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Towards an Evolutionary Model of Argumentation

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ABSTRACT: Toulmin’s original models of argumentation and human reasoning are reexamined in this paper from the perspective of evolutionary and cognitive theory. On the basis of recent work done from the biological and adaptationist perspectives in communication studies, it is to be demonstrated how neo-Darwinian and cognitive psychology may provide the platform for an understanding of the relationship of argumentation to human reasoning and communicative faculties. The Toulmin’s notions of field dependence and independence in argument are then reexamined and reappraised in light of this approach.

KEY WORDS: argumentation, cognitive science, evolution, evolutionary psychology

INTRODUCTION

Years ago, as an undergrad, I was in a class seminar dealing with topics related to technology and society. One of the topics brought up was that of artificial intelligence: how might a computer develop awareness of its own intelligent nature, and how might it be able to learn in the same manner a human child would? It was a question we bandied around, mostly discussing what sort of built-in heuristic rules would be necessary for such self-realization and near the end of class, I suddenly had an insight: maybe a computer would be able to recognize itself as being intelligent once it had begun to communicate with another, similar system, and develop from its conversations an awareness of its own particular cognitive processes as each attempted, through a heuristic process of trial and error, to ‘persuade’ the other system.

This is, I grant, a simplistic idea, but I bring it up because the role of communication and argumentation in cognition has not yet received the thorough attention it has deserved in cognitive science, although it may be crucial to do so to further understand the nature and mechanisms of human thought. Argumentation is also a topic which has thus far been almost completely overlooked by evolutionary
psychologists, although it too could benefit greatly from an understanding of how knowledge and reasoning is communicated. Although evolutionary psychology has taken up the task of understanding human reasoning from an adaptationist stance, it too has not yet tried to provide a theoretical framework which tries to explain both how knowledge is communicated through argument and what form of relationship may have existed between the evolution of those neurobiological processes responsible for learning and reasoning, and those responsible for human communication.

When Stephen Toulmin wrote *On Human Understanding* in 1972, he did not omit the importance of argumentation to the development of human thinking; he, in fact made it central to a theory of the evolution and development of conceptual thought as it occurred through all human intellectual endeavors. Anticipating Richard Dawkins’s notion of memes by at least several years, Toulmin expounded the notion that ideas and conceptual structures do not follow the rigid Kuhnian path of paradigm shifts, but that they instead develop in a process akin to natural selection in biology, with random variation in concepts occurring through a process of innovation, and adaptive selection occurring through the process of argumentation. Whereas Toulmin had uncovered the basic structures of human argumentation in *The Uses of Argument*, in this subsequent text he demonstrated the role argument played in the evolution of human knowledge, with argumentation being the mechanism through which conceptual variation and selection takes place, and through which ideas succeed or fail.

The use of analogy will only take us so far if we truly wish to understand the uses and functions of argument within an evolutionary epistemology, however. While the use of natural selection as a metaphor for the development of conceptual knowledge through argumentation may be effective, a true evolutionary model would have to provide an adaptationist account for the origins and uses of human argument. Instead of a cultural model, such an adaptationist account would be best served by a model based in evolutionary psychology which is able to address certain pertinent questions: Why do we go through the act of arguing in the first place? What common features can be discerned across different arguments, regardless of the situation or milieu where they occur? What might have been the circumstances which led to the evolution of the cognitive domains which guide argument, and what adaptive functions might they have or have had? Are there limits to what an adaptationist model of argument is able to explain?

These questions will be addressed, if not fully answered, in the essay which follows. In *On Human Understanding*, Stephen Toulmin pondered the question of the existence of universals existing across human understanding, and how we might be able to explain the existence of such universals across the easily observable variability and malleability of human culture. Such an explanation, according to Toulmin, may eventually be expressed in terms of neurobiology, of human evolution, or as a function of the ‘common exigencies’ of human life (Toulmin, 1972, pp. 96-97). It is the goal of this paper to demonstrate that all three of these possible explanations are valid, and that they may be used to form a consilience of inductions in explaining human understanding and its relationship to argumentation.

1.THE ORIGINS OF ARGUMENT

1.1 Looking backwards
Let us now engage in a thought experiment, using the model of conceptual change which Toulmin set forth. Taking as literally true the notion that ideas go through the processes of speciation, variation and mutation (or, as Toulmin calls it, innovation) which together form the meta-process of evolution, we trace the common lines of the descent of human knowledge. We go back further and further in time, back to the emergence of *Homo sapiens sapiens*, we find ourselves at the beginning of the cultural evolution of the human species, as well as its biological evolution. What do we find then? Do we find a ‘Prime Concept,’ an ancestral meme from which all other ideas and cultural expressions sprung forth? This is not likely, and I provide this answer not simply because it would be impossible for us to determine with any degree of precision what such a primordial concept may have resembled, but because according to evolutionary psychology the spontaneous organization of neurobiological components into a fully functioning heuristic mechanism is an impossibility. Instead, processes of natural selection and variation occurring over periods of millions of years are responsible for the development and organization of the cognitive and communicative traits which are responsible for human argumentative capacity (Plotkin, 1993; Dunbar, 2000).

Clearly then, we are limited in what we can say about conceptual evolution if we do not also consider the evolution of the neurobiological apparatus governing its development. We are further limited in what we can determine about the emergence of said apparatus, given the scarcity of the available archaeological evidence, and the foreknowledge that we will forever be limited in the extent to which we can surmise the sort of communication and reasoning patterns which formed part of our earliest ancestors’ everyday lives. What the archaeological evidence can tell us is approximately when such cognitive capacities must have emerged, what forms they must have taken shortly after their emergence, and most importantly why they emerged at all. This is the supporting evidence which evolutionary psychologists have used in the development of their scenarios of mental evolution, and to explain the primary evidence provided by neurobiological and psychological investigation. Since there has not yet been sufficient archaeological research to provide clues as to when argumentation first emerged, and provide insight into what forms it may have taken, we are currently limited to using existing theories on the evolution of human reasoning and communicative capacity to hypothesize on the evolution of argument.

### 1.2 The evolution of human reasoning

Any discussion of the evolution of the cognitive faculties responsible for human argumentative capacity must begin with a discussion of the evolution of reasoning as a neurobiological feature. Although argumentation is to a large extent a social activity dependent on communication between group members, it begins with the reasoning processes which occur within the human brain, and these processes have been one of the main objects of study by evolutionary psychologists. The general consensus among these scholars is that the particular reasoning skills which appear to be unique to human species are primarily cognitive adaptations which endowed them with increased genetic fitness and survival capacity. Where this consensus ends is what the exact mechanisms of human reasoning are, what were the factors which led to human reasoning capacity, and to what extent we can attribute them to natural selection. Samuels (2000) has identified four common tenets of theories in evolutionary psychology which its adherents are able to generally agree on. These four tenets
are: the computational view of human information processing; nativism, or the belief that much human knowledge is innate; an adaptationist perspective viewing cognitive structures as products of natural selection; and a massively modular conception of the cognitive architecture, viewing it as consisting of separate cognitive domains. In trying to explain argumentation as a product of evolved cognition, we may find ourselves coming up with several different theories and scenarios trying to explain this particular reasoning process; they will still, however, find themselves in agreement on these four basic tenets.

The most well-known and influential evolutionary theory of human reasoning is probably that put forth by the team of Cosmides and Tooby, who have argued that human rationality, in as much as reasoning mechanisms appear to vary across contexts, must be primarily, if not entirely, adaptive in its nature and origins, and that human reasoning can only be explained by a massively modular conception of the mind which regards separate cognitive domains as having emerged as adaptations to different reasoning situations (Cosmides and Tooby, 1992, 1994). The theoretical framework advanced by Cosmides and Tooby has been expanded by other scholars to explain the relationship between human reasoning and knowledge faculties (Plotkin, 1993; Papineau, 2000), and to explain strategic thinking (Morton, 2000). Although this framework has been criticized by some other scholars working within evolutionary psychology for being too restrictive in the constraints it places on the human capacity for creative thought and for being too reductionist in trying to distill cognition down to modules (Samuels, 2000), it has proven itself to be parsimonious enough to account for myriad variations of human reasoning, and it may yet prove itself useful in trying to understand how reasoning is undertaken through argumentation.

1.3 The evolution of human communication

As important as theories of human reasoning may be, they do not fully satisfy our attempt to explain the evolution of argumentation, if we define it as the process of reasoning and understanding through the communicative process. We must also critically examine the evolution of language, symbolicity, and other peculiar human communication features related to reasoning processes. There have been various scenarios put forth for the emergence of human linguistic, symbolic and communicative faculties in which argumentation plays no uncertain role in the evolution of these particular traits. These include scenarios where they have evolved as an adaptation in hunting and tracking (Hewes, 1994), as a means of permitting social exchange and sharing of food and resources (Hildebrand-Nilshon, 1995), and even as having evolved as a means of establishing dominance and reproductive success in a social group, with the most effective and persuasive speakers being able to establish themselves at the top of the social hierarchy, and more likely to propagate their genes to future generations (Burling, 1988; Smillie, 1995). Additionally, there are also theories of linguistic evolution which make a strong correlation between cognitive and communicative function, or which maintain that the primary adaptive function of language acquisition is not as a means of communication, but as a means of facilitating cognition (Pinker and Bloom 1990; Origgi and Sperber, 2000). Such theories maintain that linguistic faculties evolved specifically to facilitate those processes essential to mutual understanding, by permitting individuals to communicate intentions and to understand those communicated by others.

The affinity between language and cognition may then be
viewed as indicative of the relationship between the verbalization of arguments and their understanding, and further neurophysiological investigation of the connections between linguistic features and reasoning may eventually lead to a decisive determination of what the exact nature of this relationship is. On the basis of the evidence thus far presented, the remainder of this paper will present the outline of a tentative evolutionary or adaptationist model of argument, which may, with the accumulation of new data in the field, be eventually revised or expanded into a theoretical model with greater explanatory value.

2. AN ADAPTATIONIST MODEL OF ARGUMENT

2.1 Domain specificity and argument fields

One of the key elements which is found across all models based in evolutionary psychology is the notion of domain specificity, the view that the mind, as a product of selectionist pressures, is not a general, all-purpose thinking device, but instead consists of separate domains or modules, each of which has evolved to perform a specific mental task, and that the limits of human cognition are internally defined by the specific functions of individual domains. In contrast to this is the notion of domain generality, which posits that the brain functions in a manner analogous to Turing’s Universal Machine, capable of solving any problem on the basis of a few built-in underlying features. In recent years, the evidence has pointed more towards domain-specificity as being an accurate representation of how the mind actually works, and how cognition is organized, further buttressing the adaptationist program: with a few exceptions, nearly all evolutionary theories of the mind are, as required by the laws of natural selection and adaptation, modular in nature (Plotkin, 1993, p. 189-190). Not all modular theories of the mind are adaptationist, however, and domain-generality remains surprisingly durable among those scholars critical of evolutionary psychology for ignoring the seeming anomalies in mental processes and structures not easily explained by adaptationist theory (Samuels, 2000).

This debate between the merits of the domain-specific and domain-general accounts of cognition bears a striking similarity to both the distinction Toulmin made between substantive and analytical argument, and his notions of field dependency and invariance in argumentation structures. In trying to apply cognitive and evolutionary theory to the study of argument, we find ourselves dealing with the same problems Toulmin did nearly fifty years ago, with extremes of generality and modularity standing in for the extremes of absolutism and relativism which Toulmin tried to overcome. If we take the neo-Darwinist account of neurobiological evolution to be true, then there clearly cannot be an all-purpose human argumentative faculty, as the ability to reason and build knowledge through communication must have developed as a result of a process of selection and adaptation to certain situations where such a cognitive function was beneficial for survival and reproduction. At the same time, the parsimonious and flexible nature of argument does not lend itself well to the massive modularity hypothesis prevalent in evolutionary psychology, and as noted, the massive modularity hypothesis by itself is not sufficient to explain the nature of all human cognition, much less argumentation alone.

If we are trying to conceive of a theoretical model which will replace a discredited view which holds that human understanding is universalist and axiomatic, while trying to avoid an equally untenable view that our ability is completely modular and entirely based on
adaptations to specific situations, it would be advisable to turn to Toulmin’s notions of field dependency and invariance, integrating them into a cognitive perspective on argument. In lieu of an all-purpose argumentative mechanism which is adapted to the purposes of human reasoning capacity, what we instead seem to possess is a series of different modules adapted to specific cognitive functions, which constitute the basis of the field-dependent components of the different forms of argumentation which the human organism is capable of undertaking, as different modules, or different functions of the same module, will come into play in different communicative situations. There also exist certain modules which are field-invariant, and which are an integral part of any argument. Rather than there existing an ‘argumentation module’ per se, I would maintain that the primary such field-invariant module is the linguistic module identified by Pinker and Bloom (1990), which, according to them, evolved primarily not as a means for communication per se, but to facilitate and improve the use of existing cognitive faculties. As the linguistic module enables the production of complex expressions of thought and emotion to others of the same species, and, in turn, allows for such messages to be understood by their audiences, it clearly plays one of the crucial roles in the development of human understanding through argument.

The emergence of other cognitive traits intimately associated with language, such as Theory of Mind, also likely play a crucial role in endowing us with the ability to reason through argument. According to Baron-Cohen (1999) human reasoning, as we know it, began with the ability to recognize and communicate volitional and epistemic states permitted by the emergence of Theory of Mind. Indeed, Dunbar (2000) has maintained that the emergence of Theory of Mind was a prerequisite for all the forms of higher cognition which are unique to humans and no other species. While it is not yet known whether Theory of Mind constitutes a domain separate from that of language or they are part of the same module, it too appears to have been a prerequisite for the emergence of argumentation, and is another of the field-invariant mental traits which are present across argument fields.

2.2. Testing and evidence

The best way to test such a modular theory of argumentation may be not through the study of the proper use of arguments, but through the study of their improper use. One of the key subjects of study by evolutionary psychologists has been our tendency towards fallacious reasoning, as it helps us to understand the common features of the heuristic mechanisms behind our reasoning processes, and how they work without even our being aware of them. Most normal test subjects fare poorly when they attempt to undertake problem-solving tasks which are based on determining probabilities, as we are not biologically hard-wired to do so in a heuristic fashion. What we do in such situations is make use of the particular heuristic mechanisms which we do possess, and which do indeed aid us in some problem-solving situations, but not others (Plotkin, 1993; Papineau, 2000; Kunda, 2001). It was on the basis of human performance in one such test, the Wason selection task, that Cosmides (1989) famously proposed that such problem-solving heuristics are derivative of a cheater-detection module or algorithm which was an adaptive feature that had evolved in response to selectionist pressures within social groups.

While such studies may have proven useful in identifying domain-specific forms of reasoning, they do not tell us much about the
specific forms of verbal reasoning which constitute argumentation, nor, by themselves, are they enough to explain the existence of both analytic and substantial forms of reasoning. What many of these reasoning-task studies have shown, however, is that there appears to be a link between those domains responsible for reasoning and those responsible for verbalization, as well as a link between verbalization and the so-called ‘Theory of Mind’ ability which allows us to understand others. Both twin studies (Reznick, et al 1997; Hughes and Plomin, 2000) and studies of autistic children (Frith et al, 1994) indicate not only connections between individual variations of competence in verbal, empathic, and true-false comprehension, but a genetic correlation to these abilities. Origgi and Sperber (2000) have suggested that the link between these seemingly disparate forms of cognition is that they constitute functional adaptations directed towards cheating-detection strategies, and Baron-Cohen (1999) has maintained that the emergence of Theory of Mind was necessary for the emergence of a sophisticated linguistic system which allowed for shared cognition between members of a social group. The very basis of human understanding may therefore originate with the earliest social organizations, where, in order to survive, individual members of a group had to be able to understand the intentions of their fellows, and be able to effectively share knowledge amongst them. Under these circumstances, verbal reasoning, the ability to argue both effectively and persuasively and the ability to understand and properly respond to the communicative intentions of others in one’s social group, would play a crucial role in individual survival and eventual reproductive success. The lack of such a faculty would impair their ability to function within the social unit and to participate in the sharing of resources, resulting in a low chance of survival and genetic propagation.

On one level, such accounts not only may help to explain why we are capable of different forms of reasoning, and the relationship between verbal reasoning and other forms of cognition, but to help explain why even the most highly trained and educated among us persist in making gross errors in judgement based on logical fallacy. In some instances, they may be caused by the misapplication of certain domain of reasoning to situations far different from those they have been adapted for; other common fallacies, such as the appeals to emotion or authority, may be a result of the close relationship between true-false reasoning and Theory of Mind as identified by the aforementioned evolutionary psychologists. Those of us acquainted with Toulmin’s textbook (co-written with Rieke and Janik) An Introduction to Reasoning (1984) will no doubt recall the student exercises asking the reader to identify the given fallacies in a particular argument. Future researchers trying to test adaptationist theories of human reasoning are encouraged to review these examples, and test their subjects with them, to see what sort of relationships there may exist between the ability to discern logical fallacies and other mental skills.

CONCLUSION

Having reviewed the evidence and implications of a cognitive and adaptationist approach to the study of argumentation, we may finally arrive at a new definition of argument under evolutionary psychology: argumentation is the process by which specific modular domains of language and reasoning faculties are appropriated and integrated towards the goals of general problem solving through verbal action. It is a trait which has presumably evolved primarily as an adaption to
living in a social group, as its primary adaptive function appears to have been as a means of allowing for the conservation and distribution of resources within a social group by allowing for mutual understanding and persuasion within the social unit. That different arguments share structural similarities is indicative of argument originating from one or more common cognitive domains, while the presence of field-dependent traits also indicates that it has long since been appropriated for purposes beyond its original adaptive functions.

The field of evolutionary psychology is still young. It has not yet exhausted the list of potential subjects which may fall under its study, nor has it yet reached a sufficient level of consensus among its adherents for us to say that there is unity in the field. Anything the human animal is capable of experiencing is explainable by science, and must eventually be explained by it. Argumentation is only one of those uniquely human features which still awaits a proper scientific explanation.

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