

## MEMORY, EMOTION, AND THE RECEPTIVE PSI PROCESS

BY RICHARD S. BROUGHTON

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**ABSTRACT:** The two-stage model of receptive psi is a reasonable starting point for understanding how ESP enters consciousness and affects behaviour. Whereas Stage 1—how ESP “gets into the system”—remains a mystery, Stage 2 is thought to involve normal cognitive processes. If evolution has conferred upon humans the ability to make use of anomalous information then it is likely to follow the pattern in which existing brain systems are adapted and enhanced to confer new advantages. Roll and Irwin have proposed memory as a candidate for one such brain system co-opted for service with ESP. This paper proposes that the emotional system also plays a role in receptive psi, perhaps an even more fundamental one than memory. Recent research suggests that the emotional system is involved in selecting the memory images that comprise dreams, as well as influencing the attention we devote to the memory images that parade across waking consciousness. Damasio’s work has highlighted the role of the emotional system, especially subtle bodily feelings, in decision-making, thus providing a link with behavioural responses that might be psi-influenced in Stanford’s PMIR model, as well as providing insight into intuitive spontaneous cases. Evolution has already designed the emotional system’s operation to be automatic, unconscious, and not easily subject to intentional control, characteristics traditionally attributed to receptive psi, so it is conceivable that this system has been adapted by evolution to serve as a “pathway” for anomalous information. The rapidly advancing understanding of the emotional system calls for new and imaginative experiments to examine the joint roles of memory and emotion in the effective use of anomalous information.

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In the effort to understand the receptive psi process—ESP, anomalous cognition—parapsychologists have traditionally seen it as involving two stages. In the first stage, information from a distant, sensorially isolated, or future event enters the human system. In the second stage, the information is elaborated into conscious awareness and/or elicits a behavioural response. In this conceptualization, stage one involves some form of anomalous information transfer. There is, of course, considerable debate surrounding certain models as to whether the psi process can involve information transfer; however, there is little doubt that in operational terms, the human organism at the receiving end responds as if anomalous information has been acquired. In any case, there is reason to expect that explanations of the stage one component are likely to come from the domain of physics. It is with stage two that some conceptual and experimental progress has been made within parapsychology, psychology, and neuroscience.

The two-stage model of receptive psi was first articulated by Tyrrell (1946), who drew a distinction between *process* and *product* in what he termed “paranormal cognition.” The *process* is the “reception” of the telepathic or other paranormal information, which he notes is always unconscious. The *product* is the elaboration of the information into conscious awareness. Tyrrell notes “*The product of the paranormal cognitive process is not paranormal ... The product of the paranormal cognitive process is always the product of cognitive and other processes which we are not in the habit of calling paranormal*” (Tyrrell, 1946, p. 68, italics in original).

Tyrrell argued that paranormally acquired information was brought to conscious awareness by “mediating vehicles” such as dreams, hallucinations, or mental images. Later, Louisa Rhine adopted a similar two-stage model to understand the different types of spontaneous cases in her collection (Rhine, 1978), and to a large degree the two-stage model has become accepted as a reasonable starting point for explanatory theories. Irwin (1999) calls the stages the mediation and the experiential phases of psi. This paper will deal with the experiential phase by revisiting the existing memory model and suggesting an expansion of that model based on recent developments in neuroscience.

As Tyrrell noted, the second or experiential stage of the psi process is not paranormal. It involves quite normal cognitive and emotional processes, and various investigators have offered suggestions for key components of the process (for a review see Stokes, 1997, pp. 48 ff). Thus, half the challenge in understanding how psi works involves understanding its pathway through the normal operations of the brain and perhaps other systems of the organism.

Nearly two decades ago I suggested that if we wanted to know how psi worked, it would help to know what psi was for (Broughton, 1988). I suggested that, as a start, we should look to the same process that has shaped homo sapiens into the most successful species on the planet—evolution. Evolution has a simple answer for the purpose of psi. It should have a role in improving our fitness, our ability to survive and to pass on our genes to the next generation. In short, psi must be useful. (For an elaboration of this idea, see Broughton, 1988, 2000.)

One of evolution’s distinguishing characteristics is that it makes remarkably economical use of an organism’s resources. Evolution tends not to devise new systems where existing systems can be adapted and extended to serve new needs and confer new advantages. The human brain is built upon the substrate of a reptilian brain that now remains a crucial part of what it means to be human. New functions are typically “piggybacked” on existing systems that they can enhance.

An important key to the evolutionary fitness of homo sapiens has been its ability to acquire and store information, and to use it to plan future action based on the assessment of likely outcomes. Humans are essentially a future-oriented species. If evolution has endowed humans with an ability

to capitalize upon anomalous information (however stage one operated), then it would be reasonable to expect that this ability would be built upon and tightly integrated with brain systems that serve this crucial fitness characteristic.

#### MEMORY AND ESP

One such brain system has already been identified—memory. The early SPR researchers, when faced with such vexing problems as “Why do ghosts wear clothes?” or “How can there be apparitions of living individuals?” largely agreed that these experiences were hallucinations, perhaps mediated by telepathy (Gurney, Myers, & Podmore, 1886; Myers, 1903). There was an awareness, though not a consensus, that apparitional experiences were essentially a product of the mind of the percipient—a hallucination constructed from images in the percipient’s memory. Warcollier’s extensive naturalistic telepathy experiments in the 1930s confirmed this for him as he concluded:

We must admit, as a starting point, that the images which appear to the mind of the percipient under the form of hallucinations, dreams, or more or less well-formed images, spring exclusively *from his own mind*, from his own conscious or subconscious memory. *There is no carrying of the visual impression from the agent to the percipient ...* (Warcollier, 1939, p. 133, italics in original).

The first comprehensive memory-based model of ESP was developed by Roll (1966), who argued that ESP responses consisted of revived memories. In his model there is an anomalous input or trigger (stage one or mediation phase), but thereafter the ESP experience is based upon the contents of existing memory. Roll draws a comparison with ordinary sensory input, which is processed by comparing it with existing memory, and the extrasensory experience, which arises *solely* from memory. Once evoked, according to Roll, the ESP-triggered memories are subject to the same mental processing as are ordinary memories on their way into consciousness.

A more fully developed memory model of ESP has been advanced by Irwin (1979). Irwin notes that there are two main approaches to understanding the experiential phase of ESP. One approach is sensory-like (or “pseudo-sensory” in Irwin’s terminology), which is embodied in the notion of a “sixth sense.” Schmeidler (1991) has proposed a model of ESP based upon the idea that ESP is a sensory-like process. However, Irwin’s extensive analysis of spontaneous cases and laboratory research (Irwin, 1979, 1980) led him to conclude that “... the available evidence does not encourage a view that extrasensory information receives the same sorts of processing as

sensory input" (Irwin, 1999, p. 166). The typical characteristics of sensory stimuli, e.g., its discriminability, have no systematic effect on performance in ESP tests. Although he does not rule out sensory models, Irwin believes that the weight of the evidence points toward memory-based models that involve what he calls "ideational" processing. In Irwin's model, the ESP-evoked memory information goes through several stages of unconscious or preconscious processing that will determine whether or not it emerges into consciousness in much the same way that sensory information would be processed (Irwin, 1979).

Without challenging Irwin's overall assessment, I would like to point out that the lack of sensory processing characteristics may be a function of the amount of information involved in stage one of the process. Because some types of ESP experience involve imagery, there is a tendency to assume that the anomalous input at stage one involves the transfer of a large amount of information. In fact, stage one may involve the transfer of very little information, but an amount sufficient to activate the appropriate systems that can elaborate the message into human consciousness. Thus the initial pathway into the human information processing system may resemble subliminal perception or perception without awareness, rather than ordinary sensory processing, as has been suggested by some investigators (see, for example, Roney-Dougal, 1986; Schmeidler, 1986; Wilson, 2002).

One of the obvious characteristics of ESP is that it seems to provide new information to the recipient, something that the recipient did not know before. Irwin notes, however, that this does not mean that information not already in memory is involved. A psychic experience that informs one that a good friend has just died obviously would not activate a memory of the friend dead but would likely activate networks of memories that involve the friend, death in general, and perhaps the manner in which the friend might be likely to die. ESP activates and links the discrete components that give rise to new information by their conjunction. The experience is often accompanied by the distinct awareness that the ESP-triggered memory images are suddenly intruding in mental activity that was directed elsewhere.

If the memory model is essentially correct, then it can account for the fact that ESP information is often frustratingly incomplete or transformed into indirect imagery. The recipient simply may not have the memories needed to complete a realistic picture, or perhaps for whatever reason, the ESP trigger is unable to cause needed memory links to be made.

Irwin (1979) has also considered what type of memory is involved in ESP. It seems clear that the type of memory involved in the ESP process is long-term memory. The spontaneous cases suggest that the memories are primarily visual and generally concrete rather than abstract. Irwin observes that in a number of experimental and quasi-experimental studies it is the structure of the target that seems to come through. Semantic memories, as such, do not seem to be activated. If any semantic information

emerges, it is usually at a later stage when the subject attempts to interpret the images he or she has experienced. Warcollier's extensive naturalistic telepathy experiments led him to conclude, "It is not the meaning which is transmitted, but the image" (Warcollier, 1939, p. 131). Upton Sinclair's experiments with his wife as subject (Sinclair, 1962), repeatedly produced examples of strikingly close reproductions of the target material, but which Mrs. Sinclair could not identify at all. Contemporary research experience confirms these observations. Early in the remote viewing research program, scientists realized that the sketches and drawings the remote viewers made were likely to be more useful and accurate than the viewer's effort to interpret his or her impressions verbally. This led to the standard operating procedure to remind the remote viewers to just draw their images—not to try to interpret them.

Although the available naturalistic evidence suggests that semantic memory plays little or no part in ESP, it also seems likely that more than mere structural elements are involved. The evidence, particularly from the dream research and the ganzfeld experiments, indicates that complete images of objects, scenes, or individuals are often activated. Thus, the basic memory that underlies the cognitive ESP experiences may be primarily visual images, which would, of course, incorporate the structural elements of Irwin's model.

#### THE EMOTIONAL SYSTEM AND ESP

The memory-based models of ESP, especially Irwin's comprehensive information-processing model (Irwin, 1979), offer an important framework within which to understand how psi operates (Edge, Morris, Palmer, & Rush, 1986, pp. 191 ff). Recent advances in the neuroscience of the emotional system and a growing understanding of its role in decision making provide strong suggestions that the emotional system may also be involved in the translation of anomalous information into human consciousness or human behaviour.

The role of emotions has a long history in parapsychology but it must be noted that in this context the focus is not affective content of experimental targets or relationships between persons involved in a psi experience. Although these factors may be of some importance, the focus now is on the neural systems that underlie human emotion, broadly defined, in the same way that memory models of psi implicate the cortical circuitry that makes memory possible.

In an evolutionary context, the emotional system is, of course, the foundation of that most fundamental survival adaptation, the fight or flight response, and, through the operations of the amygdala, is designed to detect threats and danger and to initiate responses automatically. This is an evolutionarily old system that we share with virtually all vertebrates. LeDoux (1996) argues that it is precisely the merging of the emotional and cognitive systems that has conferred upon us our immense evolutionary advantage

because it allows us to shift from simple automatic reactions to planned actions. Damasio (1994) has further shown that the emotional system plays a major role in the action-planning phase. It does this by biasing the selection of memory images that represent those options, thus constraining choice to a range already “preselected” by the emotional system. Damasio’s somatic marker hypothesis (which I shall later argue offers a very promising framework in which to see the possible operation of anomalous information in consciousness) is based upon a very close working relationship between the emotional system and memory (Broughton, 2002).

The working of memory and emotion in the ESP process may be most clearly seen in spontaneous cases, which are a logical source of data if ESP is viewed in an evolutionary context. Spontaneous cases of ESP fall naturally in three main categories, and although exact proportions differ between the major collections, some general conclusions can be drawn. Dreams form between one-third and two-thirds (in the L. E. Rhine collection) of all spontaneous cases, followed by intuitive cases and waking hallucinations (Stokes, 1997).

The dreaming state has long been seen as a fertile source of ESP-based information (Ullman, Krippner, & Vaughan, 1989). The dreaming state seems particularly suited to facilitate the arranging and combining of memory images into new patterns and episodes. This feature is fundamental to psychoanalytic theory and is a well-known component of creativity and problem-solving. It is not a big step to see dreams as an ideal workspace in which some form of ESP input can influence the assembly of the various memory images needed to present new and potentially important information to consciousness. Louisa Rhine divided the ESP dream experiences into two categories: realistic and symbolic. Two examples from the thousands on file will serve to illustrate how memory and emotion may underlie the ESP process.

The first case comes from a streetcar (tram) driver in Los Angeles. He reported an extremely realistic and detailed dream in which he was driving a tram on the W line loaded with passengers. “All the things in the dream were as they actually were; I mean the streets, stores, traffic conditions. Everything was in the dream just as they were in real life.” Crossing an intersection, he saw a northbound number 5 streetcar and waved to the motorman as he passed. “Suddenly, without warning a big truck, painted a solid bright red, cut in front of me ... and the truck making the illegal turn could not see my car because of the other streetcar. There was a terrific crash. People were thrown from their seats and the truck overturned.” Two men from the truck lay dead on the pavement and the tram driver walked up to a woman from the truck who was screaming in pain. She looked at the driver with what he described as the “largest, bluest eyes I had ever seen” and repeatedly shouted, “You could have avoided this.”

The driver awoke from his dream soaked in sweat and very shaken. Later, when he arrived at work, he was assigned to the W line and had

forgotten about the dream. On his second trip of the day he was at the intersection from his dream with a full load of passengers.

I was waiting for the signal to change, still not thinking of the dream, when suddenly I became sick to my stomach. I was actually nauseated. I felt provoked at myself and hoped it would go away. As I left the intersection on the signal change, I saw, just as in my dream, a Number 5 car, northbound. Now I was definitely sick. Everything seemed to have happened before, and my mind seemed to be shouting at me about something. When I waved to the motorman on the "5" car, the dream came to me. I immediately shut off the power and applied the brakes, stopping the car. A truck, not a big truck completely red as in my dream, but a panel delivery truck, with the space for the advertising on the side painted over with bright red, shot directly in my path. Had I been moving at all, I would have hit it as surely as I did in the dream.

There were three people on the truck, two men and a woman. As the truck passed in front of me, the woman leaned out of the window and looked up at me with the same startled, large blue eyes I had seen in my dream, and ... waved her arm and hand, thumb and forefinger circled in the familiar "okay" gesture.<sup>1</sup>

This is an example of a realistic case, and it is easy to see that most of the dream consisted of the driver's well-established memories of the streetcar route and the situations he normally encountered. The part of the dream that appears to be of an event that has not yet taken place seems to be assembled from his memories of other vehicles, people, and possible scenarios. Although he may not have had the memory of a streetcar collision as such, it would be a simple matter to construct a plausible scenario from existing memory images just as anyone could imagine an auto accident happening. It is interesting to note that not all images of the unexpected event were accurate (the truck) but they were sufficient to get the message across.

The second illustration is a symbolic dream from a woman whose son was in the Navy in the South Pacific Theatre during the Second World War. "I dreamed that my young son, an only child ... came to me while I was busy in the kitchen and handed me his uniform which was sodden, soaking, and dripping wet. He had a most distressed expression on his young face...." The woman's dream continued with her wringing the water out of her son's uniform but her son took it from her and dropped it into the laundry tub and took her into his arms and said, "Isn't this terrible! Oh, Mom—it's all

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<sup>1</sup> From the LE Rhine collection, quoted in Broughton (1991, pp. 20–21).

so terrible!" (Rhine, 1961, p. 49). In the dream the woman reminded her son that nothing was so terrible that they could not sit down and talk it through, and the two of them went into the living room and the woman sat down and her son sat in her lap, and, as these things happen in dreams, the son turned into an infant as she rocked him and the dream soon ended. In due course the woman learned that her son's ship had been torpedoed on the very night that she had the dream and that her son and 250 others had been killed in a massive explosion of ordnance that resulted.

Again, the dream images are all drawn from memory images or the plausible manipulation of image components. It is classified as a symbolic dream because it is far from a representation of the related event. One can only speculate as to why some psychic dreams are symbolic. Some theorists have argued that the symbolic nature might be a way of cushioning bad news or be a result of repression mechanisms, but an equally likely explanation could be that for this woman the images needed to construct a realistic scenario of the carnage of a torpedoed munitions ship were simply not available and the "message" was carried through other images. This example came from a time before television, of course, and the images that the public saw in theatres and elsewhere were carefully controlled during the war.

The special relationship between memory and dreaming is an area of much research and considerable debate today (Hobson, Pace-Schott, & Stickgold, 2000; Stickgold, Hobson, Fosse, & Fosse, 2001). Sleeping and dreaming seem to enjoy a two-way relationship with memory. Memory is obviously the source of the content of dreams, but dreams, and more generally, sleep, play a role in the consolidation and strengthening of long-term memory (Walker & Stickgold, 2004), especially when emotionally arousing content is involved (Hu, Stylos-Allan, & Walker, 2006).

Precisely what the sources of the memories for dreaming are and how they are selected remains uncertain. Increasingly, researchers now see dreams not simply as the result of more-or-less random brain activity but as a form of meaningful memory processing (Paller & Voss, 2004; Revonsuo, 2000). There is growing evidence that the emotional system plays an important role. Recent research shows that during REM sleep the dorsolateral prefrontal cortex is deactivated and the hippocampal formation processes minimal output, which means that structured episodic memories are not involved, whereas the visual association area and associated paralimbic projections operate in something of a close loop disassociated from outside sensory input (Braun et al., 1998). Traces of episodic memory are involved in strange and seemingly unpredictable ways (Nielsen & Stenstrom, 2005). Also, during REM, the central nucleus of the amygdala and limbic forebrain structures are activated contributing substantial input from the emotional system (Stickgold, Hobson, Fosse, & Fosse, 2001). Stickgold et al. note, "... although emotions appear to play an important role in the selection of memories for incorporation into dreams, the dreams themselves often

show little or no emotional content (p. 1056).” The particular conditions underlying the brain activity that occurs during dreams may be suited to the creative and problem solving activity associated with sleep and dreams (Wagner, Gais, Haider, Verleger, & Born, 2004; Walker, Liston, Hobson, & Stickgold, 2002), and they may provide a suitable canvas upon which the memory images needed to convey anomalous information can be painted.

The second largest type of spontaneous ESP in most of the collections is the intuitive impression, representing a little more than a quarter of the cases. Intuitive impressions often amount to a sudden hunch or an unexpected awareness that something of consequence has happened (usually to someone connected to the person who has the experience). The cases are often described as “just knowing” and are unaccompanied by any imagery or reasoning process. A typical example of an impression case would be a mother who suddenly “knows” that something has happened to her child and drives to his or her school, where she learns that her child had just had an accident on the playground. Many of these impressions are accompanied by strong emotional feelings, often anxiety or dread. A significant number of cases involve only the feelings, with no cognitive content to explain them. Consider this case from a young man in California.

One night in July of 1951 we had just finished supper, and my brother-in-law was getting ready to go to a meeting in San Jose, which is twenty-five miles from our house. For no reason I started crying, me, crying, twenty-five years old! I begged him not to go. Well there was quite a fuss and I got everyone upset. Mom kept saying, “He will be all right.” You know, the usual soft soap you give an upset person. This went on for about fifteen minutes. Then the feeling left me, and I said, “It’s all right for Bob to go now.”

By this time the fellow he was to ride with had waited at their meeting place, but left before Bob got there, so Bob had to drive his own car down. He got as far as Bayshore and Charter Streets, when the traffic began to back up. A wreck, which is nothing unusual around here, but when Bob got to the corner, he said he almost passed out. There spread out on the highway was the man he was to have ridden with; his head was half gone. The car was a total loss. They found later that his brakes had locked on one side, and he flipped up in the air and came down on the other side of the road to be hit head-on by another car. (Rhine, 1961, p. 127)

This is a striking example of a case in which the unexpected onset of strong feelings—with no images or other information—managed

to prevent a family tragedy. It must be remembered that this is just one example of a somewhat neglected type of spontaneous case. Stevenson (1970) has investigated numerous cases in which intuitive feelings alone resulted in significant alterations in plans or other behavioural responses that were ultimately beneficial.

On first inspection, intuitive cases may seem to present a problem for memory models as they seem to involve neither memory nor images, but that would be misleading. At any given moment the contents of consciousness are images. Some images are driven by sensory input whereas others are drawn from memory. During periods of low sensory input, memory images will dominate. These images are held in working memory for periods from a fraction of a second to several seconds. The mechanism of basic attention holds a particular image in working memory more or less to the exclusion of other images. As part of his somatic marker hypothesis, Damasio (1994) argues that the emotional system, working in concert with the prefrontal structures of the brain, plays a major role in generating the particular images that play across consciousness and in determining which images receive the focus of our attention. When this unconscious process leads to sudden conclusions or decisions, it will feel like intuition because the solution or the decision will seem to have just “popped” into mind. In fact, a subtle interplay of learned emotional experience and memory will have been behind the process, but that will all be hidden from conscious awareness.

A particularly interesting feature of many of the intuitive cases is that they involve strong emotional feelings. Damasio (1994), LeDoux (1996), and others have shown that in addition to declarative memory a person has emotional memory. These are memories that can set the body in the physical states—the feelings—associated with past experiences. These memories of feelings are the somatic markers that underpin decision making and planning in Damasio’s somatic marker theory. Cases such as the young man whose teary outburst delayed his brother-in-law’s departure provide a most important clue to the process in that they seem to represent a direct activation of feelings with no cognitive content at all.<sup>2</sup>

The last of the main classes of spontaneous case is that of the waking hallucination or quasi-sensory image. Hallucinations frequently involve persons, sometimes deceased, but often living persons, and animals are not uncommon. Often hallucinatory cases convey useful information, such as warnings or news of unwelcome occurrences such as deaths or illnesses of family or friends, and sometimes relatively trivial hallucinations are reported as well. In another Second World War example, an American soldier had been driving a car with several officers on an inspection tour of

<sup>2</sup> The various collections contain a number of cases that seem to straddle the border between intuitive/emotional and hallucinatory. These are the so-called “somatic cases” in which a person experiences strong and typically rather specific pains that prove to be related to the death or injury of a loved one. As with the intuitive cases, the somatic cases suggest that the relevant anomalous information is communicated either to the body or the relevant pain centers of the brain without engaging any cognitive processes.

the front lines. Just before they started the return journey, another soldier told him of a short cut back to the base. He found the shortcut and began driving down the road when suddenly he saw a friend waving him to stop, telling him to go back the way he came. Without thinking much of it, he backed up the car, taking care to avoid a truck full of marines waiting to go down the same road. Only when he was nearly back at the base did he realize that the friend who had just directed him back to the main road had, in fact, been killed a couple of weeks earlier. The next day when the casualty reports came in, the driver learned that the truckload of marines that he had taken care to avoid had hit a mine on the road he almost went down, and all were killed.

Hallucinations, of course, involve memory images, but masquerading as sensory input. The images are most commonly visual but also can be auditory or involve other senses. The hallucinations that comprise spontaneous cases are also quite unlike the recurrent hallucinations associated with clinical and neurological conditions. They usually are isolated events in normal individuals.

The aetiology of hallucinations in the clinical and nonclinical populations is also the subject of much research and debate (see Collerton, Perry, & McKeith, 2005, and accompanying commentaries). The prevailing models for hallucination generally involve deficiencies or malfunctions in attributing the source of images in short-term memory (Bentall, 2000; Collerton, Perry, & McKeith, 2005). In these models, images from internal sources are incorrectly attributed to external sensory input. More recently, speculation has grown that waking hallucinations may have their origins in the same mechanisms that underlie dreaming (Gottesmann, 2005; Ingle, 2005; Mahowald, Woods, & Schenck, 1998; Pace-Schott, 2005).

However hallucinations are triggered, there is little doubt that the images are drawn from, or constructed from, schema held in long-term memory. In psychic hallucinations, what is it that selects the particular memory images that convey the message? At this stage the answer to that question can only be speculative, but, again, Damasio's somatic marker hypothesis provides some intriguing clues. A fundamental component of his model is the role the emotional system plays in selecting the images to which we attend, and the evolutionary roots of this system are in that part of the brain concerned with threat detection and survival reactions. That system has evolved mechanisms to bias and influence the attentional resources we deploy to the images that represent our options for action (Damasio, 1994, 1996). Once again, returning to the evolutionary context, if evolution has provided humans with a system designed for fast automatic processing of survival-related information, would it not make sense for that system to incorporate psychic information if and when it is available? Evolution may simply have found that the way to present psi information during ordinary waking consciousness may be to "superimpose" suitable memory information on ongoing sensory processing.

## ESP AND BEHAVIOUR

The chief feature of most spontaneous cases in the collections is that they seem to convey information, although in many of them the information subsequently results in changes in behaviour. This has led to a not unreasonable assumption that the primary purpose of ESP is to convey anomalous information to consciousness. However, a case can be made that, in an evolutionary context, a principle function of ESP might be to guide or change an individual's behaviour in adaptive and survival-oriented ways (Broughton, 1988). The most thoroughly developed version of this view is Stanford's psi-mediated instrumental response (PMIR) model (Stanford, 1974, 1990).

The PMIR model begins from a fundamental assumption that psi operates at an unconscious level to serve human needs by disposing an individual toward adaptive responses to environmental situations based on the acquisition of need-relevant information through a nonsensory channel. The model views psi as an active component of human behaviour in that it will make use of whatever relevant information it can acquire to serve the needs of the organism. In that respect, psi is similar to our sensory systems, and the needs that Stanford sees psi serving are the same needs that the organism would respond to if sensory information were available (Stanford, 1990, pp. 60 ff.).

Within the PMIR model, psi can accomplish its goal in a variety of ways. It can involve changes in motivational or emotional arousal or the focusing of attention, and it happens unconsciously and generally without awareness of anything extraordinary taking place. Stanford states:

PMIR is accomplished through psi-mediated facilitation, release or triggering of behaviors, feelings, images, associations, desires, or memories that are already in the repertory of the organism and that can aid in the production of an instrumental response or that can be such a response. (Stanford, 1990, p. 102)

Although PMIR consists of assumptions, albeit very reasonable ones if the basic premise that psi is meant to be evolutionarily useful is accepted, Stanford has also amassed a large amount of experimental and anecdotal evidence that provides support for his model (for a full account see Stanford, 1990). At the time of PMIR's genesis, it was difficult to conceive of a brain system with which psi information could interact so as to effect such a wide range of behaviours. Now the innovative work of Antonio Damasio (1994) and others points to a brain system that could do the job very effectively—the emotional system.

The emotional system has long been known to underpin defensive, survival-related reactive behaviour, as in the fight or flight response, and

more recently, the general role of the emotional system in matching bodily responses to environmental demands through interactions with higher cortical areas is beginning to be understood (LeDoux, 1996). The important work of Damasio and his colleagues highlighted the crucial role the emotional system plays in decision making, a realm that has heretofore been considered the province of the rational (cortical) mind (Damasio, 1994). Formalized as his somatic marker hypothesis (Bechara, Damasio, & Damasio, 2000; Damasio, 1994, 1996), Damasio's model shows how various components of our emotional system interact with memory and other brain systems to produce a highly efficient, rapidly responding, decision-making system ideally suited to the evolutionary survival of humans.

In the somatic marker hypothesis, whenever stimuli are encountered in the environment, the memory of that encounter includes not just the sensory and cognitive aspects, but also the state of the body (primarily the viscera) that was associated with the emotional reaction to that encounter. This is the somatic marker for that mental datum. An encounter with a snake is likely to be associated with a somatic state that includes all aspects of a fear response (sweaty palms, racing heart, queasy stomach), whereas an encounter with an individual of possible romantic interest might engender a different set of positive emotional responses in the body. When the images of that encounter are recalled, so are the somatic markers (though this is probably not conscious). The somatic marker hypothesis posits that one of the inputs to human reasoning and decision-making is a memory or re-experiencing of the emotional body states (feelings) that prior experience has associated with the specific aspects of the decision or matter under consideration.

Somatic markers serve to generate order and priorities even in the most subtle reasoning processes by biasing the amount of attention we pay to the contents of the images that we hold in working memory for fleeting instants in the process. By thus constraining the options available for any given decision, the emotional system reduces a potentially very large number of options to a range that is more manageable for a logical and cost-benefit analysis. The process is likely to be unconscious and fast, and it would feel very much like intuition.

This in no way is meant to suggest that the somatic marker hypothesis in some way explains ESP, or that ESP is part of the process. It is simply one model based on a growing body of knowledge about the workings of the emotional system that suggests emotions could play at least as large a role as memory in the process of translating anomalous information into useful knowledge or adaptive behaviour in humans. The emerging understanding of the emotional system reveals that it plays a key role in the selection of the memory images that could form the substrate of the informational spontaneous cases, and equally it plays a role in the decisions and behaviour that would represent psi operating within Stanford's PMIR.

The operation of the emotional system is, of course, unconscious, thus conforming to one of the characteristics commonly imputed to the psi

process. Furthermore, an intriguing suggestion lies in what we often think of as one of the great problems with research in this area—our inability to control the use of psychic information. Spontaneous cases are just that—spontaneous. They come of their own accord—one does not make them happen. In the laboratory psi is notoriously elusive and uncontrollable, and this is often attributed to its unconscious nature. In my evolutionary view of psi, I argued that one of the characteristics we could expect of evolved psychic abilities would be that they are not subject to conscious control because if they were they would be too easy to misuse in a way that was not conducive to survival in evolutionary terms (Broughton, 1988). At the time I could not think of a mechanism, but recently Dolan has noted that emotions “... are less susceptible to our intentions than other psychological states insofar as they are often triggered, in the words of James, ‘in advance of, and often in direct opposition of our deliberate reason concerning them’” (Dolan, 2002, p. 1191). Indeed, it seems the very nature of the emotional system’s operation as a survival response system and decision-making system is that it is *unconscious and independent of our intentions*. That is precisely the type of system by which psi information may best serve survival-related needs.

#### THE EXPERIMENTAL CHALLENGE

Roll’s (1966) model sparked a burst of experimental interest in memory and ESP (see Palmer, 2006, for a recent review). Almost exclusively these experiments tested participants’ memory abilities using standard semantic memory testing paradigms and compared the results with performance on forced-choice guessing tests. Irwin’s (1979) analysis suggests that semantic memory does not seem to be involved in the process of bringing anomalous information into consciousness, so it is unlikely that much of this early research addresses the functional relationship between ESP and memory proposed by Irwin and in this paper, although Carpenter has found it useful for his recent model of psi functioning (Carpenter, 2006). Arguably some of the most suggestively relevant evidence of the relationship between ESP and memory comes from the observations of experimenters using the ganzfeld technique. Virtually by design, the imagery produced in a ganzfeld session arises from the participant’s memory, and the striking hits that are observed are due to the participant’s bringing forth a particular memory image that matches the target material (Bem & Honorton, 1994). Among the most successful target clips in the PRL ganzfeld series were those of Santa Claus in the Coca-Cola advertisement and the cartoon character Bugs Bunny, two very iconic images for the American participants.

New research that takes into account the image-based nature of typical ESP experiences is required to advance our understanding of the role of memory and psi. Possible avenues to explore could involve manipulating or controlling the iconic quality (or familiarity) of target

images in free-response ESP experiments. An obvious prediction emerging from the arguments in this paper would be that more familiar or more accessible memory images would produce higher levels of success. Such research would not be easy because controlling for image familiarity would be a considerable challenge, with factors such as culture, age, and regional differences providing potential confounds.

In the realm of individual differences, revisiting the issue of visual and verbal processing styles across individuals on a behavioural basis and, ultimately, using brain imaging techniques may reveal predictors of high performance in ESP tests or of frequency of spontaneous ESP experiences.

The relationship of emotion to ESP has also been the subject of considerable research over the years. Much of this research has dealt with the affective quality of target material and its influence on ESP scores, or on the relationship between participants in ESP experiments. The research that is needed to explore the suggestions in this paper would involve a different perspective on the emotional system—one that focused on the survival-related functions of the emotional system and their expression in contemporary humans as influences on emotion-guided decision making. The growing literature on the presentiment effect, which suggests that emotionally driven components of the autonomic nervous system can anticipate unpleasant or threatening future events (Bierman & Radin, 1997; Bierman & Scholte, 2002; Radin, 2000, 2004) offers a promising initiative in this regard, though alternative interpretations have not been ruled out (May, Paulinyi, & Vassy, 2005).

Exploring individual differences in sensitivity to the feelings that unconsciously bias decisions and the deployment of attentional resources may also suggest individual differences in ESP. The Iowa Gambling Task (IGT) (Bechara, Damasio, Damasio, & Anderson, 1994), used in somatic marker research, could be used to explore individual differences in sensitivity to the subtle, learned emotional signals (feelings) that facilitate effective decision making (Evans, Kemish, & Turnbull, 2004; Suzuki, Hirota, Takasawa, & Shigemasu, 2003). If the emotional system does play a role in mediating ESP into awareness or into decisions, it would be expected that individuals who demonstrate greater effectiveness at utilizing feelings and emotional biases would also demonstrate more effective use of ESP.

Clearly there is a need for new and creative experimental approaches that examine the role of memory in the psi process, and the possible, perhaps even likely, role that the emotional system plays in the selection of psi-relevant memory images. These experiments should be ecologically valid, especially in an evolutionary sense.

#### CONCLUSIONS

Within the context of the two-stage model of receptive psi, it should be expected that evolution would have adapted existing brain

systems to capitalize on anomalous, psi-based information in order to serve survival goals. The memory system has been identified as the brain system that mediates anomalous information into conscious awareness, but the issue of how the particular memory images are selected remained unaddressed. The recent and rapidly growing understanding of the role that the emotional system plays in determining the imagery contents of consciousness through its interaction with memory suggests that this system could play a key part in getting the psi “message” through. Furthermore, the emotional system is now understood to be a fundamental component of our decision-making at all levels, thus providing a plausible connection with the psi-mediated adaptive behaviour predicted by the PMIR model. Finally, the substantial number of spontaneous cases that seem to consist solely of emotional feelings further suggests that the emotional system may be the “root” system by which anomalous information can begin to effect change in the human system via multiple pathways. Some pathways might involve interaction with the emotional system and memory, or the direct triggering of the feeling component of emotions, or the biasing of decisions in an adaptive or need-serving manner. If emotion and memory have been selected by evolution to make use of anomalous information then the emotional system component would go a long way to explaining the unconscious and uncontrollable nature of receptive psi, and together they may advance the understanding of stage two of the receptive psi process.

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*Centre for the Study of Anomalous Psychological Processes  
The University of Northampton  
Boughton Green Road  
Northampton, NN2 7AL, UK  
richard.broughton@northampton.ac.uk*