AN EVOLUTIONARY APPROACH TO ANOMALOUS INTUITION

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Intuition is generally understood as knowledge or an insight, especially leading to a decision that does not seem to be arrived at by logical deliberation. Often it seems contrary to what would be expected by logical analysis. As can be seen from the papers in this symposium, we are beginning to understand the inputs to the intuitive process, among them the emotional system, especially unconscious emotional memories encoded in bodily feelings, and unconscious experiential learning.

Intuition, however, has always been associated with a hint of the anomalous, as frequently people report intuitive experiences that cannot easily be traced back to the typical inputs to the process that we have been considering. Examples of these experiences abound (Rhine, 1978; Stevenson, 1970) and often involve strong feelings that compel unexpected actions such as abruptly changing travel plans because of a 'feeling' that a relative needed them. The attacks on the World Trade Center towers generated a flood of reports such as one that was reported to me. It involved a woman who had a perfect attendance record over several years at her job in an office in one of the towers. She was proud of that record and had no intention of spoiling it, but early on the morning of the attack she awoke to the early morning sun streaming into her apartment and, quite unexpectedly found herself considering skipping work to enjoy the day in a park. After wrestling with this urge for a bit she gave in, turned off the alarm and went back to sleep. Of course, when she got up later and turned on the television she learned what she had missed.

It is, of course, an easy exercise to make reports like this seem trivial by chalking them up to coincidence or embellished memory, but for this woman it was a profound intuition, one that saved her life. Apart from its dramatic focus, it is just like all the other examples of intuition that we are considering in this symposium, but in this case, from where did the input to that intuition arise.

Cases like this have traditionally been studied within the field of parapsychology where over the decades a substantial data base of experimental research supports the notion that people are capable of acquiring information without the use of the senses as currently understood, i.e., anomalously. Within parapsychology and its predecessor, psychical research, taxonomy of the phenomena exists: telepathy, clairvoyance, and precognition, often just lumped together as extrasensory perception, or ESP, for short. For the purposes of this talk, we can call them *anomalous intuition*, because that is what it seems like to the person who experiences it.

Within parapsychology, there is a growing consensus that the fundamental feature of anomalous intuition is the ability to acquire information from the future, also known as precognition. All other aspects of anomalous intuition can be subsumed within this. This derives mainly from theoretical models of the phenomena (Bierman, 2008; May, Utts, & Spottiswoode, 1995) but also from the simple realisation that all of the ESP phenomena do not really become anomalous until some point in the future when the experience is confirmed by an event or additional information arriving

through normal channels. Thus, the fundamental extrasensory perception is that of seeing the future, but not just any future. *It is seeing one's own future.*

There is no escaping the fact that these phenomena have been stereotyped as supernatural, but it is by no means necessary to view ESP or anomalous intuition as beyond the reach of science. In this talk I propose to outline how anomalous intuition can be understood not just within science, but firmly grounded in an evolutionary understanding of human abilities.

We begin with a deconstruction of anomalous intuition following a model proposed in the 1940s by Tyrrell (1946) in which anomalous intuition is seen to consist of two stages. Stage one, called the *process* in Tyrrell's terminology, is an unconscious process in which the anomalous information is received by the organism. Stage two, called the *product*, is the means by which the anomalous information is transformed into useful information or behaviour by the organism.

Stage one is the properly anomalous part. How can information from the future travel backwards in time? How can information travel great distances with no carrier medium? Stage one is a problem for physics to solve and there is no shortage of physicists working at it, as evidenced by a recent regional conference of the American Association for the Advancement of Science (AAAS) conference (Sheehan, 2006) and Professor Bierman's contribution to this symposium.

Stage two is not anomalous. This stage involves the normal psychological and neurophysiological processes of the human body. How anomalous intuition is utilised is most definitely for psychology and neuroscience to explain, but not unlike our efforts to understand all the other ways we gather and utilise information from the environment.

In trying to understand the stage-two components of anomalous intuition it is helpful to begin with an old maxim from engineering that I learned from a colleague, "If you want to find out how it works, first find out what it is for." As I have noted when I began this quest (Broughton, 1988) parapsychologists typically have not been moved to ask the question, "What are these strange abilities for?", preferring to revel in their strangeness rather than their utility.

Looking at the spontaneous cases that people report one might be tempted to think that the communication function was self-evident, but that does not stand up to close scrutiny as the 'communication' more often than not is very fragmentary and unreliable. Stanford was the first to explore seriously how extrasensory and other anomalous abilities might serve human needs. His Psi[1] Mediated Instrumental Response Model (PMIR) (Stanford, 1974) and its subsequent elaborations (Stanford, 1990) speculated elegantly that anomalous intuition may be part of a system that gathered useful information to serve human needs, but what those needs are remained rather non-specific. Inspired by Stanford's initiative, I argued that if we are to take ESP or anomalous intuition seriously then we had to look for the needs it serves in an evolutionary context (Broughton, 1988), although I must admit that at the time I was not able to be any more specific than Stanford. However, the 'bottom line' for an evolutionary interpretation of anomalous intuition is that it must serve to increase our fitness to breed, survive and help insure the survival of our offspring.

In the decades since I first proposed the idea there has been only limited interest in evolutionary explanations for anomalous intuition or ESP. Taylor (2003) offers a comprehensive analysis of what he describes as 'need-serving' theories of psi

[1] In the parapsychological community psi is a general term for a range of anomalous phenomena, including ESP or anomalous intuition. It is not an acronym.

within a properly biological evolutionary context. He concludes that an evolved ESP ability would necessarily be limited or imperfect and would probably operate through an environmental scanning type of mechanism. Taylor's scanning mechanism, however, is not an active one, but rather "being in a state receptive to any information that may serve the needs of the organism" (Taylor, 2003, p. 11). McClenon (2002) on the other hand, plays down what he calls 'direct benefit' theories such as those examined by Taylor, in favour of an evolutionary model based on indirect and largely psychological benefits that would arise from beliefs in the efficacy of healing and similar paranormal phenomena.

Advancing the evolutionary understanding of anomalous intuition

To move an evolutionary understanding of anomalous intuition forward it is necessary to identify specific and significant advantages that anomalous intuition might convey. For Homo sapiens this will be more than just knowing where food can be found or where predators lurk. Finn and colleagues (Finn, Geary, & Ward, 2005) have argued that as early hominins gained a level of mastery over the environment social competition between and within groups of other hominins increased. This generated selective pressure for increased intelligence, the development of a theory of mind, and possibly other capabilities such as the ability to entertain alternative future scenarios and predict others' behaviour. While the evolutionary advantage gained must be significant, it need not be big advantage. Haldane (1927) has calculated that just a 1 percent advantage could spread throughout the population within just the evolutionary time period for our own genus, homo. A related issue, the extremely slow pace of evolution, is also no longer seen to be a major obstacle as scientists are finding more and more examples of relatively rapid evolution in humans (cf. Wade, 2007, Chapter 12).

If the fundamental role of anomalous intuition is to provide some information of the future, then it may not need to work miracles to provide sufficient evolutionary advantage for selection to work. It has been noted (Broughton, 1988; Taylor, 2003) that the dramatic examples of anomalous intuition that are sometimes reported may not be typical of the 'normal' function of anomalous intuition. Most cases are described as hunches, feelings, or dreams that only make sense when some future event corroborates the initial impressions. Meta-analyses of the more successful lines of laboratory experiments on anomalous intuition have shown that the success rate (where anomalous intuition or ESP yields correct results) is very modest. The extensive US government funded programme into remote viewing (anomalous intuition by another name used in this case for 'psychic espionage') was said by even its supporters to have yielded actionable information in only about 15 percent of the real-world cases in which it was used (May, 1996). A key point frequently argued by the government researchers was that remote viewing was not a miracle source of information that solved all problems, but that it was most useful as an adjunct to the traditional means of collecting intelligence (May, 1996). This observation can equally be applied to anomalous intuition within the individual—it is not a magical window onto the future, but an occasional extra input to our normal sensory information gathering and processing systems. In this manner, anomalous intuition need not be correct or useful all of the time, but would need to be useful with sufficient frequency to be seen as an advantage by evolutionary selection. The result would be that anomalous intuition would be virtually indistinguishable from normal intuition.

Mental time travel

The hunt for how anomalous intuition would fit into the evolutionary development of homo sapiens has recently become more sharply focused thanks to the work of Thomas Suddendorf and Michael Corballis that highlights the role of what they call *mental time travel* (MTT) in human evolution (Suddendorf & Corballis, 2007a). Mental time travel is nothing more than our capacity to imagine the future. There is a growing recognition that mental time travel into the past—memory—and mental time travel into the future are closely related, and, according to Suddendorf and Corballis, "the ultimate evolutionary advantage must lie with the capacity to access the future" (Suddendorf & Corballis, 2007a, p. 299).

Mental time travel is based on episodic memory, not semantic memory. It is the vast memory store of specific events experienced by the individual that form the basic building blocks from which can be constructed various possible futures. MTT is also a top-down generative process in which the memory images are arranged in such a way as to create a plausible 'lived' scenario, but one not yet experienced. The well-known fragility of memory fidelity actually facilitates the process by allowing a degree of flexibility in the construction of futures.

Suddendorf and Corballis make a compelling argument for the evolutionary importance of MTT. The increased behavioural flexibility that humans have by means of their ability to imagine, and therefore to prepare for, the future seems self-evidently an evolutionary advantage of the utmost importance. Suddendorf and Corballis go so far as to argue that our capacity for revisiting our past in memory is essentially a by-product of evolution's pressure to be able to predict the future (Suddendorf & Corballis, 2007a, p. 302), which they later call the 'Future-first hypothesis' (Suddendorf & Corballis, 2007b, p. 339).

MTT may also be uniquely human. Suddendorf and Corballis argue that the flexibility and generative nature of MTT is distinctly different from future-oriented behaviours of other animals (such as caching food, etc.) that are rooted in instinct and relatively inflexible. Evidence suggests this difference is rooted in the expanded prefrontal cortex of homo sapiens, though Suddendorf and Corballis are open to the possibility that future animal research may qualify the claim that MTT is uniquely human (Suddendorf & Corballis, 2007b).

This is not the place to present a detailed exposition of MTT, but it is important to note that there are important commonalities between key features of MTT and anomalous intuition.

MTT utilises episodic memory as the building blocks for the generated future scenarios. Anomalous intuition has long been recognized to be based on episodic memory. Memories and memory fragments are assembled to convey anomalous information. I have argued, quite independently of MTT, that the experiences fundamental to ESP and anomalous intuition are similarly generated, though the inputs to that process remain obscure (Broughton, 2006).

Suddendorf and Corballis argue that offline processing is required in order to be able to combine the memories that will represent the future. In this sense, offline processing is the ability to disconnect the mental representational space from constant sensory input. Suddendorf and Corballis (2007a, p. 307) offer dreaming and daydreaming as examples of the offline capacity to assemble memories and merge these with recent input to represent the future. In parapsychology, it is well known that most spontaneous examples of ESP or anomalous intuition occur during the

dreaming state, followed closely by daydream like states. Specific individuals with a 'talent' for anomalous intuition and who have been studied almost uniformly claim that they employ strategies of 'clearing the mind' to reduce sensory input and encourage spontaneous imagery. In addition to carefully conducted and highly successful dream studies (Ullman, Krippner, & Vaughan, 1989) the consistently most successful research paradigm for ESP, the ganzfeld experiment (Hyman, 2010; Storm, Tressoldi, & Di Risio, 2010a, 2010b) explicitly cultivates offline processing. It can easily be demonstrated that offline processing in precisely the sense meant by Suddendorf and Corballis is fundamental to successful anomalous intuition in both the laboratory and in life.

Finally, the argument that the fragmentary and malleable nature of episodic memory may be crucial to an evolutionary adaptiveness that derives not from accuracy but by providing a fluid and flexible 'vocabulary' of memory images also finds parallels in parapsychology research. In a wide range of experiments, stronger evidence of anomalous intuition has been associated with highly creative types, having good imaginations and cognitive flexibility. While not a strong link, this nonetheless suggests that imagination and cognitive flexibility may be a trait that underlies successful use of anomalous intuition as well as adaptive MTT.

Emotional input

Suddendorf and Corballis allow for affective input to the MTT process, but almost in passing, and largely by reference to the affect heuristic (Slovic, Finucane, Peters, & MacGregor, 2002). Commenting on Suddendorf and Corballis, D'Argembeau and Van der Linden (2007) draw attention to the role of emotional input to the MTT process citing their own research and that of Damasio and Bechara (Bechara, Damasio, Tranel, & Damasio, 2005; Damasio, 1994, 1996). D'Argembeau and Van der Linden note that the emotional weighting of memories contributes to their likelihood of entering the recombinatorial process that is MTT, and the emotional weighting will relate to an individual's goals. The evidence is quite clear that any process that involves manipulating the contents of memory, whether it be decision making or MTT, will have critical input from the emotional system in the form of emotional weightings attached to the memory images. Previously I have highlighted the considerable evidence for a similar process in generating anomalous intuition, especially through the emotional components of dreaming and the generation of anomalous feelings, including somatic ones (Broughton, 2006). More direct evidence for an involvement of the emotional system in anomalous intuition comes from the line of research known as presentiment studies. (Bierman & Radin, 1997; Radin, 2004, Lobach, E. (this volume)).

It must be emphasized that I am not suggesting that MTT *requires* anomalous intuition. I am suggesting that if we are looking for an evolutionary rationale, as well as evolutionarily designed physiological mechanisms for anomalous intuition, MTT is clearly a leading candidate. This does not mean that somehow anomalous intuition tags memory images to indicate 'your future', but rather anomalous intuition may bias or influence the selection of the particular memories from which we construct our futures in the MTT process. The resulting future scenarios that are considered for the purposes of action or decisions will be indistinguishable from 'normal' intuition, but will have some degree of input from the future via the stage one mechanisms that we have yet to understand.

What is the evidence for an evolved anomalous intuition?

The short answer to that question is, "Not much." This is probably due principally to the fact that parapsychologists have not been inclined to look for evidence that would indicate evolutionary origins of anomalous intuition. If anomalous intuition were evolutionarily determined then we would expect evidence of heritability. There is a long tradition of anecdotal reports that suggest heritability, and these are backed up by at least one large survey of Scottish 'second sight' (Cohn, 1994). Several independent sets of data from the ganzfeld experiments, mentioned above, have shown a substantial advantage for relatives when they are used as the sender-receiver pairs in those experiments. Parent-child pairs and sibling pairs demonstrate anomalous intuition far better than others do, including spousal pairs (see, for example, Broughton & Alexander, 1997).

Objections to an evolved anomalous intuition

There is one principal objection to the idea that anomalous intuition is a product of evolution that can be summed up in the question, "Why is anomalous intuition not more highly developed and more effective than what we see?" Given geologic time spans and evolution's power to develop exquisite organs that can extract information from so many aspects of our physical environment—electromagnetic radiation, vibration, biochemicals—anomalous intuition should be far more effective at keeping humans out of danger than it appears to be. One philosopher who is convinced of the reality of psi has used the lack of evidence for an evolutionarily honed ability to use psi as evidence for a dualist worldview (Levin, 1996). This sort of argument is based on the dubious assumption that evolution is supposed to work according to a naive notion of what it should produce. Evolutionary psychology is on shaky enough ground trying to deduce evolutionary rationales for existing behaviour (Buller, 2005). It would be even riskier to propose expected behavioural outcomes for evolution.

Several answers can be offered to the above objection. The first is that the anomalous intuition that we observe may be the result of the optimum functioning that can be derived from the underlying mechanism. We have no idea how the stage one process outlined at the start of this paper interacts with human biology, so we have no way of determining how effective this process might be at extracting useful information. What we see of anomalous intuition may be as good as it gets, but that is good enough to constitute an evolutionary advantage.

A second answer is that the observed anomalous intuition is functioning at the level appropriate to an evolutionarily stable strategy (ESS). In evolutionary theory an ESS is a pattern of behaviour (strategy) which, if employed by all members of society, cannot be bested by another strategy (see Broughton, 1988 for an elaboration in the context of ESP). The balance of how 'effectively' we use anomalous intuition and when we use it may simply conform to an ESS that we have yet to understand.

A final possible answer is that anomalous intuition may not have been evolving so very long. Suddendorf and Corballis (2007a, p. 312) argue that mental time travel may have evolved comparatively recently, principally as a result of an evolutionary 'arms race' of cognitive and social abilities driven by intra-species and perhaps intra-genus competition. If anomalous intuition amounts to a supporting subsystem to MTT, then its evolutionary history may be correspondingly short. It is

even possible that anomalous intuition is a competitive evolutionary adaptation for a species that was rapidly developing MTT capability based exclusively on memory.

Conclusions

Anomalous intuition, known by many different names, has been around as long as recorded history, and the substantial amount of scientific evidence that has grown up in recent decades to support its existence suggests that a complete understanding of what we think of as normal intuition will require an understanding of how anomalous intuition fits into the picture. Anomalous intuition need not be seen as something that is paranormal, but rather it is a yet-to-be understood component of the evolutionary tool kit that humans have developed.

Mental time travel, with its immense evolutionary advantage, suggests a clear evolutionary pathway in which anomalous intuition might be located. Anomalous intuition may share key mechanism with MTT (Broughton, 2006), and although the evidence at present is largely circumstantial, it strongly suggests areas in which future research aimed at understanding anomalous intuition should be directed.

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