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CHAPTER 3

Discriminating the Origin of Information

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INTRODUCTION

There is an issue lurking in perception, in the recollection of specific, autobiographical episodes, and in the expression of knowledge and beliefs. How do we know that an apparent perceptual object is actually "out there"? How do we know that the events that we think make up our life actually happened? How do we know that knowledge or beliefs accurately reflect the infomation we have obtained through experience rather than guesses, our deepest fears, wishful thinking, or prejudice? We constantly attribute information to *sources*, both internal (e.g., dreams, imagination), and external (e.g., TV, a friend) in a kind of ongoing monitoring or judgment process. Most of the time we are not particularly conscious of this judgment process and not too concerned about errors in it. Sometimes, however, we are made quite aware of the process, for example, when we think we see a burglar lurking in the corner and it turns out to be the laundry bag, or when we awake suddenly from a nightmare, or when a colleague challenges us about the origin of an idea. Benign failures in these monitoring processes are called misperceptions, errors in memory, and unfounded or self-deceptive beliefs. Less benign failures lead to hallucinations and delusions.

Nowhere is the importance of the distinction between the real and the imagined clearer than in the topic of delusions. Most of us have erroneous memories and beliefs. We even cultivate a few self-serving self-deceptions, but we continue to function reasonably well all the same. What differentiates ordinary failures in source monitoring from those experienced by psychotic

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individuals? We may be able to make progress toward answering this question by considering how such judgments are normally made.

Delusional patients are sometimes described as unable to differentiate perceptions from ideas, but this characterization of the problem is too global. It may mean any or all of the following: (1) difficulty discriminating ongoing perception from ongoing imagination, (2) difficulty discriminating internally generated from externally derived memories for particular events, and (3) difficulty discriminating the self-generated basis (thought, inference, etc.) from the perceptually derived basis of knowledge and beliefs. I think it is useful to reserve the term *reality testing* for the first case, which deals with present events, and *reality monitoring* for the other two cases, which deal with past events. It may help us analyze both normal and abnormal failures in discriminating the origin of information if we adopt this classification scheme. I will briefly consider false perceptions, false event memories, and false beliefs separately, and then turn to some general issues. The major theme of the chapter is that, in all these cases, discriminating the origin of information is a judgment process, and like all judgments, it is limited by both the quality of the evidence and by characteristics of the judgment process.

FALSE PERCEPTIONS

As Helmholz (1878, cited in Kahl, 1971) noted some time ago, it isn't obvious why the objects in the space around us appear to be red or green, cold or warm, to have an odor or a taste. These qualities of sensations belong only to our nervous system and do not extend at all into the space around us. Thus a classic perceptual problem is why objects are perceived "out there" when the processing that is our immediate experience is "in here" (see also Gregory, 1970). However, there is another equally puzzling class of experiences—some objects and events are clearly experienced as "in here." That is, an equally central problem for cognitive psychologists is why we experience ourselves as the source of activities such as imagination, dreams, or thoughts. If *some* mental experiences are projected into the outside world, why are not *all* mental experiences projected into the outside world? This is especially curious considering the apparent similarity between perception and imagination.

The Similarity Between Perception and Imagination

Perky's (1910) studies were perhaps the first experimental exploration of the relation between ongoing imagination and ongoing perception. The observer

looked at a screen while imagining a colored object (e.g., a banana) and describing it. At the same time, a faint color stimulus (e.g., a yellow banana shape) was raised from a subliminal value to just above threshold (based on pretesting of Perky and Titchner). Almost all Perky's Cornell student subjects mistook the perceptual stimulus for an imagination and incorporated aspects of the perception in their report (e.g., the orientation of the banana). They were quite indignant or surprised later when asked if they had really imagined the objects.

Half a century later, Segal and her colleagues replicated and extended Perky's results. Segal (1970) suggested that several factors probably combined to increase the probability that Perky's subjects would attribute their experience to imagination rather than perception: Introspections about imagery were common in 1910; the instructions focused subjects' attention on their imagery; nothing suggested the possibility of externally presented stimuli. Segal and Nathan (1964), "with the hard-headed, suspicious students of 1959 and 1960" (Segal, 1970, p. 105), found that only about 25 percent of the subjects failed to detect the perceptual stimuli after six images. However, Segal then changed the procedure and got better results. Subjects looked in a large translucent plastic cylinder that limited their field of vision. They were told that the experiment was concerned with the kinds of imagery experienced by normal people under conditions of reduced visual stimulation, simulating the environment of astronauts, pilots, deep-sea divers, or polar explorers. An object was named and about the time that most subjects began describing their images a slide was back-projected onto the screen of the cylinder. With this procedure and "cover story," some of the students were just as surprised and indignant as Perky's observers when they were later told that real pictures might have been projected onto the plastic hood. Even after the apparatus was explained, the majority of the students concluded that, for them, no stimuli had been projected.

Segal and her colleagues also found that subjects who felt relaxed from a pill (actually a placebo) reported vivid images, but few perceptions of the stimulus (Segal & Nathan, 1964); subjects reported more images and fewer detections of the stimulus when lying down than when standing (Segal & Glicksman, 1967), and reported more detections when they were expecting stimuli to be projected than when they weren't. A prior series of discrimination trials on the projected pictures improved detection of them during the image trials. In general, stimuli that were more intense, of longer duration, more angular, or enclosed in a square frame were more likely to be classified as external; stimuli that were less clear, or that were shown for a more brief interval or on an opaque background so only the figure was projected, were attributed to imagination more often (Segal, 1970).

Although this was potentially the beginning of an interesting line of research on conditions that affect the attribution of origin to experiences, it was not pursued. Rather, another aspect of Segal's work subsequently had greater impact and is more characteristic of current work on imagery—the demonstration that imagining interferes with perceiving. Segal and Fusella (1970) required subjects to generate either visual or auditory images while detecting either visual or auditory signals. Imagined sounds interfered more with detection of auditory signals and imagined pictures interfered more with detection of visual signals. These results suggested that imagery generates some local effects in the same pathways used by perception itself. This led Segal to conclude that "in the final analysis, an image and a percept are indistinguishable" (Segal, 1970, p. 111).

Other work in the Perky-Segal tradition emphasized the mutually interfering aspect of imagination and perception (e.g., Brooks, 1968; Bower, 1972) or investigated in more detail their common properties (e.g., Cooper, 1975; Finke, 1985; Finke & Shepard, 1986; Kosslyn, 1980; Shepard, 1984). In considering the relation between perception and imagination, psychologists have been preoccupied with their similarities, and for good reason.*

Much less attention has been given to the problem of how, given the similarites between imagination and perception, they are ordinarily distinguished, and the conditions that favor better or worse discrimination. The fact that origin is a judgment call, subject to contextual influences and the biases of judgment processes, is important. Though Segal (1970) emphasized the similarity between imagination and perception, she did hint at the importance of judgment processes as well:

> Thus we all perceive, we all image, we all hallucinate; there is no difference in the cognitive experiences of the schizophrenic, the hallucinating drug addict, and the college student in this regard. What varies are the patterns of past experience, individual differences, contextual probabilities, expectancies and biases that each one brings to the task, a process that passes as judgment. Presumably, the judgment of the schizophrenic is different, a broader range of experiences may appear ambiguous to him, and his actions in the face of this ambiguity are probably idiosyncratic. However, the visual hallucinations of an alcoholic or drug addict are phenomenally in the same class as images, dreams, and perceptions; and as we have found the same effects for audition as for the visual mode . . . it is probably also true that the "voices" of the schizophrenic and a melody imagined by a composer are similar events, and may be further equated to the normal sensory processing of physical sounds.
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> *(p. 111)*

*As Casey (1976) points out, philosophers, as well as psychologists, may have neglected the unique characteristics of imagination.

Are Hallucinations Real Perceptions?

Added to the problem of the apparent similarity between perception and imagination is the possibility that what might at first seem like a hallucination may be a response to an actual perceptual experience (Maher, 1974; Maher & Ross, 1984). For example, Saravay and Pardes (1967; 1970) suggested that the elementary auditory hallucinations of alcohol withdrawal can be divided into two major categories, prolonged or sustained sounds, and short, phasic sounds. Gross (cited in Saravay & Pardes, 1970) studied the first group (buzzing, humming, and whistling sounds) and concluded that these phenomena are not hallucinations but examples of intrinsic tinnitus—real noises produced by the muscles of the middle ear. Saravay and Pardes (1970) drew similar conclusions about the second, phasic, type (shots, knocking, crackling, snapping, etc.), which were sometimes described by patients in alcoholic withdrawal as shots, firecrackers, a door slamming, something slammed against a wall, spiked heels walking, or water dripping.

Like auditory hallucinations, visual hallucinations have also been linked to sensory experiences. Hughlings Jackson (cited in Horowitz, 1978, p. 225) described how floaters (*muscae volitantes*) in the eye might develop into visions of rats. When Horowitz (1978) had hallucinating patients draw what they imagined, he found that "vicious snakes" were drawn as wavy lines, "two armies struggling over my soul" were drawn as moving sets of dots. One patient saw bugs on one occasion and the faces of the Holy Trinity on another, but the drawings produced were nearly identical simple drawings of dots. During an ophthalmologic examination, the subject reported the bugs again. Another chronic schizophrenic patient reported he saw his "eyeball burning." As he improved he reported that he no longer thought of his eyeball burning and that he saw "just flames" or "just wavy lines" (again, the drawings produced were quite schematic).

Horowitz obtained drawings and descriptions of visual experiences from psychiatric staff members who were asked about visual impressions they had while falling asleep, while looking at a bright light or space such as the sky, or from being struck on the head. They were also asked to close their eyes and press on their eyeballs and to draw and describe their visual impression, and were asked about any unusual visual experiences. The reports resembled those of patients who reported visual hallucinations—both groups reported or drew, for example, stars, pinwheels, wheels, marbles, dots, specks, circles, snakes, spiders, worms, bugs, spots, swirls, wavy lines, and filigrees.

Horowitz argues that hallucinations and other image experiences may be elaborated from elementary sensations that might arise either in the retinal ganglionic and postretinal neural network and/or from anatomic bodies within the eyeball. As evidence, he cites a study suggesting that mild electric

or mechanical stimulation of the optic system yields drawings and descriptions similar to those obtained in his study. Horowitz also discussed a particularly vivid example of the likely perceptual base of a visual hallucination: the case of a woman who told her minister she was seeing "the blood of Christ." The phenomenal experience seemed to be a shower of sparks followed by darkness. It turned out she had a partially detached retina.

Although delusions will be discussed below, it should be noted here that actual perceptual experience may form the basis of delusions as well as of hallucinations. Maher (1974; Maher & Ross, 1984) particularly has emphasized the role of impaired or anomalous sensory experience in the formation of delusions. The patient, faced with an unusual and perhaps intense experience, arrives at an explanation of it that constitutes the delusion. To the extent that hallucinations and resulting delusions have a perceptual basis, the nature and relative frequency of anomalous perceptual experience in normal and pathological groups is a central issue.

I would like to emphasize a different aspect of these observations. Although patients often may really "hear" or "see" something, we should remember that this is not hearing or seeing in the usual sense—that is, hearing or seeing that has all the characteristics of perceiving real external events. The woman in Horowitz's example didn't actually see the blood of Christ. Rather, she had an ambiguous visual experience that she interpreted as the blood of Christ. Many similar cases of detached retina do not result in such interpretations. Similarly, it takes a great deal of interpretation to turn lines into snakes, or spots into the Holy Trinity. These interpretive processes may be analogous to normal ones in some ways, but they clearly differ in important respects, not the least of which is the proportion of interpretation to visual experience. Rather than having a vivid *visual* experience, some of these patients seem to be having a particularly compelling *interpretive* experience.* In fact, Horowitz makes the intriguing observation that patients could sometimes distinguish a form that they "saw with their eyes" from the more elaborate images described as their hallucinations. Furthermore, he mentions that the same recurring hallucination might become simpler as the patient's clinical state improves. This suggests that it would be interesting to collect systematic data on changes in hallucinations in order to investigate the relative contribution of visual information and interpretation. Also, having patients be explicit about differentiating the visual characteristics of an experience from other characteristics (e.g., emotional qualities), and having patients examine nonhallucinatory perceptions as well as hallucinatory ones, may have therapeutic consequences.

*A parallel observation might be made about dreams. Although we usually think of dreams as vivid visual experiences, they may, like hallucinations, instead be vivid interpretive experiences.

Another point of interest is that auditory hallucinations seem more frequent in clinical populations than visual hallucinations (Leach, 1985; see Jaynes, 1977, for some thought-provoking ideas about the origin of auditory hallucinations). This is perhaps because visual stimuli typically are relatively continuous and hence easy to submit to reality testing (moving your head, attempting to touch the object, asking someone else if they see it too). It is harder to disconfirm intermittent auditory impressions through normal reality testing procedures and, hence, easier to maintain belief in their reality.

FALSE MEMORIES

Not only do we have the possibility of confusing ongoing imagination with ongoing perception, but we also face the even more likely prospect of confusion in *remembering*. The products of previous imaginal activity may be confused with the products of previous perceptual activity, producing a failure in reality monitoring (Johnson & Raye, 1981). Even when the source of an event was clear initially (e.g., purposeful fantasy or imagination), there is some possibility that later, in remembering, we will be mistaken about its origin. The attributed origin of memories is not only important to the individual, but it also greatly influences the nature of theories about the origin of psychological problems (e.g., Freud, 1914/1957; Masson, 1984).

A paradox is that imagination both helps and hurts memory. Imagining the relation between incoming information and what is already known or believed can greatly increase accurate recall (e.g., Bransford & Johnson, 1973; Chase & Simon, 1973). On the other hand, interpretive and imaginative processes are also a frequent source of errors in remembering. For example, Johnson, Bransford, and Solomon (1973) read several brief stories to high school students (e.g., "It was late at night when the phone rang and a voice gave a frantic cry. The spy threw the secret document into the fireplace just in time, since thirty seconds longer would have been too late.") On a subsequent memory test, subjects were likely to claim they heard that *the spy burned the secret document*. In order to "remember" that the spy burned the document, subjects had to infer a great deal of not necessarily true information: that the spy intended to destroy rather than to hide the document; that the document was made out of paper or some other combustible material; that the fireplace was full of wood and burning rather than, say, ready but not yet burning so that the spy could hide the document behind the wood; and so forth. These sorts of errors illustrate interpretive processes that draw on a range of prior knowledge and also suggest that people sometimes have a difficult time discriminating what they perceived from what they generated themselves (see also Sulin & Dooling, 1974; Bower, Black, & Turner, 1979).

Reality Monitoring

Johnson and Raye (1981) emphasized that many errors of memory may not reflect inaccurate or malleable storage mechanisms, but rather, fallible decision processes. We proposed that the memory system preserves both the results of perceptual processing and the results of more self-generated processing such as thought, imagination, and certain types of inferential thinking. Because the system is veridical (it preserves whatever it has processed), we sometimes see evidence of accurate memory for very specific detail, for example, memory for typeface (Hintzman & Summers, 1973) or particular wording (Bates, Masling, & Kintsch, 1978; Christiaansen, 1980). However, people will sometimes confuse the origin of information, misattributing to perception something that was only imagined, or confusing information from one source (e.g., visual input) with information from another source (e.g., verbal input).

Johnson and Raye (1981) proposed a framework for understanding the processes by which perceived and self-generated events are discriminated and confused in memory (the processes of reality monitoring). Briefly, with respect to class characteristics, memories originating in perception should have more perceptual information (e.g., color, sound), time and place information, and more meaningful detail, while memories originating in thought should have more information about the cognitive operations (such as reasoning, search, decision, and organizational processes) that took place when the memory was established. Differences between externally and internally derived memories in average value along these dimensions or attributes form the basis for deciding the origin of a memory. For example, a memory with a great deal of cognitive operations information and not very much sensory information could be judged to have been internally generated. More extended reasoning processes include retrieving additional information from memory and considering whether the target memory could have been perceived (or self-generated) given these other specific memories or general knowledge. For example, a memory of a conversation with another person might correctly be attributed to a fantasy on the basis of the knowledge that you are not acquainted with the person. In addition, judgments will be affected by people's opinions or by "metamemory" assumptions about how memory works. Thus there are at least two ways for reality monitoring to break down—a target memory may be uncharacteristic of its class (e.g., an especially vivid imagination) or the subject may fail to engage in reasoning (or engage in faulty reasoning) based on prior knowledge.

The results of a number of experiments provide support for the reality monitoring model. For example, (1) the class characteristics of memories from external and internal sources seem to differ, and discriminations within

a class are more difficult than discriminations between classes (Foley, Johnson, & Raye, 1983; Foley & Johnson, 1985; Johnson & Foley, 1984; Raye & Johnson, 1980); (2) confusion is increased by sensory similarity between memories from the two sources (Johnson, Foley, & Leach, in press; Johnson, Raye, Wang, & Taylor, 1979); (3) confusion is reduced with increases in the information about cognitive operations associated with internally generated memories (Johnson, Kahan, & Raye, 1984; Johnson, Raye, Foley, & Foley, 1981); (4) memories based in perception have better spatial, temporal, and sensory information, and people's tacit assumptions about these characteristic differences are reflected in metamemory assumptions that influence reality monitoring judgments (Johnson, 1985; Johnson, Raye, Foley, & Kim, 1982); and (5) reality monitoring and recognition may draw on different characteristics of memories (Johnson, 1985; Johnson & Raye, 1981; Kahan & Johnson, 1984). This last point is important because it emphasizes the fact that information can be quite familiar (hence memory for it is good), yet people can be mistaken about its origin.

The reality monitoring model predicts that the more imaginations are like perceptions in sensory detail, the more subjects should confuse imaginations with perceptions. Consistent with this, Johnson, Raye, Wang, and Taylor (1979) found that the more often subjects thought about a picture, the more often they thought they had seen it. Furthermore, compared to poor imagers, good imagers were more affected by the number of times they had imagined a picture. In another experiment (Johnson et al., in press), subjects imagined themselves saying some words and heard a confederate saying other words. Later, subjects were quite good at discriminating the words that they had thought from the words the confederate had actually said. In another condition, the procedure was the same except that subjects were asked to think in the confederate's voice; in this case subjects later had much more difficulty discriminating what they had heard from what they had thought. (It is probably not accidental that auditory hallucinations are usually in someone else's voice.) Like the good/poor imager study, this study is consistent with the idea that the more sensory overlap there is between memories derived from perception and memories generated via imagination, the greater will be the confusion between them.

To explore the role of cognitive operations in reality monitoring, Johnson, Kahan, and Raye (1984) investigated people's ability to distinguish their own dreams from those told to them by someone else because dreams are a class of internally generated events with relatively little information about operations. Briefly, pairs of people who lived together read instructions each night assigning them to one of three conditions: They either read a dream or made up a dream and reported it to their partners the next morning, or they reported an actual dream from the night before. The taped

morning reports were transcribed and identification of origin tests constructed by sampling sentences from the reports. Distractor (new) items for one pair of people were drawn from the test items of another pair of people. Subsequently, each subject received a surprise memory test on which they were pressed to respond quickly. On both read items and made up items subjects were better able to identify sentences from their own reports than from their partners'. In contrast, subjects could *not* better identify their own dreams compared to their partners'. This pattern is consistent with the idea that dreams are deficient in the kinds of information about cognitive operations that help identify waking self-generations (such as the items that were read and made up). In their involuntary quality, dreams are like perceptions.

In a second experiment, in which subjects were provided with better cues and more time, the deficit for identifying the origin of real dreams was eliminated. Thus, if subjects have sufficent cues and the opportunity to think about the dreams in light of other memories, their reality monitoring improves. We also had subjects explain the basis of their origin attribution. One interesting observation was that subjects would occasionally make misattributions of origin on the basis of general beliefs (e.g., "That couldn't have been mine because it is just not the sort of thing I dream.").

In another series of studies, we are investigating reality monitoring for various kinds of naturally occurring, autobiographical events. In one study, we asked subjects to remember an event from their own experience (a trip to the library, a social occasion, or a trip to the dentist, a dream, a fantasy, or an unfulfilled intention), and then we asked them how they knew that the event actually had (or hadn't) happened. Three types of explanations were clearly used differentially for actual and imagined events: (1) For actual events, subjects were very likely to refer to characteristics of the target memory trace itself such as temporal information (e.g., time of the school year), location information ("I know exactly where it happened."), or sensory detail ("I remember the exact color of his shirt."). (2) For actual perceptions subjects were very likely to refer to supporting memories. Actual events are embedded in anticipations before the fact (such as buying something to wear) and consequences after the fact (such as later conversations about the event or later regrets). People frequently refer to these supporting memories to justify their belief that an event really happened. (3) For imaginations, people referred to characteristics of the target memories or to supporting memories much less often. Rather, the overwhelmingly most frequent response for imaginations involved reasoning, such as pointing out inconsistencies with their general knowledge of the world (e.g., "In this fantasy I was a doctor but really I was too young to be a doctor, so it must be only a fantasy." Or, "The event breaks physical laws about time and space.").

In addition to judgments about whether events derive from the external world or from the self, we also constantly must discriminate among various types of memories within each class. As Figure 3.1 shows, within the domain of memories for perceptually derived events, we attribute events to *particular* sources (e.g., Raye & Johnson, 1980; Foley, Johnson, & Raye, 1983); abnormal failures in external source monitoring are sometimes called "source amnesia" (e.g., Schacter, Harbluk, & McLachlan, 1984). Within the domain of self-generated events, one of the most interesting discrimination problems is that between ideas and ideas realized in action (e.g., "Did I say something or only think it? Did I turn off the stove or only intend to?" Foley et al., 1983; Foley & Johnson, 1985; Johnson & Foley, 1984; Anderson, 1984). All orderly thought and skilled action depends on this latter type of self-monitoring process. There is some evidence that children, while not generally disrupted in ability to monitor the origin of external versus internal events or between external events from two sources, are less able than adults to discriminate between their ideas and the ideas that they have realized in action

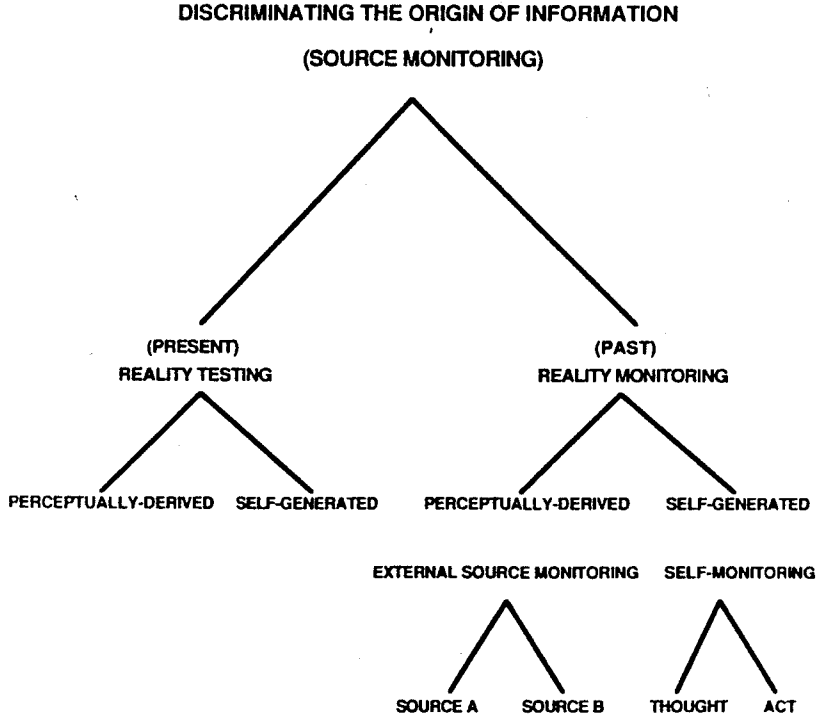

Figure 3.1

(Johnson & Foley, 1984; see also Harvey, 1985, for a similar result with thought-disordered schizophrenics).

The reality monitoring model offers an alternative to a number of other current approaches to the problems of distortion, errors, and intrusions in memory. In some memory models, imagined information and perceived information are assumed to have essentially the same underlying representation (e.g., Loftus, 1979); in other models, they are distinguished simply by tags specifying the external or internal origin of the information (e.g., Anderson, 1983). In the former accounts, there would be no basis in memory for separating externally derived and internally generated information. In the latter accounts, confusion is thought to result from lost tags and memory for origin to result from retrieval of the correct tag. In contrast, our model assumes that the representation of information in memory reflects its processing history (e.g., Kolers, 1975; Johnson, 1983) and emphasizes the role of decision processes in both confusing and discriminating memories from these two sources. Johnson and Raye (1981) emphasized that memory for origin is actually the outcome of a judgment process that evaluates the characteristics of revived or activated information. This judgment process is sensitive to many factors (e.g., the amount of sensory detail expressed in a memory, whether it gives rise to supporting memories, how it fits with prior knowledge); the notion of an all-or-none retrieval of a tag does not do justice to the importance of these many factors. In addition, the present approach provides a general framework for investigating similarities and differences in reality testing, reality monitoring, external source monitoring, and self-monitoring processes (see also Lindsay & Johnson, 1987).

Can Reality Monitoring Be Improved?

There are some indications that reality monitoring can be improved. For example, Raye, Johnson, and Taylor (1980) examined confusion between perceived and imagined words as reflected in subjects' frequency judgments about how often a particular word occurred. Half of the subjects were given an upper limit for their judgments and half were not given any limit. The effect of the limit was to selectively reduce the impact of inappropriate events—that is, it reduced the effect of generating a word on estimates of the number of times it was perceived. This suggests that a more stringent criterion can help edit out inappropriate memories (see also, Gauld & Stephenson, 1967; Hasher & Griffin, 1978).

Schooler, Gerhard, and Loftus (1986) used a misleading question paradigm to suggest to some subjects that a sequence of slides depicting a traffic accident had contained a yield sign when, in fact, no sign was present. Other subjects were actually shown a yield sign. Subsequently, subjects were asked

whether they had seen a yield sign and were asked to describe their memories. The verbal descriptions of subjects who had actually seen the sign and those of subjects who had not seen the sign, but who reported they had, were compared. Descriptions that resulted from suggestion were longer and contained more hedges, more reference to cognitive operations, and fewer sensory details. These results are what would be expected based on Johnson and Raye's (1981) reality monitoring model and are consistent with subjects' justifications about the origin of autobiographical memories (Johnson, 1985). Schooler et al. (1986) reported two subsequent experiments investigating the ability of new subjects to accurately classify the descriptions given by other subjects as real or suggested memories. Classification was better than chance and improved with instruction about the ways in which real and suggested memories differ. If people can become better at classifying the origin of others' memories, presumably they can become better at classifying the origin of their own memories.

In addition, there is evidence that subjects are more confident about (1) correct origin decisions than incorrect origin decisions (Johnson et al., 1981), (2) presented than generated information (Gauld & Stephenson, 1967), and (3) seen than suggested information (Schooler et al., 1986). Thus a number of findings suggest that subjects could improve the accuracy of their decisions about origin by applying a stricter criterion during remembering.

FALSE BELIEFS

Perceptions and imaginations yield events or episodes, and episodes yield knowledge, beliefs, and attitudes. Knowledge (or beliefs, or attitudes) is distinguished from memory for episodes in that beliefs represent summary conclusions about "states of affairs."* The information is decontextualized. I "know" Columbus discovered America in 1492, and believe that one person's vote counts, and neither of these cognitive experiences (knowing or believing) seems the result of a particular event that I can remember. Under many circumstances, this inability to get back to the source of information is not a problem and, in fact, is an advantage. It allows us to use words and concepts facilely without reference to how we learned them.

*The distinction here is similar to Tulving's (1983) episodic-semantic memory classification, but without the implication of separate memory systems underlying memory for events and more generic memories (Johnson, 1983). The difference between knowledge and beliefs is a matter of judgment. Beliefs seem more removed from perception than does knowledge. Knowledge is associated with greater certainty perhaps. However, the line is fuzzy because for different people with similar experiences, the same idea (e.g., "There is a God.") may be a matter of knowledge or belief.

There is some controversy over how we should characterize the representation in memory of general information such as knowledge and beliefs—how to behave in restaurants; what birds, or blacks, or women, or the self are like (e.g., Markus, 1977; Schank & Abelson, 1977). One possibility is that individual, related events are combined into an abstract, conceptual representation (e.g., a schema or prototype) that is used in perception, learning, judgment, and so forth (Nisbett & Ross, 1980; Posner & Keele, 1968; Rosch, 1975; Schank & Abelson, 1977). Alternatively, knowledge may not be represented in any abstract format, but rather may be computed when needed from memory representations of individual episodes (Hintzman, 1986; Jacoby & Brooks, 1984; Kahneman & Miller, 1986).

Regardless of how knowledge and beliefs are represented, the veridicality of a belief, attitude, or knowledge depends on the origin of the information. If imagined events have contributed to the construction of a schema, the schema itself may be inaccurate; in addition, details generated by a schema during recall of a particular event may be normatively true but factually inaccurate for a particular episode. Reality monitoring processes may fail to distinguish schema generated (i.e., imagined) from perceptually derived information. On the other hand, if knowledge is computed when needed from individual memories for events, specific imaginal episodes may be miscounted as perceptual episodes by the knowledge computation process. Thus, reality monitoring is critical, however, knowledge and beliefs are represented. The factors emphasized by the Johnson–Raye (1981) reality monitoring model should be important in reality monitoring of knowledge and beliefs as well as in reality monitoring of specific events.

In addition, failures in reality monitoring may contribute to a number of other factors that produce errors in memory or knowledge. For example, the ease with which people can recall instances will often influence judgments of frequency, probability, or causality (Tversky & Kahneman, 1974; Nisbett & Ross, 1980). Insofar as self-generated instances are highly available and become confused with actual instances, or rehearsals of perceptual events become confused with actual perceptual events (Johnson, Taylor, & Raye, 1977), self-generated information may have an inappropriate effect on beliefs and judgments about states of affairs. There are other common biases in the interpretation of events; for example, people attribute other people's actions to traits and their own actions to situational demands (Jones & Nisbett, 1972). Similarly, people often blame others for the negative things that happen to them and take credit for the positive things (Greenwald, 1981). These sometimes may be instances of failures to discriminate the origin of information if the person making the attribution mistakes an interpretation (self-generated) for perceptually derived evidence.

The possible relations among false perceptions, false autobiographical memories, and false beliefs remain to be specified. Hallucinations are not invariably turned into false memories; people sometimes remember a hallucination but feel certain the experience was self-generated and not perceived. On the other hand, imaginations that we knew full well at the time were imaginations, later—in remembering—can be confused with previous perceptions (e.g., Johnson, Raye, Wang, & Taylor, 1979; Johnson et al., in press). Episodes that are misattributed to perception (either initially or during remembering) are likely to be viewed as evidence for a belief, but beliefs do not depend on conscious recollection of any particular episode (whether based on accurate source identification or not). For example, amnesics can believe that one man is nicer than another without remembering the information that produced that belief (Johnson, Kim, & Risse, 1985).

Delusions are usually defined as false or implausible personal beliefs that are firmly held in spite of evidence to the contrary (see chapters by Maher and by Oltmanns, this volume). They are usually classified in terms of content (e.g., paranoia, grandiosity, etc). Another potentially interesting way to classify delusions is in terms of whether they (1) seem to involve (false) perceptions or memories of specific episodes or whether they (2) have more the character of (false) beliefs or knowledge that is independent of memory for particular episodes. It is likely that delusions of the first type are a precursor of delusions of the second type and thus may signal the eventual development of a full-fledged delusional system. Furthermore, there may be differences in prognosis or effective treatment depending on whether the delusion centers around the interpretation of particular events or represents a belief that has become independent of the "evidence" that originally gave rise to it.

One particularly interesting aspect of delusional beliefs is that people's conviction in them does fluctuate. Sacks, Carpenter, and Strauss (1974) suggested that there is a "double awareness" phase in many patients' recovery from delusional thought (see also Hilgard, 1977). For example, one patient said, "Forty-nine percent of me knows that what I am thinking is too weird to be real," and another asked a member of the staff to take him around the hospital grounds to see whether it really was a political prison.

It is possible that this monitoring activity could be encouraged by having patients report in detail about the qualitative characteristics of their mental experiences of both a delusional and nondelusional sort (similar to the suggestion above that hallucinations could be compared with actual perceptual experiences). Perhaps a modified version of our Memory Characteristics Questionnaire (MCQ) (Johnson, 1985; Johnson et al., 1984; Suengas & Johnson, 1985) could be developed, asking subjects to rate various specific memories and beliefs for sensory content, contextual information, meaningfulness, affect, and so forth. It would be quite useful to have more specific information about the qualitative characteristics of delusions, how these change, and whether changes in conviction about a delusion follow or are independent from other qualitative characteristics of the memory or belief.

DELUSIONS AND REALITY MONITORING

This section highlights a number of factors that may contribute to the development of delusions and that are particularly interesting from the reality monitoring perspective.

Perceptual Characteristics of Imagination

Insofar as there is a real perceptual basis for delusions (e.g., Maher, 1974), or insofar as imagination is similar to perception (e.g., Finke, 1985; Johnson et al., 1979b; Perky, 1910; Segal, 1970), the feeling that the delusion is based in fact should be compelling because perceptual information typically is weighted very heavily in reality monitoring judgments (Johnson, 1985).

Rehearsal

Delusions sometimes develop in cases of social isolation, lack of social skills, and deafness (Maher & Ross, 1984; Winters & Neale, 1983). One obvious consequence of these states is that the person does not have the benefit of testing ideas against social consensus. Another strong possibility is that these are conditions in which the number of internally generated episodes increases relative to the number of externally derived episodes. If you are cut off from perceptual (especially social) stimulation, more time is spent in self-generated processes. What are the consequences of thinking about events, especially thinking about events repeatedly?

One consequence is that the frequency of occurrence of certain perceptual events may be inaccurately inflated (Johnson et al., 1977; Johnson, Raye, Wang, & Taylor, 1979; Johnson, Raye, Hasher, & Chromiak, 1979; Raye et al., 1980). Thus, if you think repeatedly about the various times people have seemed to ignore you or slight you in some fashion, your subjective estimate of the number of times such events happen will be inflated. In addition, thinking about an event increases its availability for recall, and highly available events may exert a special influence over various judgments. For example, if your neighbor appears unfriendly today, and you can remember an earlier, similar episode, it will affect whether you attribute your neighbor's behavior today to his mood (a transient factor unrelated to you) or to his

attitude toward you. Another potential consequence of thinking about events is that they may seem more true the more often they are thought about. For example, Hasher, Goldstein, and Toppino (1977) showed that when people were asked to judge the truth of obscure facts, repeated judgments about the same facts increased subjects' ratings of the truth of the statements.

We have recently begun to explore the consequences of thinking about complex events (Suengas & Johnson, 1985). We developed a paradigm in which autobiographical events are simulated in the lab. Students perceived some situations and imagined other situations (e.g., meeting a Korean woman, making a pot of clay, visiting a computer lab, having coffee and cookies, writing a letter of complaint to the university administration). Situations were counterbalanced so that a given situation was perceived and imagined by an equal number of subjects. On perception trials, subjects actually experienced the event and on imagination trials, imagination was guided by a script read by the experimenter (e.g., "Imagine that I am offering you a cup of coffee . . . Please try to imagine the steaming cup of coffee in front of you as clearly and as vividly as possible . . . I also offer you some milk and sugar . . .). Several seconds between sentences in the script allowed subjects time to imagine what was suggested. The next day, subjects filled out the MCQ, which involves rating each memory on several dimensions (e.g., sensory detail, personal relevance, etc.).

Subjects' responses on the MCQ indicated that, relative to imagined memories, perceived memories were sharper, had more color, more visual detail, more sounds, more touch, seemed more comprehensible, had clearer spatial arrangement of objects and people, and produced more of a feeling of being a participant. For perceived memories, subjects could also better remember how they felt, thought the memory was more revealing about them, and had fewer doubts about the accuracy of their memory. Imagined memories seemed longer (when, in fact, the imagined events were, on the average, shorter). Imagined and perceived memories did not differ on a number of other dimensions—in amount of smell, taste, or temperature information; in complexity, bizarreness, tone, intensity of feelings they evoked; or in how unique the events seemed. These findings are generally consistent with those we have found for naturally occurring autobiographical memories.

In this study we also manipulated the number of times events were thought about after the initial ratings were obtained. Subjects were instructed to think about each situation either 0, 8, or 16 times (distributed equally across second and third sessions that were one day apart). On each rehearsal trial, subjects were cued with an event label (e.g., "Think about making the pot of clay.") and were allowed 15 seconds. As with assignment

to perceived and imagined conditions, particular events were assigned equally often across subjects to number of rehearsals. Final ratings of the memories were obtained at the end of the third day.

Rehearsal affected some aspects of the memories but not others. For a number of rating dimensions, instructions to think about the events had parallel effects on perceived and imagined memories, maintaining initial differences between them: If situations were not rehearsed, the availability of visual infomation diminished (e.g., clarity, color, detail). If situations were rehearsed, initial levels of visual information were maintained, but not exceeded. Other questions followed a similar pattern—that is, if not rehearsed, perceived and imagined memories became more sketchy and confusing, and rehearsal decreased the confusing and doubtful quality of perceived and imagined memories equally. On the other hand, some characteristics of memories appeared to become less available over time and instructions to rehearse had no effect. For example, rehearsal did not affect memory for the sound, touch, temperature, what people thought at the time of the event, and how much the situation revealed about themselves.

These results seem promising for a number of reasons. The initial ratings (before rehearsal) replicated the general pattern we have found for natural autobiographical memories, suggesting that differences between perceived and imagined memories are consequences of the processes of perception and imagination, and not a function of differences in the usual "topical" content of what is perceived and what is imagined (which, of course, is uncontrolled in the autobiographical studies). Thus, these findings are consistent with those indicating that when subjects are asked about their reasons for believing that something happened or that they just imagined it, they often refer to perceptual and contextual attributes of the situation as evidence for its occurrence and sometimes to the lack of those attributes as evidence for mere imagination (Johnson, 1985). In addition, the results suggest that rehearsal has a selective effect on complex memories. For the types of events we studied, thinking about an event very much seems to involve the activation of visual features, and much less so other types of information.

The finding that thinking about an event maintains certain types of information to the same degree for perceived and imagined memories suggests that thinking about events alone might not be a sufficient condition for producing later confusion between fact and fantasy. However, the *differential* rehearsal of events (thinking more about imagined than perceived events) could, in principle, produce a situation in which memories for previous imaginations are actually more vivid than memories for previous perceptual events from the same time frame. This provides one potential mechanism for the development of delusions. Those conditions (e.g., isolation, deafness) that would be expected to increase thinking about

self-generated events relative to thinking about perceptually derived events would tend to reduce the difference in qualitative characteristics of the two types of memories and hence, make the self-generated memories seem more real.

An interesting question that follows from this is whether only those aspects of an event included in a rehearsal are affected (maintained or potentially distorted), or whether all aspects are affected. For example, in thinking about events we sometimes focus on the physical characteristics of the event, and sometimes on our feelings, thoughts, or reactions. Especially if an event evokes strong feelings or reactions, we are likely in subsequently thinking about the event to focus on our feelings. One consequence of this may be that the perceptual features of the event become less available than they would have been with an equal number of "unemotional" rehearsals. This suggests one mechanism by which emotional involvement might reduce our ability to later give an accurate physical description of events, even if emotion did not disrupt initial encoding of physical features of the event. Furthermore, events that initially had high emotional content often later have an "unreal" quality—people know the events happened because they remember reacting, but they can't revive the events themselves (dreams are a particularly striking example of this phenomenon, but waking events can suffer the same fate). Again, this loss of a sense of reality surrounding an event may be a consequence of earlier rehearsals focused primarily on the emotional qualities of the event. Emotion may produce "repression" not because an event is "expelled" from consciousness, but because (relative to an unemotional event) certain critical (e.g., perceptual) features of the event do not receive the attention they would otherwise have received. This also would tend to increase the similarity of perceived and imagined memories and make reality monitoring more difficult.

Another important consequence of rehearsal is that it may embed an event in a network of other events or beliefs. When people think about something, they may look for other events that fit with or confirm the target event. For example, if subjects are told that a test indicated that they were particularly socially sensitive, they may remain convinced that they are even after they are told the test was not genuine (Ross, Lepper, & Hubbard, 1975). Presumably, this is because the initial information causes them to remember events that are consistent with the idea that they are socially sensitive. Similarly, if subjects initially liked their lab partner, thinking about the partner was likely to increase this feeling, but if they initially disliked the partner, thinking about the partner tended to increase the dislike (Sadler & Tesser, 1973; Tesser & Conlee, 1975). Presumably, thinking about a person includes thinking about reasons why you feel the way you do. The bias is to think of evidence consistent with the feeling; hence, the feeling becomes

exaggerated. Through thought, particular events become embedded in a network of other, related events. We know from our studies of autobiographical memories that people often take the existence of supporting memories as evidence for the reality of an event. Thus, the quality of embeddedness implies the reality of a perception, the perceptual origin of a memory, or the reasonableness or truth of a belief.

Control over Self-Generation

There are several reasons that dreams, hypnotic events, hypnogogic images, hallucinations, and delusions might seem real. When we are asleep or hallucinating, perceptual memories that are normally suppressed by reflective functions might become activated and recruit attention (Johnson, 1983). That is, remembered reflections may ordinarily recruit attention more easily than remembered perceptions, but if reflective activity is somehow "turned off" or attenuated, then perceptual activity can dominate phenomenal experience. Another possibility is that the reduction of reflection does not result in a more vividly perceptual phenomenal experience, but rather in the reduction of the criteria used to decide what an object is. That is, ordinarily the features of a stimulus may suggest several possibilities for its identity and the correct one is selected through a hypothesis-test cycle (Hochberg, 1968; Neisser, 1967). If this normal cycle is suspended, a stimulus may be assigned an incorrect identity selected at random or because of its association with other ongoing events or ideas.

Finally, a critical factor (and one that I think may be particularly interesting) is that the self-generation is not under conscious control. Most of the time, we have a sense of control over our imagination. One way, for example, of differentiating a present perception from a present imagination is to attempt to change the appearance of the object. Perceptions are more stable, whereas imaginations can be changed at will (e.g., Casey, 1976). Loss of control makes a self-generated event seem like a perceptual event. For example, take the case of dreams. One obvious possibility is that dreams seem real because they are particularly vivid experiences; that is, they have the perceptual detail characteristic of perception. However, the vividness of dreams may be overestimated. Often, upon waking, we realize that although a dream seemed as real as life, we are not sure of the identity of people in the dream. Also, although we may have a strong sense that the action took place in a certain location, the specifics of the location are not clear. In fact, when Johnson, Kahan, and Raye (1984) had subjects rate the characteristics of real dreams and dreams subjects had either read or made up, memories for the real dreams were not rated as having significantly more detail on perceptual dimensions. Perhaps more critical than the visual aspect of dreams is the

fact that they are not under reflective control—and this is the characteristic they share with perception that makes them seem so real. Similarly, the ideas that occur under hypnosis, or posthypnotic suggestion, may not be more vivid or realistic than the ideas that can normally be conjured up during consciously controlled imagination. However, the very fact that they do not come and go with conscious intention is perhaps what makes them seem real. Experiences that are the basis of hallucinations (e.g., visual experiences of stars and jagged lines, or auditory experiences of clicks and buzzes) also do not appear to have great perceptual detail. Rather, it is their unbidden quality (Horowitz, 1978), augmented by interpretation (especially embedding), that perhaps creates the sense of something happening "out there."

Another consequence of loss of control is disruption of temporal ordering of events. Events do not come with "time tags." Rather, they are ordinarily ordered with reference to other events (Friedman & Wilkins, 1985; Loftus & Marburger, 1983). Events should be particularly easy to order when they are a part of a goal directed sequence (Johnson, 1983). Melges and Freeman (1975) emphasize the importance of temporal disorganization in the development of persecutory delusions, and point out that it has consequences for reality monitoring:

> Memories, perceptions, and expectations, which are ordinarily separated by geophysical time, seem to be interconnected in psychological time. Such temporal confusion might blur the distinction between inside events (memories and expectations) and outside events (perceptions). In short, that which is lost in time may also be lost in space, and internally generated threats and predictions may seem to be coming from the outside. . . . The blurring of temporal boundaries would also enhance the interaction between threats and predictions . . . since predictions would be endowed with a sense of reality similar to the present-time or past occurrences. That is, rather than thinking, "They might attempt to control me," the temporarily confused individual would be more likely to think, "They are (or have been) controlling me."
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> *(p. 1043)*

Inappropriate Criteria

Most of the time, we adjust our criteria for deciding the origin of information according to the situation. For example, we are more likely to adopt a lax criterion for detecting peaches in a tree than for detecting enemy planes in the sky, or for telling an autobiographical anecdote on a social occasion (Johnson, 1985) than for testifying as a witness, or for expressing beliefs about politics than for beliefs about psychology (a political scientist would perhaps show the reverse effect). We also adjust our criteria as a function of the same sorts of biases that lead us to look for confirming evidence of

hypotheses we favor and disconfirming evidence of hypotheses we do not favor (Smedslund, 1963; Ward & Jenkins, 1965; Wason & Johnson-Laird, 1972). That is, a memory (or belief) that we find pleasant or comforting might not be examined for accuracy, whereas one that we find disturbing might well be. Ordinarily, we are governed by our notions of plausibility—if a perception, memory, or belief does not seem plausible, it should be scrutinized more carefully than if it does seem plausible. Delusions may not represent the operation of unusually lax criteria, but rather of inappropriately lax criteria.

Individual Differences

There may be habitual differences in attitude with which experience is approached. Generally, if you are unaware of how much imagination may fill in for perception, you may not consider the possibility in a particular case. Some people are more willing to trust their first impression than others; some are more willing to jump to conclusions on the basis of little evidence. It is less likely to occur to some people than to others to doubt their memory. For example, after talks that I have given on reality monitoring, people have told me that they were reminded of something they had always assumed had happened but now they were not so sure. Also, we have found a normal bias that adults show in reality monitoring experiments: If they feel that something is familiar but are not sure of the source, they are more likely to attribute it to perception than to generation (e.g., Johnson et al., 1981). Perhaps people differ in the extent to which this bias operates. Reserving judgment and living with the ambiguity of not attributing an experience to a source is an option that some people may find more difficult than others, or that individuals may find more difficult under some conditions (e.g., stress) than others. Although we know that delusional patients do not differ from normals on logic problems (Nims, 1959; Williams, 1964; both cited in Maher & Ross, 1984), it would be nice to have more information about their general style of thought, especially to have more information about their habitual mode of dealing with the ambiguity of the origin of information of nondelusional as well as delusional content.

Reality Monitoring as a Skill

Reality monitoring may be a skill that develops with experience. For example, although young children behave like adults in some reality monitoring tasks, they are sometimes worse at discriminating the source of information (Johnson & Foley, 1984). As Austin (1962) suggests, because all of us cannot tell subtle differences in vintages of wines, we do not assume

they are indistinguishable, or because a child may at first confuse a bent stick with a refracted stick, we do not assume that the child cannot learn something about the differences in the stimulus array that signal refractedness rather than crookedness. Similarly, a person prone to hallucinations might perhaps be taught to examine the "stimulus" for characteristics that reveal that it is a hallucination.

With respect to beliefs, a good deal of the best part of higher education is helping people adopt a critical attitude toward what they think and teaching them to differentiate between beliefs that are supported by evidence and beliefs that are not. If this were easy, many college courses would be unnecessary. As Tversky and Kahneman (1974) have so clearly pointed out, we all, even quite sophisticated scientists, make errors. Because delusions often involve false beliefs about other people, one of the most important issues is whether delusional people have, during the time preceding the development of their delusions, adequate opportunity for the social interactions that provide the opportunity to come to some accurate reading of the social environment (e.g., Swann, 1984). As Swann points out, accuracy in social perception is achieved through a process of interaction.

Delusions may be a response to intense and otherwise unexplained sensory experiences, or a response to traumatic experiences or other stressful events (Maher & Ross, 1984). Delusions are ways of coping, and may be produced by cognitive processes that produce other sorts of memories and beliefs (e.g., interpretation, selective rehearsal, selective confirming of hypotheses, etc.). However, delusions are the result of a dysfunctional, rather than a functional, coping strategy. What do people do who successfully cope with anomalous sensory experiences, traumatic events, social isolation, deafness, and so forth? Perhaps some research patterned after the novice versus expertise literature in cognition (e.g., Chase & Simon, 1973) would be useful. As well as studying the dysfunctional coping strategies of people who fail (and become delusional), perhaps we should study people whose coping succeeds, and pattern preventative treatments and educational programs after successful individuals. If we assume that reality monitoring is a complex skill (as is mental health), there are many points for it to go awry. Perhaps people could at least be partially protected against the future development of delusions by learning to anticipate the types of mental processes and activities (and the types of social contexts) that help and hurt their ability to discriminate the origin of information. Prevention is particularly important because once a complex delusional system develops, the probability of being able to change a person's habits of thought and life situation (e.g., social isolation) may be very low.

Availability of Alternatives

Another important variable in reality testing and reality monitoring is the availability of alternative explanations. People need not only the disposition to consider alternatives, but also some specific alternatives to consider. Again, environmental and social factors are critical. For example, suppose you are having mood swings that seem unconnected with events in your life. If you have read something suggesting that hormones (or blood sugar, or magnesium) affect mood, and you have social support for this idea, you may be less likely to conclude that some abstract force is controlling you. Similarly, if you are skeptical of miracles (or magic) to begin with, you should be less likely to conclude that a visual experience is the blood of Christ, and more inclined to look for other possibilities. Delusions should be affected by patients' cultural and social experience, particularly when the delusions are not sufficiently driven by perceptual experience to determine their character and are not constrained by alternative possibilities that are salient because of prior experience. Especially important may be the availability of alternative explanations for people's own *feelings*.

SUMMARY AND CONCLUSIONS

Reality is not given by experience, but by judgment processes. The characteristics of mental experience that provide it with the quality of reality are similar for perception, event memories, and beliefs: sensory detail; embeddedness in spatial and temporal context; embeddedness in supporting memories, knowledge, and beliefs; and the absence of consciousness of or memory for the cognitive operations producing the event or belief. Reality testing of ongoing perception and reality monitoring of memories and beliefs are complex judgment processes that are subject to error and more difficult in some situations than others.

For example, discriminating origin is limited by the quality of the information. In a situation such as Perky's (1910), in which imagination and perception are made quite similar, distinguishing between them may be difficult. Similarly, in some of our lab experiments, in which subjects perceived some words and generated others, the ability to later judge origin was quite poor (Johnson et al., 1981). But it would be a mistake to conclude from such work that perception and imagination are the same. These lab situations are only a subset of the possible judgment tasks, and not a random subset at that. Austin (1962) nicely makes the point that it is a mistake to assume that because perception and imagination are sometimes confused,

they are the same:

> Could it be seriously suggested that having [a dream that I am presented to the Pope] is "qualitatively indistinguishable" from *actually being* presented to the Pope? Quite obviously not. After all, we have the phrase "dream-like quality"; some waking experiences are said to have this dream-like quality, and some artists and writers occasionally try to impart it, usually with scant success, to their works. But of course, if the fact here alleged *were* a fact, the phrase would be perfectly meaningless, because [it would be] applicable to everything. If dreams were not "qualitatively" different from waking experiences, then *every* waking experience would be like a dream; the dream-like quality would be, not difficult to capture, but impossible to avoid. It is true, to repeat, that dreams are *narrated* in the same terms as waking experiences: these terms, after all, are the best terms we have; but it would be wildly wrong to conclude from this that what is narrated in the two cases is *exactly alike*. When we are hit on the head we sometimes say that we "see stars"; but for all that, seeing stars when you are hit on the head is *not* "qualitatively" indistinguishable from seeing stars when you look at the sky.
>
> Again, it is simply not true to say that seeing a bright green after-image against a white wall is exactly like seeing a bright green patch actually on the wall; or that seeing a white wall through blue spectacles is exactly like seeing a blue wall; or that seeing pink rats in D.T.s is exactly like really seeing pink rats; or (once again) that seeing a stick refracted in water is exactly like seeing a bent stick. In all these cases we may *say* the same things ("It looks blue," "It looks bent," etc.) but this is no reason at all for denying the obvious fact that "experiences" are *different*.
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> *(pp. 48–49)*

Assuming that perceived and imagined experiences are different, discriminating origin is also limited by the nature of the tests and judgment processes applied to information. What kind's of tests are possible? If an ongoing perception seems doubtful, you can move your head, try to touch something you see, ask someone else if they heard it too. In remembering, you can compare the qualitative characteristics of a memory you are uncertain about to one you are more certain is accurate. As with ongoing perception, social verification ("How do *you* remember it?") is an extremely important reality monitoring device for memories and beliefs.

Segal's (1970) suggestions that Perky's subjects made their judgments during a time when introspections about imagery was common and under conditions in which they had no reason to doubt that their experiences were imaginal illustrates the cultural and contextual factors operating in making origin decisions. Segal's work, as well, suggests that detecting the origin of experiences is influenced by a range of conditions that presumably affect

a person's set or bias (e.g., whether they are relaxed) as well as by conditions that presumably affect the quality of the information (e.g., stimulus intensity).

Taking into account the nature of both the information and judgment processes, I have suggested several specific aspects of delusional thinking that seem particularly important from a reality monitoring viewpoint. Delusions are likely to involve imagined sensory information (e.g., another person's voice) that is difficult to distinguish from actual perceptual events (Johnson et al., in press). Delusional people experience a loss of control over their thoughts and may spend considerable time thinking about and embellishing the delusion. Such a loss of control, even without any increase in frequency or vividness of imagined experiences, would tend to make thoughts seem external. Furthermore, frequent rehearsals and embellishments of a delusion should make it seem even more real, both because sensory aspects are preserved that normally would become less available, and because of the process of embedding. (At the same time, rehearsal of actual events that focuses on their emotional as opposed to perceptual aspects may decrease the discriminability between actual and imagined events.) Social isolation may not only decrease opportunites for social verification, but may also produce increases in rehearsal and embedding. In addition, delusions may be sustained by lax reality monitoring criteria (which we all use on occasion) applied inappropriately. Together, loss of control, frequent rehearsals, embedding, and inappropriately applied lax criteria should contribute to producing compelling interpretive experiences that (like perceptually vivid imaginations) might seem real.

I also suggested there may be important individual differences in how ambiguous information is dealt with. Reality monitoring is a complex skill and some of us are better at it than others. There are hints in the literature that editing of false memories can be improved (e.g., Raye et al., 1980; Hasher & Griffin, 1978), or that people can be given instructions that help them differentiate descriptions of constructed versus perceived events (Schooler et al., 1986). In addition, certain aspects of reality monitoring appear to develop with age (Johnson & Foley, 1984). These facts suggest that reality monitoring is not fixed but is subject to change. Similarly, there are hints in the social cognition literature that people can be made more aware of the biases that operate in processing incoming information (Lord, Lepper, & Thompson, 1980, cited in Fiske & Taylor, 1984). Presumably, if people became aware of these biases as they occur, they will entertain the hypothesis that past biases have influenced the quality of remembered evidence as well. Horowitz's (1978) report that sometimes patients seemed capable of differentiating between visual and nonvisual qualities of a hallucination is quite interesting, as is the fact that people recovering from

delusions go through a "double awareness" phase in which delusions are questioned (Sacks et al., 1974; see also Hilgard, 1977). These observations suggest the intriguing possibility that there is some potential for dissociation between the delusional experience and judgments about it. This is perhaps the heart of the answer to what differentiates delusional beliefs from ordinary fantasy.

There may be some fundamental discontinuity between normal and delusional thinking; that is, delusions may involve factors other than those involved in nondelusional memory and judgment processes. However, it seems clear that there is much room for the conditions and processes that are typically involved in discriminating the origin of information to contribute to the formation and maintenance of delusions. Conversely, considering the formation and maintenance of delusions should provide hypotheses about and insights into normal reality testing and reality monitoring processes.

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