ISSA Proceedings 2002 – The Genealogy Of Argumentation

Where did argumentation come from? That is, how and why is it that we can reason? There are at least two questions here, and I will have something to say about each. The first question is, how does it come to be that there are such things as valid arguments? In other words, what is the origin of logic itself? The second question is, how did human beings develop the ability to understand and use that logic? The first of these questions is itself a logical one; the second is largely empirical. My comments on the first, the origin of logic itself, will be essentially negative: I will argue that those thinkers who claim logic is supernaturally created must be mistaken. My arguments here follow closely the reasoning of Plato, who showed that morality cannot be dependent on divine command. On the second question, how human beings came to be able to reason, I will draw on the work of evolutionary psychologists of the past couple of decades, to show the outline of a naturalistic explanation of how this ability might have been acquired.

1.

Some might imagine that logical validity itself was divinely created. The idea that God created logic might seem reasonable to those who believe that God created the whole Universe. If one believes that he created everything, why not believe that he created logic as well? But this notion involves a logical confusion. Suppose that there is a supernatural creating agent – though I have argued elsewhere that this concept is also logically incoherent. (Fulmer, 1977). And suppose that this agent undertakes to create logic – that is, to make it true that certain arguments are valid.

A valid argument, of course, is one such that if its premises are true then its conclusion must also be true. So our hypothetical supernatural creating agent would have to make it the case that if the premises of these arguments are true then their conclusions would be true. In the argument form known as *modus ponens*, it is argued that:

If *p*, then *q*; and *p*; therefore *q*.

This or some equivalent form of reasoning necessarily underlies any deliberate

intentional action: “If I do this, then that will result.” For example, “If I turn west on 12th Street, I will arrive at the grocery store.” The crucial point is that such reasoning is required for any agent to form the intention to perform any action whatever. For only by such reasoning can the intended consequence be understood to follow from the act. But we were supposing that such reasoning *itself* was the result of an intentional action by a creating agent, who, we supposed, created validity. And now it should be clear that this notion is logically incoherent: it is not possible that any agent, natural or supernatural, could create the validity of arguments, for any intentional action – including creating anything – presupposes the validity of arguments! Without the validity of *modus ponens* no one could form any intention to *perform* any action, and therefore no one could perform any intentional action, including the action of making *modus ponens* valid.

To carry the reasoning a step further, suppose that some such creating being tried to create logical validity in a *different* way from that which we recognize. Suppose, for example, that he undertook to make the following form valid:
If *p*, then *q*, and *q*, therefore *p*.

This is the fallacy commonly known as affirming the consequent. It is an invalid form of reasoning, because the conclusion does not follow from the premises. In terms of the previous example, if I do in fact arrive at the grocery store, it does not follow that I turned on 12th Street – I might have driven around several blocks and approached the store from the rear, or parked the car and walked there. My arrival at the store does not prove that I turned on 12th Street, for I could have proceeded there by an indefinitely large number of other ways – perhaps taking a detour on the Space Shuttle. When I say that the conclusion does not follow from the premises, this is not an empirical claim about observed or observable facts. The point is not about how I might have reached the store: it is conceivable that 12th street really is the only way of getting there. (Perhaps the store is at the end of a tunnel through solid rock.) The point is that my turning on that street *cannot be deduced* from my arrival at the store. Even if it is empirically true that no other approach is possible, that information is not included in the stated premises, and so the argument is not valid. The conclusion does not follow from the premises, and no dictate from any authority, natural or supernatural, could make it do so. Yet the notion that logic follows from divine authority would imply that *whatever* that authority commanded would be valid.

Therefore, that notion must be false.
Note that this argument is itself a valid argument form, the one known as modus tollens:
If *p*, then *q*; and not-*q*, therefore not-*p*.

That is, in the present example, if logical validity followed from divine authority then the fallacy of affirming the consequent could be made valid. But it cannot; therefore, logical validity cannot follow from divine authority. In other words, it is logically impossible for anyone to create logical validity – including even a supernatural God, if there were or could be one. Any creative act such a being could perform with the intention of creating validity, would in itself presuppose valid reasoning. So whatever may be the basis of validity, it cannot be the command of a Creator.

2.
Now that we have established that the validity of logical arguments cannot come from divine (or any other) authority, how has it happened that the human mind has the ability to use them? In other words, how is it that we can reason? Some have denied that this human capability can be explained naturalistically, as a result of evolution by natural selection. They believe that the foraging way of life followed by our ancestors during the time our present physiology evolved would not have required the advanced intellectual capabilities that modern humans possess. Obviously, life on the African savannah in the period of two million to one-half million years ago did not involve the use of calculus; and so, some have reasoned, natural selection could not have produced the ability to master such subjects. Alfred Russel Wallace, with Charles Darwin the co-discoverer of the theory of evolution, held this view. He said, "… a superior intelligence has guided the development of man in a definite direction, and for a special purpose" (Pinker, 1997, 299-300). A contemporary philosopher with a similar view is Peter Van Inwagen, he argues that for evolution to produce the mental capacity for science and mathematics there would have to be what he calls a "special set" of characters, "… a set of characters that *both* conferred a reproductive advantage on some populations of our remote ancestors *and* underlies our ability to do science. I… am a skeptic about this" (Van Inwagen, 1999, 270). The conclusion drawn is that no naturalistic explanation is possible for the human capacity to do complex reasoning, such as science and mathematics. I believe this conclusion is unfounded.

Here the evidence is empirical as well as logical, involving especially discoveries of evolutionary psychology. Specifically, the concept of an evolved cognitive strategy explains a great deal about human thought that cannot, it seems to me, be properly understood without it. Anthropologist Stewart Guthrie explains that, in this sense, "… 'strategy' here is meant as Darwinian shorthand for a behavioral/neural practice that results from natural selection that operates almost entirely without our awareness." (Guthrie, 1993, 214, n.1)

A work in this area particularly useful for the nonspecialist in psychology is Steven Pinker's *How the Mind Works* (Pinker, 1997), which describes what he calls the "standard equipment" that our minds have evolved for its survival value. For example, the eye receives information about a three-dimensional world projected on the two-dimensional retina. The problem of interpreting this information correctly is, strictly, not solvable by deductive means. Any two-dimensional image could, as a logical possibility, represent an infinite number of three-dimensional fields. We automatically interpret the image of two zebras, one image much larger than the other, as indicating two animals of similar size, one closer, one farther away. But it *could* be that the zebras are the same distance away, and are of different sizes. And it *could* be that the zebras are of different sizes, and are different distances away other than the distances we assume if they are the same size.

How does the mind resolve the problem? By making *assumptions* about the world. It assumes that zebras which we believe are roughly equal in size must be different distances away. It assumes that straight lines like river banks which appear to converge are probably parallel or nearly so, and are receding into the distance. How are these assumptions justified? As a matter of conclusive proof, they are not justified at all: the other interpretations are all logically possible. In fact, countless deliberately constructed illusions take advantage of this fact, for purposes of instruction or entertainment: so-called "crazy houses" are sometimes built, with sloping ceilings, in which a person appears to grow when walking along a wall from the side with the high ceiling to the low side. Our deep expectation is that the ceiling is level, and that as the person's head gets closer to it, the person must be growing taller. These illusions are often so powerful that they appear real, even to those who know full well how they work, because evolution has planted such expectations in the standard equipment of our minds. These assumptions are evolved cognitive strategies which were advantageous for

our ancestors.

Again, an important evolved strategy in our interpretation of the world is that we see many parts of it as animate, even when they are not. That is, we interpret objects as conscious, as possessing minds somewhat like our own. ” … we not infrequently are in doubt as to whether something is alive… the best strategy is to assume that it is.” (Guthrie, 1993, 41) It is the best strategy because it tends to be the safest strategy: living things tend to be the most important parts of our environment: they may be potential food for us, or we for them. As Guthrie says, “Consider guessing whether a large lump is a bear or a boulder. Facing uncertainty, most people bet on the bear… If they are wrong the mistake usually is cheap. Conversely, mistaking a bear for a boulder may be costly” (Guthrie, 1993, 51).

The justification of these assumptions, if it can be called that, is that they are correct often enough that organisms which make them survive more successfully than those which do not, and therefore have an evolutionary advantage. Thus the minds of our ancestors – long before the emergence of humans, in some cases no doubt before that of mammals – developed the strategies of employing them.
(Though inductive reasoning is not really the topic of this paper, it is noteworthy that the famous “problem of induction” can be understood, and essentially resolved, through an understanding of evolved cognitive strategies. As David Hume famously noted in the eighteenth century, no deductive argument can prove that the future will resemble the past, i.e., that inductive reasoning will lead to true conclusions. For example, we cannot deduce that the sun will rise tomorrow without relying on inductive premises. Hume noted that we cannot prove inductive reasoning; but we cannot live without it; and we cannot help using it. All three of these facts are explained when we understand our use of induction as an evolved cognitive strategy.)
More to the present point, identifying material objects, counting and calculating are likewise evolved cognitive strategies. Any organism needs to know that what it swallows is the same thing it meant to ingest: the nut does not turn into a tree knot, the water does not turn into volcanic magma. An evolved strategy is to assume that objects generally remain constant, and do not change their fundamental natures without cause. This constancy makes counting possible. Early man needed to count the number of lions that went into a thicket to see that the same number came out, before venturing in himself. Those that could do this

were more likely to survive and contribute to the gene pool than those that could not.

Pinker remarks, “Mathematics is part of our birthright. One-week-old babies perk up when a scene changes from two to three items… five-month-old infants even do simple arithmetic. They are shown Mickey Mouse, a screen covers him up, and a second Mickey is placed behind it. The babies expect to see two Mickeys when the screen falls and are surprised if it reveals only one.” (Pinker, 1997, 338).

3.

Pinker offers a solution to “Wallace’s Paradox”–the fact that the human mind, which evolved in a primitive environment, can master, e.g., calculus. He says:

The answer to the question, “Why is the human mind adapted to think about arbitrary abstract entities?” is that it really isn’t… We have inherited a pad of forms that capture the key features of encounters among objects and forces, and the features of other consequential themes of the human condition such as fighting, food, and health. By erasing the contents and filling in the blanks with new symbols, we can adapt our inherited forms to more abstruse domains. *Some of these revisions may have taken place in our evolution, giving us basic mental categories like ownership, time, and will out of forms originally designed for intuitive physics. Other revisions take lace as we live our lives and grapple with new realms of knowledge*. (Pinker, 1997, 358-359; italics added).

In other words, our abilities to count, reason, calculate and do advanced science and mathematics are the result of combinations of evolved cognitive strategies. The advantage conferred on the early human ancestor who could count lions was the foundation stone for counting and calculating as we know them today. And the ability to reason, “If I sharpen this piece of flint, it will serve as a knife” evolved into the generalized comprehension of modus ponens. Modern human brains are hard-wired with such abilities (though they often need a great deal of refinement by teachers), because our ancestors who had them survived more successfully than those who did not.

Here, then, is an explanation of the human ability to reason entirely in terms of naturalistic processes now known and understood. Like all good explanations, it integrates will with other known facts about the world and the human mind, and it requires no radical new assumptions or hypotheses. And, like all successful science, it requires no resort to divine or supernatural intervention in the natural world.

REFERENCES

Fulmer, Gilbert. (1977). The concept of the supernatural. *Analysis*, 37, 113-116.

Guthrie, Stewart. (1993). *Faces in the clouds: a new theory of religion*. Oxford: Oxford University Press.

Pinker, Steven. (1997). *How the mind works.* New York: W. W. Norton.

Van Inwagen, Peter. (1999). Genesis and evolution. In Paul Helm (Ed.) *Faith and reason* (pp. 273-277). Oxford: Oxford University Press.