University Press), 335-357.

4 Nagel, *Mind and Cosmos*, 80.

5 Anjan Chakravartty, "Scientific Realism," in *The Stanford Encyclopedia of Philosophy* (Fall 2015), ed. Edward N. Zalta, <http://plato.stanford.edu/archives/fall2015/entries/scientific-realism/>.

6 Nagel, *Mind and Cosmos*, 79.

7 Ibid.

describes, the story of evolutionary theory would roughly go like this: because obtaining the ability of reasoning is beneficial for my ancestors' survival, the adaptive value of reasoning allows it to survive the screening process of natural selection.⁸ However, if we believe in the reason's ability to obtain objective truth, reasoning as an ability would not be shaped by environment as an adaptation, for no matter how the environment changes, reason will still provide us with the same version of the truth. In contrast, information provided by the visual system does not need to have this quality; our visual system can result in different forms or levels of misleading, selection and distortion, depending on its fitness. Since "shaping" implies a sense of graduation and a sense of modification in evolutionary history, it implies different degrees of truthfulness. Moreover, even if we could be sensibly skeptical to our scientific theories as well, there is one thing whose truthfulness we cannot doubt: logic. For example, we can never believe that the sun is there and not there at the same time. That is saying we are absolutely certain of logic as an objective truth. If logical reasoning provides us absolute certainty that cannot be reshaped by the environment, it is questionable if we can still regard it as having an evolutionary history. As Machery notes,

Saying that a trait has an evolu-

tionary history is to say something stronger than the fact that it has perdured across generations. Humans have probably believed that water is wet for a very long time, although this belief has no evolutionary history. For this trait is not a modification of a distinct, more ancient trait. By contrast, human shame is probably a modification of emotion that existed among the last common ancestors of humans and the great apes.⁹

From my understanding, for Nagel, the trait of being able to use reason is comparable to holding a belief that water is wet in that they are both not modifications of distinct, more ancient traits. One can hardly imagine that there can be any modification of logical reasoning, for logic is absolutely certain from the very beginning, accepting no further changes. In this sense, human reason does not have an evolutionary history, and therefore evolutionary theory cannot ultimately explain it.¹⁰

Another problem evolutionary explanation has derived from the problem above is that it has difficulty explaining logic's reliability. Fundamentally, evolutionary theory explains the life world behavioristically. Therefore, when evolutionary theory explains logical inference's reliability and accuracy, it is in the form of "it is consistent with natural selection that opts for accuracy and consis-

teny."¹¹ Nagel believes this "would drastically weaken the logical claim" as logical reasoning being essential enough to be grasped directly.¹² Evolutionary theory is trapped into a circularity when it tries to explain logic's reliability by providing a story of how logic is favorable to the fitness of a species because the evolutionary theory itself assumes logic's absolute truth as a fundamental rule for all reasoning. Therefore, Nagel believes that logical reasoning has to be grasped as basic truth from the very beginning, and evolutionary theory cannot explain its reliability without undermining its reliability.

We can see the tensions between evolutionary theory and our cognitive ability are illustrated as two main issues: 1) human reason's capacity of reaching objectivity is not compatible with its being a product of an evolutionary history and being determined by relative fitness; and, 2) evolutionary explanation does not provide a sufficient explanation for logic's fundamental reliability because it assumes logic's reliability in the first place. I will evaluate Nagel's reasoning in the next section. Providing possible criticism and possible replies, I want to show that Nagel's arguments are not as strong as they appear to be.

II. Evaluation

I will discuss the two issues described above, respectively. First, I deal with the seeming inconsistency between reason's objectivity and its being a product of evolutionary

history. I will show two attempts to solve this puzzle, in which the first is unattractive while the second is stronger. Then, I move on to the problem of circularity of evolutionary explanation.

Two things need to be clarified before I proceed with my arguments. First, perceptual systems of animals, just like our cognitive system, do provide living beings with some truths of the world. For example, even though the visual system can be selective, distortive, and misleading, it still gives animals, including human beings, at least some aspects of reality. Second, not every aspect of our higher-level cognitive system provides us with information that is significantly more reliable. Nearly all human reasoning can be doubted, and we do maintain our skepticism about most current scientific theories, though we have faith in them in our everyday life. It is logical reasoning that has the absolute, objective, and reliable nature claimed by Nagel. Therefore, we need to make a clear distinction between logical reasoning and other forms of the human cognitive process. These two points will be important to my later criticisms on Nagel.

The Problem of Incompatibility between Logic and Evolution

One simple objection one can give is that our logic is actually not as reliable as we would like to believe. In other words, this objection suggests that in another

8 Ibid., 76.

9 Edouard Machery, "A Plea for Human Nature," *Philosophical Psychology* 21, no. 3 (July 2008): 327.

10 For an example of arguments that mistake in disregarding the fact that an evolutionary trait has to be in a process of being modified, see Michael Ruse, *Taking Darwin Seriously* (New York: Prometheus Books, 1998), 162. Ruse explains arithmetic truth by appealing to its fitness; however, it is dubious whether there can be a different system of arithmetic at all.

11 Nagel, *Mind and Cosmos*, 80.

12 Ibid.

environment, our logical reasoning would fail as a truth-preserving process. This objection seems to be very unattractive—if there is such an environment in which logical reasoning does not work, how radically different would it be from our environment? This kind of environment does not seem to be imaginable. To render this objection attractive, one needs to provide a convincingly vivid picture in which our current ability to logically reason stops obtaining adaptive value. Even though such an environment is possible logically speaking, a mere logic possibility would not be a strong argument against the reliability of logical reasoning.

One might notice that this objection could also be circular, for how can one rely on a logically possible world that is based on logic to reject the reliability of logical reasoning? However, I do not think we have a circularity problem here. One does not need to deny the objective existence of logical truth to deny our subjective ability to know the logical truth. The issue at hand here only requires that in a possible world (i.e., a possible environment), cognitive creatures would appear, but they reason under different rules from the ones we use because doing so is more adaptive. Nevertheless, I doubt if we could still call this faculty “cognition” if it does not apply the logic we use, for we might as well call those who obtain it as “crazy” or “irrational.”

Furthermore, solely a picture describing this kind of environment is not adequate, however it might be achieved. As mentioned earlier, evo-

lution is relative in two senses: one not only needs to show that there can be alternative rules of reasoning, but also that these rules are in the process of being modified by the environment. For a trait to be explained by evolutionary history, it needs to be a modification of a more distinct and ancient trait. Therefore, this picture needs to state another requirement: describing how the alternative environment allows for a sequence of modification on our logical reasoning throughout history. I do not argue that providing a plausible picture satisfying these two requirements above is impossible, but rather that before evolutionary theorists provide any description of such an alternative environment, the unreliability of our logical reasoning will only remain as a logical possibility and would not be strong enough to reject Nagel’s claim.

Although this solution is unappealing for explaining logic’s reliability, it is suitable for explaining some of our other cognitive abilities. We cannot deny that other parts of human reasoning do not have absolute reliability like logical reasoning does and that logical reasoning is just a very small part of all ways of reasoning. We are skeptical of our scientific theories, and we are even more skeptical of historical and political theories. We have this skepticism because we know that human reasoning can be selective, distortive, and misleading. As evolutionary psychology shows us, when it comes to survival-related reasoning, our reason is more reliable than in other cases that are not survival-related. One example is given by Cosmides and Tooby, who set up a Wason selection test to show “that

people who ordinarily cannot detect violations of conditional rules can do so when that violation represents cheating on a social contract.”¹³ Thus, this experiment “would constitute initial support for the view that people have cognitive adaptations specialized for detecting cheaters in situations of social exchange.”¹⁴

I believe that there is another stronger reply to this issue of incompatibility. The reply would be that logic as the rule of reasoning is the by-product of our reason. As a by-product, it does not need to be selected by natural selection as an adaptive trait; instead, it exists only as an inevitable result of traits’ evolution (i.e., a “spandrel”) being analogous to the “tapering triangular spaces formed by the intersection of two rounded arches at right angles [that] are necessary architectural by-products of mounting a dome on rounded arches.”¹⁵ A by-product is a necessary result of natural selection, but not a direct result of adaptive selection. However, even though a by-product is not an immediate consequence of natural selection, it could still be adaptively useful. It is just that this usefulness is accidental. In a word, its existence is of necessity, but its adaptiveness is a matter of accident. One often-used example is the small front legs of the Tyrannosaurus being a reduced product of conventionally

functional big front legs; Gould and Lewontin consider the small front legs as a by-product of the increasing size of the Tyrannosaurus’s head and rear legs.¹⁶ However, these small legs can be accidentally useful still, such as in titillating female partners.¹⁷

So how is our ability of logical reasoning produced out of the evolutionary process? I propound to understand the logical rules as the by-product of general human reasoning—the cognitive ability that we apply all the time in life and science, and that normally is not as rigorous and reliable as logical reasoning. One possibility is to conceive it as the hidden algorithm for our general reasoning actions. For every action, there is some mechanism operating behind. When we talk and walk, our brain dictates the movements of our mouth and legs by applying the algorithms of talking and walking to our body. Similarly, when we reason, there is a mechanism that operates according to an algorithm, i.e. logical rules. Like the application of the talking or walking algorithm, the application of logical rules can be flawed, and this is why there is bad reasoning. However, unlike the application of the talking or walking algorithm, logical rules can be found out, reflected upon, and applied consciously by us to improve our reasoning.

13 Leda Cosmides and John Tooby, “Evolutionary Psychology: A Primer,” University of California Santa Barbara Center for Evolutionary Psychology, last modified 1997, <http://www.cep.ucsb.edu/primer.html>.

14 Ibid.

15 Stephen J. Gould and Richard C. Lewontin, “The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme,” *Proceedings of the Royal Society of London B: Biological Sciences* 205, no. 1161 (1979): 581–98.

16 Ibid., 587.

17 Ibid.

In a sum, first, reason itself is not reliable in many cases; the only reasoning that provides us with direct objective truth is logical reasoning. Then, if we regard logic as the necessary by-product of other forms of human reasoning, we solve the incompatibility between logic's objectivity and its being a product of evolution.

The Problem of Sufficient Explanation of Logic

By regarding logical reasoning as an evolutionary by-product, we solve the incompatibility problem, yet this solution can hardly be taken as an explanation of logic's reliability. Further, if we regard logic as a necessary by-product, it means that evolutionary theory cannot give an evolutionary explanation of logic if what we mean by evolutionary explanation is to give a genealogical description of logic based on its evolutionary history. Logic would not be a subject of evolutionary theory's inquiry because it has no evolutionary history. However, this does not prove evolutionary theory wrong. There are a lot of things that cannot be given evolutionary explanations, and a spandrel is one of them. To save evolutionary theory is not to show how every biological fact is explainable by its genealogical picture; rather, we only need to illustrate how logic's reliability can survive in an evolutionary framework. If we understand our ability to apply logic in reasoning as the by-product of other reasoning processes' evolution, then logical reasoning is exempt from direct environmental influence. As the spandrel necessarily results from the mounting

of the dome, logical reasoning with its nature of being truth-preserving results necessarily from the evolution of our other cognitive faculties. In this sense, logical reasoning's reliability is not under the modification of its environment and is indeed grasped immediately. Therefore, its absolute reliability is not undermined by the fact that it is situated in the evolutionary theory.

If we stop thinking of logic's reliability based on its fitness but as a necessary by-product, the circularity problem raised by Nagel would also be solved. In this case, explaining logic's fundamental reliability would be a metaphysical issue or an issue of philosophy of language, but it does not need to be a puzzle for evolution. Evolutionary theory does not have the obligation to explain the logic, and its inability to rationalize it does not reduce evolutionary theory's consistency or truthfulness.

Therefore, evolutionary theory does not need to base on relative fitness to account for logic's objective reliability. What evolutionary theory can do is give an indirect illustration of how logic is possible for humans, for example, by understanding the human brain and providing a description of the physical condition that renders logic possible, but it does not need to provide a sufficient explanation of logic, per se, to save itself.

Conclusion

Nagel believes that evolutionary explanation of cognition is insufficient for two reasons: first, it is incompatible with the objectivity

human reason and logic provides us, and second, it is circular when it tries to explain the reliability of logic. On the first problem raised by Nagel, I provided two possible solutions: 1) to reject logic's reliability, and 2) to understand logic as the by-product of general cognitive abilities. I concluded that the first one is unattractively weak, but the second one is strong enough to reject Nagel. On the second problem, I argued that if we consider logic as a necessary by-product of our use of reason, then its reliability is not weakened by evolutionary theory. The circularity of evolutionary explanation of logic would also be solved because evolutionary theory does not need to provide an evolutionary description of logic. I thus conclude that evolutionary theory can resolve the problems Nagel raises within its own framework on this particular problem of cognition.



About Haiyu Jiang

Haiyu Jiang is a senior studying philosophy at Katholieke Universiteit Leuven in Belgium. His main interest is in philosophy of science, but he also dabbles in a variety of areas from the continental tradition to the Anglo-American one, as well as meta-philosophy. At this moment, his research is on the tools, such as thought experiments, used in philosophy and science.