

Memory and Consciousness

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INTRODUCTION

The Relevance Of Consciousness

This chapter is concerned with a topic of growing importance in psychology: subjective feelings, sensations, and conscious control of memory processes. The topic is of relevance to every other chapter in this book: When you see someone walking down the street and you recognize their face (Chapter 5), but you do not know where from, how does that feel? When you have a Tip-of-the-Tongue experience and you cannot think of a word that you want to use – how frustrating is that? When, sat in an exam, you have rich evocative recollections connected to your knowledge – like remembering exactly where and when you were taught about flashbulb memory, how helpful is that conscious awareness to the task in hand? What do these feelings tell us about our memory processes and – in the real world – how do these feelings influence our subsequent behaviours as we search for the answers? This topic is often described as metacognition: your thoughts about your thoughts. The main aim of this chapter is to present the ways in which the study of memory from the subjective viewpoint

considering consciousness and states of awareness illuminates our understanding of real-world memory behaviours, in doing so it gives an overview of the topic of metacognition.

Case Study – AKP

Patient AKP (Moulin, Conway, Thompson, James, & Jones, 2005) was a man with a very specific, rare memory problem. As a result of cell death in his brain as part of a dementing process, he had an almost persistent sensation, or belief, that he had encountered things in his life before; something that could be described as like persistent déjà vu. As a result of this memory difficulty, AKP withdrew from all his hobbies and interests. On refusing to watch the television because he said he'd seen the programme before (he could not have – it was a new programme), his wife once asked him – “If you think you have seen the programme before, what happens next?” AKP gave the very self-aware response: “How should I know? I've got a memory problem!”

Clearly, AKP had a problem with his memory. He was not particularly forgetful, but he had a peculiar sensation that he had encountered things before, when in fact he had not. This is not like déjà vu as you or I might experience it (see *Déjà vecu* below), as AKP could not help but act on his feelings. Because he felt as if he had done things before he did not enjoy doing them, and he withdrew from activities: his real world behaviour was changed by beliefs he had about his memory. We might say his problem was his conscious experience of memory: how it felt when he encountered information. It was his subjective viewpoint that led to his problems.

The Importance Of Consciousness

Traditionally, memory has mostly been studied from an objective point of view – focussing on the observation and measurement of behaviour. It has been relatively easy to explore individuals’ abilities and difficulties in this manner. For instance, our understanding of processes such as breaking memory into chunks have been illuminated by studying performance on tasks using lists of words or sequences of digits. These have readily been applied to novel topics and real world problems, like the memorability of postcodes or classroom practices. In these kinds of study and application, we are interested in the content of memory. Quite simply, we are interested in whether an item is remembered or forgotten. This emphasis is best illustrated by what Koriat and Goldsmith (1996) refer to as the storehouse metaphor, a representation of the way in which traditional psychological research has conceptualized memory, with a priority on the quantity of information that can be stored accurately. Even in more esoteric topics like flashbulb memory, we tend to focus on memory content: whether we can or cannot remember the facts associated with learning a new event, whether we can remember how we felt, for instance.

Such a bias on the content of memory is pragmatic: these things are easy to test and measure – it is an inheritance from very early studies of memory based on measuring the behaviour of animals. When testing an animal, it is impossible to ask them to reflect on their experience – so instead we have to measure what we can observe. An animal has remembered something if they change subsequent performance on the basis of having stored something they encountered earlier. In a similar fashion, psychologists tended not to ask about feelings, sensations and reflections of their human participants, but concentrated on easily measurable aspects of memory – such as, “if I give a person a list of words, which ones will they be able to remember?” But with AKP above, his behaviour is changed as a result of his own internal

feelings and his conscious evaluation of his memory system, not because of forgetfulness.

How can we explain this without considering his own first person experience and how it feels for him? What do cases like his say about how memory and consciousness interact? Just as Koriat and Goldsmith (1996) proposed a shift from the storehouse metaphor to a more subjectively meaningful and naturalistic correspondence metaphor, in this chapter we propose that the study of memory must include conscious sensations and beliefs by recognizing self-awareness in order to make a full account of real world behaviour.

Philosophers (e.g. Gennaro, Herrmann & Sarapata, 2006) interested in this issue discuss this problem along these lines, in reference to using behaviour to make inferences about mental states:

If a person leaves her house with an umbrella, we might explain that behaviour by attributing to her a belief that it will rain. However, the behaviour in question cannot be adequately explained merely in terms of that single belief causing the behaviour. She must also want to keep dry. Thus we must at least attribute a desire in addition to the belief to explain her behaviour.

(Gennaro, Herrmann & Sarapata, 2006, p.374)

That is, we *can* infer processes are operating in the mind of someone who takes their umbrella with them when they leave the house, but to fully understand their mental state, we might need to know if they hate getting wet, whether they are quite sure it will rain, whether they like the umbrella, and so on. The whole problem gets more complicated if the person forgets the umbrella. How then would we explain the lack of an intended behaviour, if all we can do is measure the behaviour itself? The idea is that it is a complex mental state –

consciousness – that drives behaviour. And, as this chapter will demonstrate, failures of some aspects of conscious experience can lead to particular failures of memory. But how do we define consciousness?

CONSCIOUSNESS

Defining Consciousness

Consciousness, as in ‘to regain consciousness’, is the state of awareness which we all have an understanding of. You are, at this very moment, conscious whilst you read these words on the page in front of you. You are using your conscious mental monologue to translate and communicate the written words into a stream of language that makes sense to you. As automatic as reading seems, and despite the engrossing nature of this paragraph, your conscious processes are easily distracted. For example, should something more pressing come to mind, like an itch on your ankle, these sensations will temporarily invade your consciousness until you have dealt with the cause of the disturbance, following which you will be able to resume the task of reading again. Of course, you are not consciously aware of every single aspect of reading. Some things you can make yourself aware of by diverting your attention to them, such as the way you can mentally vocalize what you are reading, or the movement of your eyes from one line to the next. Other things are much more difficult to notice and almost impossible to control, such as the saccadic movement of your eyes from one group of words to the next. The act of reading the passage illustrates some important aspects of consciousness; that it can be seen as an attentional process, that it can signal to us what we do or do not understand, and that some processes need to go through consciousness to influence our thoughts and behaviour, whereas other processes do not. Much of what

makes up our experience of the world comes from this interplay between conscious and unconscious processes, which could be seen as a priority system with conscious processes needing more attention to carry out than unconscious processes which mostly proceed automatically. Tellingly, when something noteworthy enters our consciousness, it is difficult *not* to get distracted by it- this is proof enough that, however hard it may be to measure, consciousness itself impacts greatly on our experience of the surroundings. Just as the overwhelming sensation of itchiness compels us to scratch the offending ankle, so too can an overwhelming sensation of familiarity entering consciousness convince us that a particular face that we encounter must be someone that we have met before. In this way, whether it is to resolve the sensation of an itch or the sensation of a memory, conscious states capture attention, and guide behaviour.

Although it is fairly easy to produce descriptions of consciousness and the way in which it is engaged in everyday activities, sometimes it seems wise to leave the definition of the term to philosophers. This is mainly because of the difficulty that psychologists have had when settling on a definition that pleases everyone. Some cognitive psychologists will describe only very specific mechanisms as being like consciousness, such as working memory, or the control mechanism that guides attention. Others may like to think of consciousness as metacognition (as outlined later, metacognition is the process of thinking about what we know), or the subjective experience of 'knowing about knowing'. It is because of well-defined constructs like these that many memory researchers will avoid talking about consciousness wherever possible, and refer instead to these more specific, 'safe' entities. In fact, some prominent philosophers suggest that we will never understand the subjective nature of consciousness (e.g. Searle, 1992), since its very subjective nature means it is not likely to be accommodated into objective scientific methods. One of the problems is that the

idea of subjective awareness central to consciousness is poorly understood (although measures such as recollective experience (see later) are gradually helping us to get a better grasp of conscious involvement in memory). For instance, if awareness is about monitoring a system and then acting on this information, we might describe a thermostat as being aware, since it can monitor the heat of a tank of water and control a heating element accordingly. But we would not describe a thermostat as possessing consciousness in any way that we can relate to our own subjective experience.

A further difficulty is historical. Consciousness was often proposed by philosophers as one of the differences between humans and all other species (in the way that theologians still propose the existence of a uniquely human ‘soul’). It is just this issue that led behaviourism to reject the need to measure or consider consciousness at all, and instead focus on stimulus-response links – observing objective behaviours, not introspective, subjective experiences. This behaviourist approach is often cited as being influential in the development of memory research, and presumably, that is why there is still a very large focus on objective tests of memory, things that are remembered and forgotten – as above. Thankfully, there are a growing group of credible researchers beginning to define and explore consciousness from a cognitive viewpoint. Pinker (1997) for instance, suggests that consciousness comprises three distinct parts: *Sentience*, *Access to Information* and *Self-Knowledge*. *Sentience* describes subjective experience, phenomenal awareness, feelings of what something seems like to you. *Access to information* considers the ability to report your ongoing mental experience or operations. *Self-knowledge* considers whether an organism can know itself and its impact on the world. To paraphrase Steven Pinker: We cannot only say we feel happy (*sentience*) and we can see red (*access to information*), we can also say, ‘Hey, here we are, Akira and Chris, feeling happy and seeing red.’ It is these kinds of debates that dominate discussions of

whether memory is comparable in rats and humans for instance. If rats have memory, can they really reflect on their existence at all – they may remember one maze or another, but are they able to consider how good it was to be in the maze in Colin’s laboratory, before they started on this new task in John’s laboratory? It seems that animals may lack this kind of self-knowledge, but that this may be a very central part of human memory. These three facets of consciousness are beginning to be taken forward in research illuminated by such things as amnesia, blindsight and split brain patients, and in the following review we are careful to consider these three aspects. But first, we consider an aspect of consciousness that Pinker may have overlooked, but that finds a lot of favour with memory researchers: how consciousness may act to bind our experiences together.

The Unity Of Consciousness

As we have discussed previously, to delve too deeply into the philosophical ruminations on consciousness would not be within the realms of this chapter, nor the academic experience of these writers. However, there is an important notion concerning consciousness that makes it particularly relevant to the exploration of the psychology of everyday life: the notion of the unity of consciousness. Take, for example, when you arrive home needing to relax after a hard day. You may put some background music on to help you to get out of the work mindset. It is also nice to sit down in a comfortable chair and take the weight off your feet. As you look out of the window at the hustle and bustle of the world outside, your overall conscious experience may be one of blissful comfort. That you undergo one phenomenological experience and you do not have individual and separable streams of consciousness for your throbbing feet, aching head, comfortable chair, relaxing music and tired eyes, is down to what is called the *unity of consciousness*.

Since the times of Immanuel Kant (1781), the unity of conscious experience has been considered as an integral characteristic of consciousness itself. Although falling out of favour when the emphasis shifted to behavioural research (as most work on consciousness did), the psychological exploration of consciousness has benefited in more recent times from neuropsychological investigation. Counterintuitively, as is often the most elegant way to learn from neuropsychological methods, the individuals from whom we have learned most about consciousness are individuals who demonstrate a disruption in the unity of their own conscious experiences. Absence seizures in epileptic individuals may cause minor disruptions of conscious flow for a number of seconds (Revonsuo, 2003). Drug-related experiences can also have similar effects over a much more prolonged period of time, but perhaps the most conclusive division of the normal unity of consciousness has been reported in split-brain patients.

Split brain patients, as demonstrated famously by Sperry (1984), are a unique group of individuals for whom the unity of consciousness does not hold. Having conducted commissurotomies (the surgical cutting of the corpus callosum; the only part of the brain through which left and right hemispheres can communicate) on a number of epileptic patients, Sperry made a number of interesting observations on the accessibility of the contents of consciousness relevant to the functional specificity of the two hemispheres. The crux of these observations was that aspects of consciousness located within the left hemisphere (for example speech) were largely unable to utilize the contents of consciousness relevant to the right hemisphere (for example the tactile sensory input of the left hand) and vice versa. These observations were important for the scientific study of consciousness, placing what is often thought of as a 'spiritual' or 'otherworldly' construct well within the

realms of empirical investigation. Furthermore, these sorts of investigation have resulted in further breakdown of classical Cartesian dualistic ideas (the philosophical viewpoint that mind and body are two separate entities with little to no influence on each other, Descartes, 1641), with the conscious mind demonstrably resulting from neuronal connection and activity. As is the trend, many recent neuroimaging studies have attempted to establish and demonstrate neural correlates of consciousness. However, we do not need to examine such technological means so far to see how a basic knowledge of consciousness can help with our understanding of everyday memory. We often make memory errors if we are distracted, or our current goals and processes clash with something in memory. For instance, we may run upstairs and forget why we have done so, or be halfway through answering a question only to lose track of what the question was in the first place.

We have established that for most of us, for the vast majority of the time that we are awake, consciousness is unitary and uninterrupted. It acts as a bridge between ourselves and the world we interact with, making us aware of internal and external states, thereby facilitating decision-making as we know it. But is consciousness needed in order to make accurate judgments? The answer to that question is, of course, no. A thermostat can make far more accurate judgments that you or I could about temperature, yet as we discussed previously, the existence of a thermostat having consciousness similar to our own is out of the question. But it is easy to list thousands of man-made, non-conscious objects designed for a particular function, like temperature control, and observe that they can perform these functions far more consistently and for longer than you or I ever could; that's no surprise at all. After all, their physical constraints do not let them do anything else. What is far more exciting is to find a person who would expect to utilize their conscious processes normally, a person for whom consciousness is an unavoidable part everyday of life, except in certain, very specific

situations when conscious awareness leaves them, and they have to rely, quite unnervingly for them, on their unconscious awareness. In *blindsight* patients, that is exactly what we have.

DB, a neuropsychological case study of blindsight reported by Weiskrantz (1986), believed himself to be blind in certain areas of his visual field. When presented with stimuli which he was asked to identify, DB was unable even to notice that he was being presented with anything. However, when asked to guess as to whether what he was currently being presented with was an X or an O, he would invariably guess correctly. His confidence in the accuracy of his judgments was the same as yours would be, were you to stare at a blank piece of paper and say whether what you were seeing was an X or an O. However, DB's accuracy demonstrates that his conscious experience, or lack of it, was not representative of his accurate unconscious experience. Input from his eyes was being processed accurately on an unconscious, implicit level, but was not being made available for conscious, explicit consideration. Of course, for DB's own subjective experience it was probably verging on the irrelevant that he was able to unconsciously perceive things accurately, such is the importance of conscious experience and the way it drives our experience of the world. What use was it to him if he could guess correctly what he was seeing if he did not think that he might be seeing anything at all in the first place? It is this dissociation between two normally congruent aspects of experience, the separation of the *unconscious* and the *conscious*, which has driven much early work on consciousness. The separation of two processes that normally occur as one can tell us about what each component process brings to the experience as a whole. It is not normal for these processes to work out of union, but when they do, it is striking: think about your own experiences of *déjà vu* – or of having a word 'on the tip of your tongue'. We may be able to understand better some of the more nebulous but

nonetheless valuable experiences that form part of everyday experience by tackling these topics head-on.

SUBJECTIVE EXPERIENCE AND COGNITIVE FEELINGS

Defining Cognitive Feelings

When we discuss memory and consciousness the main thrust of the argument is that as individuals we have ‘privileged access’ to our memory functions. But what sensations does memory give us, and with what apparatus do we judge the qualities of our memory? These sensations and qualities are ‘cognitive feelings’ - they are subjective experiences about processing that guide our behaviours and have consequences for us. One such commonly experienced cognitive feeling is the tip of the tongue state; where we know we know a word, but momentarily we cannot access it. Such a feeling is evidence for a separate conscious contribution to memory. We have the feeling that we know the word and yet the word is not accessible to us to share with another person. The consequent tip of the tongue sensation is a cognitive feeling which drives us to consider using another word, to search harder for the word that we want, or to ask a person to help resolve the feeling. Table 12.1 gives some examples of cognitive feelings. The top four are well-established, and discussed here, but in our view this list could be expanded on – the bottom three are examples of feelings which may, like the top four, result in some frustrating feelings and an all-pervading sense of self, and which may signal some important issues for cognitive processing.

Table 12.1 about here

The central theoretical questions here are: To what extent are we aware of our memory limitations and functions? And how do we act on the states of awareness generated by memory processes? In turn we turn our attention to metacognition, then recollective experience. These two large areas of investigation might be thought of as memory's intersections with consciousness. We might refer to these as quantitative and qualitative cognitive feelings. In metacognition, we use numbers, like you would in a quiz show format, to report subjective experience. Participants make statements like "*I am 90 per cent sure I will be able to remember that word*" – it has a quantitative focus. In recollective experience, we ask for subjective reports of a state that the person is in, based on how they feel. Participants report feelings, images and thoughts, as well as the quality of their memory.

Measuring Subjective Experience

We have already argued that cognitive psychology and, in particular, memory research grew from scientific approaches which sought to remove subjective feelings, and avoid the 'bias' of subjective report. The reasoning of early psychologists was that by using subjective report, the reliability of theories would be weakened – they believed that if psychologists base theories on idiosyncratic reports from certain individuals, then it may not be possible to generalize those theories to others. Moreover, as the discipline developed, we began to understand that factors like social desirability and the Hawthorne effect (that fact that when you are observed by someone your behaviour has a tendency to change) were probably influencing our results if we directly asked people to report their feelings or subjective views. To confound the area further, psychology began to uncover 'subconscious' processes critical for healthy cognitive function that were not available for conscious report anyway. Some

researchers who were trained in this period could be forgiven for thinking that their participants would lie to them at every opportunity.

How then, should we measure subjective experience, and be confident that we are reflecting true internal processes, and not the idiosyncrasies of a few select participants? There are four general principles that underpin much research on subjective experience:

1. *Subjective evaluations should relate to actual performance.* If someone feels that something has been very well learned, then their performance for that item should be better than their performance for something they feel they have not learned well. This is a general principle that is upheld in the metacognition literature. The fact that people can predict how well they will perform or how well they have performed, suggests that their subjective reports are indicative of some access to mental operations. As an example, Lovelace (1984) showed that an individual's prediction of performance for an item was more accurate than an average of everyone's predictions for that item: the individual has a privileged access to their memory function not captured in a group aggregate of predictions.

2. *Subjective evaluations should relate to objective characteristics of stimuli.* Psychologists know that different types of materials produce different levels of performance, and that these appear to be processed in different ways. One such difference is between high frequency words (such as 'house') and low frequency words (such as 'okapi'). It has long been known that these produce different levels of memory performance, but reassuringly, they generate markedly different reports of subjective experience too. Because the low frequency words are vivid, and usually bizarre, they tend to generate rich, evocative memories, whereas words like 'house' are difficult to differentiate, and tend to generate vague feelings: "Was it the

experimenter who showed me the word ‘house’, or was I thinking about it on the way to work?” This type of difference has been explored with subjective reports of remembering and knowing by Gardiner and Java (1990; also see section on Recollective Experience later). The two types of stimuli yield very different types of subjective experience and unless the participants have studied memory in detail (otherwise how would they know how to produce this pattern) and are very bloody-minded, they would not be able to ‘fake’ this pattern.

3. *Participants should be able to justify their responses.* This is possibly the simplest approach, and one often used by Gardiner, one of the leaders in the field of memory and consciousness (e.g. Gardiner, 2001). Put simply, people’s justification of responses should relate to their experience, and the way that they have responded to the test. We regularly collect such justifications from our participants, and they can effortlessly discriminate between feelings such as, “*It’s vague – I think I saw it before*” and “*I made an association with Polka dot. It’s a Polish word it means woman.*” It is particularly persuasive if people spontaneously justify their experience, or draw parallels between what you have produced in the laboratory and what they feel in daily life.

Figure 12.1 here

4. *There should be converging evidence from neuropsychology or neuroimaging.* Brain damage and neuroimaging are powerful tools, often regarded as ‘converging evidence’ by cognitive psychologists. If we are measuring a verifiable subjective process, we would hope that we could see it in studies of neuroimaging, or that it might break down in a systematic manner in brain damage. Consider Figure 12.1, The Necker Cube. This image is a classic ‘ambiguous figure’ and can be perceived in one of two ways. You can view it as having point

A in the foreground and point B in the background, which will make the cube point upwards (and to the right), and you'll be able to see underneath it, or you can view it as point B in the foreground, which means that the cube is facing downwards (and to the left), and you can see on top of it. We have no way of knowing which of either way another person is looking at the cube, unless we ask them, but then no idea, either, of whether what they have told us is true. The same can be said of the conscious experience of Figure 12.2, either seen as two faces, or a vase. Because we know what area of the brain is responsible for face perception, we can examine what happens when people report that their experience is shifting from face to vase and vice-versa. Andrews, Schluppeck, Homfray, Matthews, and Blakemore (2002) showed that significantly different areas of the brain were activated when seeing this as a face or a vase: people's subjective reports mapped onto activation within their brain. The same has been demonstrated for memory: the responses of different brain regions dissociate according to the phenomenology (Henson, Rugg, Shallice, Josephs and Dolan, 1999). This exciting area, how subjective experience is manifest in the brain, is one of the frontiers of neuroscience and it is hopeful that such studies will enable us to map out the functions and operations of consciousness in the future. Of course, another approach is to consider how memory fails in people like AKP, which has yielded similar valuable insights.

Figure 12.2 here

Metacognition

Metacognition is 'knowing about knowing', and as a topic for scientific study, it considers subjective reports about memory processes, developed from the rationale above. When we try to retrieve something from long term memory, we can introspect on how difficult it was to

reproduce, what else came to mind, how confident we are that what we have retrieved is correct, and sometimes we can even remember where and when we encountered the information. These are 'higher order process', and clearly have a lot in common with Pinker's view of consciousness: we have access to information, and self knowledge. These concepts explain the 'meta' part of metacognition. Not only do we produce some content when searching memory, we can report some knowledge about the search for that content, or metaknowledge. The general term "metamemory" has also been used, but Cavanaugh (1988) has pointed out that three kinds of knowing about memory can be distinguished:

- (1) *Systemic awareness* consists of knowing how memory works, what kinds of things are easy or difficult to remember, or what kinds of encoding and retrieval strategies produce the best results.
- (2) *Epistemic awareness* consists of knowing what we know, knowing what knowledge is in store and being able to make judgments about its accuracy. This is metaknowledge.
- (3) *On-line awareness* consists of knowing about ongoing memory processes and being able to monitor the current functioning of memory, as in prospective memory tasks (see Chapter 2). Cases of absentmindedness occur as a result of failures of on-line awareness.

As Cavanaugh has noted, the three kinds of metamemory may be interrelated. In trying to recall a particular fact, epistemic awareness may be involved in knowing that the relevant information is in store; systemic awareness may guide the selection of search strategies and direct the search process; and on-line awareness might be involved in keeping track of the progress of the search.

Evaluating Memory Failures

One function of systemic awareness is that it provides us with standards against which to evaluate memory failures. People have quite clear expectations about what things they ought to be able to remember and what it is quite acceptable to forget. However, it appears that these expectations are tailored to the age of the person who is doing the forgetting, and also vary with the age of whoever is making the judgment. Erber, Szuchman, and Rothberg (1990) asked young and elderly participants to evaluate other people's memory failures. The participants were provided with written vignettes describing memory failures of different kinds. Examples are:

"Mrs. X went upstairs to get a stamp and forgot why she had gone up."

"Mrs. X was introduced to someone and shortly afterwards forgot the person's name."

"Mrs. X forgot to buy one item of the three she intended to buy at the grocery store."

"Mrs. X hid money in her house and next day could not remember where it was."

In some examples Mrs. X was described as young (23-32 years) and in others as elderly (63-74 years). Participants were asked to rate possible reasons for the memory failures, whether they were signs of mental difficulty, and whether they indicated a need for memory therapy or for medical evaluation. It was strikingly evident that the same memory failure that, when the protagonist was described as young, was dismissed as due to lack of attention and of no consequence, and when the protagonist was described as elderly, was seen as a sign of mental difficulty and need for memory training. Young participants were also more severe in their judgments than the older participants. These findings show that people have double standards about what level of memory efficiency is "normal" and their judgments are biased by negative stereotypes of ageing.

Knowing What We Know

In the recall of general knowledge it is the epistemic kind of metamemory, or metaknowledge, that has received most attention. Our ability to know what we know, and, even more importantly, to know what we do not know, is such a commonplace feature of everyone's mental processes that we tend to take it for granted, and fail to realize quite how surprising and how puzzling an achievement it is. Given the enormous range and quantity of information that an adult accumulates and stores over a lifetime, it is surprising that when we are asked a question we can usually say at once and with reasonable confidence whether the answer is in memory or not. Paradoxically, we know whether the search for an answer will be successful or not before it has begun. An example of this ability comes from lexical decision tasks. People are able to decide that a letter string (such as *brone*) does not constitute a real word, and they make this decision so fast that it is hard to believe that they can be searching through the entire mental lexicon to find out whether *brone* is represented. The same ability to know what we know and what we do not know extends to facts as well as lexical items.

Knowledge on the Tip of the Tongue: The TOT State

Brown and McNeill's (1966) research into the tip-of-the-tongue phenomenon is a classic study of epistemic metamemory. When recall of knowledge is rapid and successful there is little or no conscious awareness of how that knowledge was retrieved. Direct access to information in the memory system is a fast and automatic process and is not accessible to introspection. Occasions when recall departs from our normal experiences of it, when it is slow, effortful and indirect are

much more illuminating to the researcher because people are able to report something about *how* they are searching and what fragments or items the search process turns up along the way.

Brown and McNeill focused on cases when a target is known but cannot be recalled. In these cases there is a temporary failure of the retrieval process, but recall is felt to be imminent. This phenomenon was called the TOT state because the target item is felt to be on the tip of the tongue, and Brown and McNeill described this feeling as like being on the brink of a sneeze. The material used in their study consisted of rare words, and their findings are therefore relevant to the storage and retrieval of lexical knowledge rather than factual knowledge, but the basic method they developed has been adapted and used in other studies examining retrieval of general world knowledge. They assembled a large group of participants and read out questions such as "What is the word designating a small boat used in the river and harbour traffic of China and Japan?" and succeeded in inducing 233 TOT states. Of these, 65 per cent were classed as positive because, when the target word was supplied by the experimenter, it was recognized as the one that had been sought, indicating that the feeling of having the word on the tip of the tongue was a valid reflection of what was in the memory store. As in the studies of name blocks, described in Chapter 5, people in the TOT state could often supply partial information about the target word, recalling the first letter, number of syllables, and location of primary stress. They also recalled candidate words that were not the target, but were similar in sound or meaning, and they were able to judge the relative proximity of these candidates to the target.

Brown and McNeill (1966) concluded that words are generically organized in memory into sets with similar meanings or with similar sounds. Recall of partial information, and of nontarget candidates that resemble the target word, reflects this generic organization. James and Burke

(2000) have reported results that reflect links between phonologically related words.

Pronouncing prime words that shared phonemes with the blocked target words helped to resolve the TOT because activating these related words strengthened activation of the target. These findings suggest that top-down search processes first access a class of semantically or phonologically related words, and may sometimes stop short at this point without locating the specific target. It is worth emphasizing, however, that these findings apply to indirect retrieval processes. They do not apply to rapid automatic direct access to a designated target, which does not necessarily follow the same route as TOT searches.

The Feeling Of Knowing: FOKs And The Knowledge Gradient

The Feeling of Knowing (FOK) is distinguished from the TOT state because it relates to a whole range of knowledge states from being sure you do not know something, to being confident that you could recall it if you were given enough time, or given suitable hints, to being quite sure that you do know the right answer. Retrieval attempts, whether successful or not, are accompanied by a subjective feeling of knowing that falls somewhere along this scale. There are two main questions to be asked about FOK judgments. The first question is concerned with their accuracy. How well does the subjective FOK correlate with objective measures of correct recall? Does the FOK predict actual performance? The second question, which is more controversial, concerns the underlying mechanisms on which the FOK is based.

The Accuracy Of FOKs

Lachman, Lachman, and Thronesberry (1979) developed Brown and McNeill's (1966) insights using a more experimental technique for investigating epistemic awareness and the retrieval of

general world knowledge. Their experiment used a method known as the RJR (Recall: Judgment: Recognition) paradigm in which testing is divided into three phases. In Phase One of Lachman et al.'s experiment, participants had to answer general knowledge questions covering current events, history, sport, literature, etc. such as "What was the former name of Mohammed Ali?" or "What is the capital of Cambodia?". They were told not to guess, but to give the correct answer or respond "Don't know" as quickly as possible.

In Phase Two, participants were re-presented with all the questions to which they had responded "don't know" and asked to make a "feeling of knowing" (FOK) judgment on a 4-point scale: 1 = definitely do not know; 2 = maybe do not know; 3 = could recognize the answer if told; 4 = could recall the answer if given hints and more time. In Phase Three, after a short delay, the participants were given four multiple choice alternatives for each of the questions to which they had initially responded don't know, and had to select one of these alternatives and give a rating of confidence in the correctness of their choice. So, for example, the choices for the question about the capital of Cambodia were Angkor Wat, Phnom Penh, Vientiane and Lo Minh. The confidence-rating scale ranged from 1 = a wild guess; 2 = an educated guess; 3 = probably right; to 4 = definitely right.

The results showed that high FOK ratings were positively related to the probability of picking the correct alternative and to the level of confidence. The response times in Phase One were also systematically related to the FOK ratings. Participants took longer to say "don't know" when they thought they might possibly know the answer, so high FOK ratings of 3 or 4 were associated with long response times. When FOK was low, "don't know" response times were fast. Confidence ratings in Phase Three also reflected the correctness of the choice. Participants were more confident when they chose the correct alternative and less confident when their

choice was wrong. This experiment takes subjective self-ratings of FOK and of confidence, and validates them against objective measures of accuracy and response time. The results confirmed that there is not a simple two-state dichotomy such that people either know something or they do not know it. Instead, there is a gradient of knowing that is reflected subjectively in the FOK and confidence ratings, and objectively in the speed and accuracy with which a target piece of information can be retrieved.

Nelson, Leonesio, Landwehr and Narens (1986) reached a similar conclusion using the RJR paradigm like Lachman et al. (1979). They compared three different predictors of memory performance. The FOK supplied by an individual was a better predictor than the average FOK of all the participants, but the best predictor was the objective probability of recall. These findings draw attention to the fact that, although it is generally fairly accurate, the FOK may sometimes be misleading. Krinsky and Krinsky (1988) found that when participants failed to remember a state capital, their FOK for the unrecalled capital city was distorted by a tendency to recognize falsely other large cities as the capital. For example, your estimate of your ability to recall the capital of Kenya will be inaccurate if you think Dar-es-Salaam is the capital.

People cannot always judge what they will or will not be able to retrieve from memory. For this reason, metacognition researchers are very fond of testing people on the capital of Australia: whilst Canberra is the answer, it is Sydney that most readily springs to mind. But the general feeling by the participants is that one really should know what the capital of Australia is.

Metacognition In The Real world

The beauty of the metacognitive approach is that it has many real world applications, and its utility is broadening every day. For an example of some of these applications, see Chapter 13

on the Psychopathology of Everyday Memory. One aspect of the metacognition approach is that it enables the study of memory difficulties which are not easily captured on everyday tests, or tasks where the focus is on forgetfulness. For example, people who repeatedly check whether the front door is locked or not to a pathological degree, do not have a memory deficit, but we could describe them as having a metacognitive deficit: it is their interpretation and evaluation of their memory for locking the door which is dysfunctional. Arguably, it is not these people's memory that is impaired, but their relationship with it. Such a perspective requires a consciousness viewpoint.

One area where there has been a great deal of metacognition research is in memory impairment, particularly in healthy aging, where there is known to be an impairment in certain types of memory (see Chapter 11). Here, the chief advantage of the metacognition approach is that any deficit that is essentially metacognitive can be remedied by strategy and training. Put another way, if you do not know that you have a memory impairment, how can you implement procedures to compensate for your memory difficulties? Thus, a research priority has been to investigate whether older adults have impaired metacognition. If older adults are not aware of the subtle changes in their memory abilities, their day-to-day functioning will be so much worse, since they will not compensate for memory difficulties in their behaviours.

Unfortunately, this persuasive and simple question has not been met with clear-cut data. In fact, the richness and complexity of the data produced by older adults has been driving a lot of the theoretical changes to how we think about metacognitive processes. For instance, although older adults tend to over-estimate their memory performance when compared to younger adults, they are still as able as younger adults to accurately select which items from a memory test they are most likely to remember (Dunlosky & Connor, 1997). That is, they have a general

belief that their memory is still as good as when they were young, which suggests that they have a metacognitive deficit, but nonetheless they can still accurately monitor which items in memory they will later remember. This suggests the need for a model which has both general awareness about memory, and more specific on-line monitoring of information, as outlined by Cavanaugh (1988) above. In turn, even if older adults are able to know which items will be better remembered, and which might need more effort to remember, they are unlikely to act on it during memory processing (Connor, Dunlosky, & Hertzog, 1997). In a series of experiments, Connor and Dunlosky showed that whereas young people's predictions correlated with the amount of time they chose to study items they had to learn, older adults' predictions had little or no bearing on how long they elected to study the items. This of course could be an explanation, or at least an exacerbating factor in memory difficulties: older adults do not take steps to remediate their memory difficulties – studying items which they judge as more difficult to remember for a longer period of time, for example. Finally, consider the FOK task, which has been studied extensively in older adults. Whereas it appears that FOK is intact, and accurate for semantic materials i.e. general knowledge tests, it is impaired for episodic materials i.e. newly learned word pairs (Souchay, Isingrini & Espagnet, 2000). This again raises theoretical issues as it suggests that the way in which we are aware of general knowledge differs from our awareness of recently learned material.

Theoretical Explanations Of The FOK

We need to examine models and theories which can explain these otherwise peculiar patterns of results seen in older adults. Koriat (1995) distinguished two very different views about the processes underlying FOKs. According to the *Internal Monitor View*, sometimes called the trace-based view, there are two stages involved. The first stage is like looking up a directory

listing of computer files, and this precedes the second stage of retrieving the desired item. The FOK is based on whether or not the monitor detects the target item in the listing. As Koriat has pointed out, there are some problems with this account. It is consistent with an all-or-none FOK, rather than the graded judgments that are reported, and is also difficult to reconcile with inaccurate FOKs. By contrast, *Inference-based Models* claim that the FOK is based on inferences. For example, you may believe that you know something because the topic is familiar or because you can remember the context in which you acquired the information originally. Reder and Ritter (1992) elicited FOK judgments for arithmetical problems and varied the amount of exposure to whole problems and to individual terms in the problems. Their results showed that the FOK increased with increased exposure to the terms of the problem. That is, the FOK was based on familiarity with the question not familiarity with the answer. This result appears to support an inference-based account of FOK.

Koriat's *Accessibility Model* (Koriat, 1993, 1995) is also an inference-based model. However, according to Koriat, the FOK does not precede retrieval, but is based on the products of retrieval. The products of retrieval may consist of the target item or of partial information about the target provided by the initial retrieval attempt. The FOK is determined by both the quantity and the quality of this information; that is, the amount of information, its intensity, and the ease of accessing it. The main difficulty in testing this model is that partial information may not be consciously available. Given a question like "What is the capital of Uganda?", fragments of the target may be retrieved but remain below the level of conscious awareness. Koriat carried out experiments examining FOKs for the recall of both four letter nonsense strings (1993) and general knowledge facts (1995). The letter strings allowed Koriat to measure the amount of partial information available when recall of the whole string failed (i.e. the number of letters that were recalled), but in the experiments with general knowledge, the amount of partial

information recalled for a given question had to be estimated from normative data based on how many participants could answer the question, that is, if more people could answer the question it was simply assumed that more partial information would be elicited. This method is therefore less satisfactory, although recall of general knowledge has greater ecological validity than recall of letter strings.

The model predicts that:

- (1) FOK will be higher if a response is given even if it is not correct than when no response is given (because the amount of information available is greater).
- (2) FOK will be higher if the response is correct than if it is wrong (because the quality of the information is more intense and it is accessed faster).
- (3) FOK will be higher if there is more partial information than if there is little or no partial information.
- (4) FOK will be higher for questions that many participants can answer (on the assumption that more partial information is, normatively, available for these questions).

These predictions were supported by the results. The model is also consistent with the graded character of FOKs and the fact that they are not always accurate. In line with his view that the accuracy of the FOK depends on the accuracy of the information retrieved, Koriat showed that for questions that tended to elicit many wrong answers FOKs were overestimated. The quantity and ease of access of the information misled participants into feeling overconfident that they

knew the correct answer. Thus, for the perplexing finding that episodic but not semantic FOK is impaired in older adults, one merely has to consider that for the two tasks, the cues are different, and therefore, older adults struggle with episodic and not semantic cues. To consider what the difference between these two is, we need a theory of what the difference is between semantic and episodic memory is from a consciousness viewpoint – see Recollective Experience below.

Finally, one very important idea arises from Koriat's model. He concluded that FOK formation occurs neither before retrieval nor after retrieval, but as part of an interactive on-line process contemporaneous with retrieval. This view blurs the distinction between retrieval and FOK, between knowledge and metaknowledge, which are both seen as part of the same process. One might argue that metacognition is not a bolt-on process that occurs alongside memory processes: it is an intrinsic part of memory itself. The contents of memory and the contextual detail retrieved when bringing to mind a memory is the material which generates the feeling of knowing. To understand this interactive on-line process, one has to turn to the literature on states of awareness, or what is most often described as states of awareness.

RECOLLECTIVE EXPERIENCE

The Historical Context Of Recollective Experience

Up until the late 1980s, psychological research had generally been constrained by what Endel Tulving (1989) called the ‘doctrine of concordance’ of behaviour, cognition and experience. Gardiner and Java (1990) explain that according to this doctrine, “performance, knowledge and experience are closely correlated” (p. 23) with the assumption that if you measure one,

you are going to get an adequate enough picture of the others. This was, of course, convenient for researchers: It is much more reassuring to give someone a memory test and objectively score it out of 30, than it is to question them about their experience of remembering, and interpret the transcript of that interview, introducing subjectivity from both the participant *and* the experimenter. The latter seems especially unnecessary if you are of the opinion that conscious processes contribute little that the final response cannot summarize.

However, in 1985, Tulving argued that it was possible to classify different memory systems on the basis of subjective experience, rather than content, or time period. He argued that memory retrieval could either be self-knowing or not. He characterized episodic memory as ‘autonoetic’ (self-knowing). Semantic memory, on the other hand, often described as memory for facts, was ‘noetic’ (just knowing: There is also anoetic memory- memory without awareness, such as implicit memory, or procedural memory). According to Tulving, then, episodic memories are self-knowing – that is, some aspect of the memory includes its source, an awareness of its origin, a feeling of pastness, a conscious evaluation of itself. On the other hand semantic memories are not. These distinctions, which are still used in the psychological literature, are operationalized to reflect the presence or absence of recollective experience (as detailed below, in Defining Recollective Experience).

Tulving’s classifications revitalized the exploration of conscious processes in psychology, and better still, made it a formalized and relatively straightforward task to study the subjective experience of memory. Abandoning the behaviouristic doctrine of concordance, the shift in attention from *the result* of a decision-making process to *the process itself* (including the end-result) recognized the importance of consciousness in decision-making. What’s more, the theoretical underpinnings of these memory systems have afforded the

development of objectivized measures of subjective experience, called recollective experience, which can be taken alongside standard objective memory tests. Recollective experience measures allow psychologists to trust that participants have an insight into *why* they make memory judgments. So what exactly is recollective experience?

Defining Recollective Experience

Recollective experience is the subjective report of the sensations attached to the retrieval of an item from memory. Basically, it allows us to distinguish between sensations of ‘remembering’ and ‘knowing’. *Remembering* is the act of bringing something to mind with recollective experience: It includes a subjective state of pastness, and knowledge about the memory’s context and source. For example, I may like to think about a recent holiday to New Zealand. On this holiday, I went for a walk in the Abel Tasman national park. I can remember who I went there with, and the sights and the smells of the path, and how I felt at the time. As I dwell on the memory, I begin to recall more detail about it, and I may enjoy the sensation of reminiscence. On the other hand, *knowing* about information, and recalling it from semantic memory only involves the retrieval of information without recollective experience. There is no rich contextual information, or sense of pastness, I *just know* the information that I have retrieved. Two examples of ‘knowing’ are as follows. If you ask me to name the capital of New Zealand, I can tell you that it is Wellington. I cannot remember how I learned this information and it does not necessarily evoke any feeling in me: it is a just well established fact. Alternatively, if you ask me whether I have seen the film ‘Whale Rider’, I can say that I have without any bringing to mind any specific memories of watching the film, without any recollective experience for it. Thus, although these two experiences of ‘knowing’ could be considered quite different, the absence of recollective experience means that they are both

'know' experiences. 'Remembering' and 'knowing' can be considered as either reflecting episodic and semantic memory, or auto-noetic and noetic storage (Tulving, 1985).

Recollective experience research integrates classical, objective, right or wrong, recognition memory tests with measures of recollective experience. Based on the premise that we make recognition judgments for stimuli after examining our internal responses to them, this paradigm allows the memory researcher to score subjective measures of conscious experience in an objectified way, alongside standard objective measures of memory. A generic, if very short, recollective experience task would proceed as follows:

- 1) Participants read a list of four words: *heart*, *postcard*, *lily* and *typewriter*.
- 2) They complete a distractor task, e.g. go through the alphabet backwards.
- 3) They are presented with of the following definitions of judgments they will be asked to make:

Remember: I recognize this word. I can remember aspects of my previous experience of reading it before (e.g. what it made me think):

Know: I recognize this word. I don't remember any aspects of previously encountering the word but I just know it was in the previous list.

No recollection: I do not recognize this word. This is a word I didn't read before.

- 4) Participants are presented with the test list of words which participants are asked to categorize according the above definitions: *tree, postcard, knife, hangar, lily, heart, mug* and *typewriter*.

In this way, ‘remember’ and ‘know’ judgments allow the researcher to understand what sort of conscious recognition experience the participant is having, as well as acting as positive recognition judgments in their own right. As you have been reading this example, you’ve probably been making recollective experience judgments of the example words, finding that you ‘remembered’ all four of the words. However, imagine if you had looked at a list of 30 words for five seconds each, followed by a real distractor task lasting 15 minutes and were then presented with a test list of 60 words. You can see how some words would be distinctive enough to be ‘remembered’, others would just be ‘known’, and some would slip through the net altogether. All in all, this sort of memory experiment can help us to examine further the phenomenology involved in the experience of remembering.

Recollective Experience Research- Levels Of Processing

As we have discussed, one of the groundbreaking aspects of recollective experience research is the help it gives in quantifying the degree to which conscious recollection is involved in our everyday memory. And, due to the nature of the categorical judgments participants make regarding their recollections, we can separate the judgments participants make where conscious recollection helps bring the memories to mind, from the judgments not utilizing these processes. It would therefore follow, that if we were to engage our conscious processes more when processing something for the first time, we may stand a better chance of recollecting the very same conscious processes and ‘remembering’ the item at test. This is

what was tested when the effect of manipulating *levels of processing* on subsequent recollective experience was measured.

When we refer to the level of processing of a stimulus, we refer whether it is encoded mainly using sensory processes (shallow processing) or semantic processes (deep processing). Were I to present you with the word 'umbrella' and ask you to count the number of vowels in the word, I am sure you would respond "three". Vowel counting is a *shallow* level of processing; you do not need to do anything more sophisticated than know that 'u', 'e' and 'a' are vowels, and count the number of times that they occur in the word. Were I to ask you to think about a memorable encounter with an umbrella, you would give me a totally different response. I could think back to the time I put my umbrella up in Leeds city-centre, only to see it get turned inside out- an embarrassing moment. This would be a *deep* level of processing which requires knowledge of the meaning of the word umbrella, combined with previous experience of using one, and the multitude of associations contextualizing the account just described.

You are engaging conscious processes and associations much more actively when processing stimuli on a deep level, compared to a shallow level of processing. It has been established that a deep level of processing leads to better performance in standard memory tasks (Craik and Lockhart, 1972), but crucially, the manipulation has been shown to have an impact on recollective experience, and therefore on our conscious experience of remembering. Java, Gregg, and Gardiner (1997) found that deep processing resulted in higher levels of subsequent recollective experience. It is intuitively plausible that the formation of semantic associations at encoding will increase the network of associations through which conscious awareness of recollection can later be signalled, and it appears that this is what happens. For anyone with an interest in consciousness, this is reassuring. Consciousness appears to serve a

real purpose in signalling to us the degree to which it has been affected by the quality of our memories.

Relying On Recollective Experience

Interestingly, although subjective experience is an important and often under-investigated aspect of our everyday memory experience, it is not always objectively 'accurate' either. As mentioned in Chapter 13, the Deese-Roediger-McDermott (DRM) paradigm can be used to induce false memories at test, in participants previously presented with a list of words associated with an un-presented semantic associate. Based on what we know about levels of processing, it is perhaps understandable that in a DRM procedure can have such an effect on standard recognition memory, especially when you consider that the semantics of the presented words and their associate are so similar. However, the fact that participants tend to make these judgments based on recollective experience associated with the semantic associate is much more intriguing. Roediger and McDermott (1995) found that more than half the participants incorrectly identified the associate word as having been previously presented to them, and crucially, they often 'remembered' encountering the word previously, including such details as how they felt at the time they encountered it. Now, what the participants report cannot be true, but equally, the participants are not lying, they genuinely believe that they encountered the associate word previously, justifying that belief with a constructed memory of what they thought at the time.

Of course there is the argument that, due to the uneven comparison between the recollection of individual words and the recollection of entire events, procedures such as the DRM are not good analogues of how we form actual false memories (Freyd & Gleaves, 1996). But in this

chapter we are not too concerned with the formation of false memories themselves, but the conscious processes that go into convincing us that these false memories are part of our previous experience and not a figment of our imaginations. In this respect, the effects of the DRM give us an idea of the predicament faced by individuals such as AKP. If we, as individuals without neurological impairment, can have erroneous recollection so convincing that we will confabulate what we ‘thought’ when we ‘encountered’ previously unencountered stimuli, it becomes easier to understand AKP’s responses to situations that he also recollects, however erroneously. AKP is not behaving in an abnormal way, he is simply responding as you or I would to the convincing impulses resulting from his conscious experience.

Due to the unity of consciousness, when aspects of our conscious experience, such as recollective experience, go wrong, we seemingly do not have any super-ordinate executive processes to convincingly over-ride them. Thus, if you do not have any reason to believe that you have not previously read this paragraph before, and if you can remember what you thought when you read it previously, you would be mad *not* to trust that you had read it before. (We will explore erroneous sensations of memory further in the section on Déjà Vu). As far as the psychology of everyday memory is concerned, recollective experience appears to be crucial to understanding how we deal with what we encounter. The growing emphasis memory researchers are placing on conscious experience is providing us with a greater understanding of the processes by which we evaluate our own memory experiences. Far from complicating the previously objective field of memory research with impenetrable subjective experience, recollective experience is helping to explain the way in which we utilize our memories, as a rational and effective, though occasionally error-prone, storage system.

EDUCATION

Understanding The Way We Learn

The process you are hopefully engaging in now, learning, is another more applied aspect of memory research that has benefited from the use of recollective experience in its investigation. There appears to be a systematic progression we go through in order to acquire and then best use the information we have acquired. Traditionally, psychologists have thought of this as a schematization process, where learned information (such as your knowledge of standardized experimental processes), through consistent and frequent use, becomes generalized to be universally applicable to all appropriate situations (Conway, Cohen & Stanhope, 1991). This transfer of knowledge, is thought of as a transfer from episodic memory to semantic memory. At first, facts are retained and contextualized with memory emphasizing the contextualizing aspects of the fact, such as how, where and when it was learned. Then however, as we encounter the same fact in differing situations, we semanticize the memory, stripping it of the contextualizing factors and representing it more as an abstract concept independent of how or when it was first learned. In the case of learning, it appears to be the removal of conscious access to the episodic companion information to a fact, that signals our increased understanding of the fact.

For a moment, think about working memory. As a psychology student, you will undoubtedly be familiar with the concept, and you will probably bring to mind automatically, the diagram of the central executive, phonological loop and visuospatial sketch-pad (and maybe even the episodic buffer) when I ask you to think about it. However, unless learning about it was a particularly momentous occasion, or done particularly recently, you may find it very hard to think back to the moment you first encountered working memory academically. Who told

you about it? Where were you? What did you think of it at the time? You are probably struggling to find answers to these questions because you have semanticized your knowledge of the working memory system. You have studied it, discussed it and written about it in so many different contexts (in the library, in tutorials, at home) that it makes most sense for your mental representation of it just to abstract it from the multitude of episodic baggage that you could have associated with it. On the other hand, if you think of your knowledge of recollective experience, if your first encounter with it was whilst reading this chapter, you will probably, at the moment, have a memory of it that is highly contextualized by the episodic memory associated with how you encountered the information. However rich this memory seems, in order for you to have learned and understood recollective experience to a degree that would satisfy psychologists who study memory, you are probably going to have to sacrifice your memory of reading about it in this book so that, eventually, you only have an abstract knowledge of the system and the way in which you believe it works.

We do not yet fully understand the way in which knowledge is transferred from episodic to semantic memory. However, it has been possible to test the assumptions about schematization using what we already know about recollective experience. In a study examining over 200 students doing psychology modules at University, Conway, Gardiner, Perfect, Anderson and Cohen (1997) measured participants' recollective experience immediately after lectures, and then following final exam assessment in order to determine the degree to which memory was semanticized, and how that was associated with final exam performance. They found that, immediately following lectures, high-performing students reported higher levels of 'remember' than 'know' response. However, when exam-assessed, these students reported higher levels of 'know' response. Termed the *R-to-K shift*, this effect was found to be stronger in higher performing students, than low-performing students. The

implication is that students who performed well were able to effectively encode the episodic content of the lectures, and then consolidate it, through semanticizing it prior to the exam and is consistent with how we have discussed learning to take place most effectively.

Yet again, it seems conscious experience is tied to more traditional objective measures of memory, in this case memory performance, but not in the way in which we might expect it to be. That we lose recollective experience in order to consolidate and schematize knowledge is intuitively plausible. In order to be able to best operationalize our knowledge, it makes sense to lose the automatic activation of specifics associated with individual and not necessarily generalizable experiences of the knowledge. However, the previously discussed ‘knowing’ was indicative of less elaborative levels of processing and lower memory performance (see Recollective Experience Research - Levels of Processing), but in this case ‘knowing’ is associated with more rehearsal, and ultimately, better performance. The distinction between the two ‘know’ states is discussed in depth in the Conway et al. (1997) paper but, as with much of the incorporation of consciousness to psychological research, it remains to be fully established.

A similar line of reasoning explains the involvement of consciousness with fluidity and expertise. In order to understand the role of consciousness in fluidity however, we must first understand fluidity. When we carry out something we are fluid at, we need to devote fewer attentional resources to doing it, and consequently have more resources available for other tasks. In essence, it becomes easy. For example, when I was learning to drive I found that I had to concentrate so much on remembering and implementing how to keep the car going and avoid collisions, that I could not even contemplate talking to a passenger. Now, I can talk readily when driving on the open road, but still find conversation difficult when driving in an

unfamiliar city. I have developed fluidity, as measured by my ability to transfer more of it to unconscious processes, for driving on the open road but not for city-driving. This development can be measured by this transfer of conscious processes to unconscious control without any detriment in performance (e.g. Fitts, 1964), the act of *attaining fluidity*, of comparing oneself with other more proficient models, of goal-setting and error-monitoring, also requires consciousness (Rossano, 2003). In this way, and somewhat conversely, consciousness mediates the process of transferring unconscious control of previously cognitively-intensive tasks in two ways. Firstly, knowledge must pass through consciousness in order to become so practiced so many times that it becomes so fluid it can be carried out unconsciously. Secondly, error monitoring, goal-setting and self-other-comparison all require consciousness to be implemented successfully. So it is perhaps not surprising that the better performing students in Conway et al.'s (1997) study had started off by 'remembering' more of the lectures than they 'knew'. They had engaged conscious awareness of what they were learning, presumably making it easier to begin the process of attaining fluidity.

HYPNOSIS

Defining Hypnosis

Thus far, we have considered how conscious states arise from mental acts such as remembering. There is also considerable interest in how changes in conscious states, in turn, affect memory processes. One such circumstance occurs when individuals' memories are influenced by suggestions given during hypnosis. Hypnosis is an *altered state of consciousness* that can be entered into, in varying degrees, by 90 per cent of the population. Whilst in a state of hypnosis, individuals are able to interact with the world in much the same

way as they do normally- they can open their eyes, learn new information and respond to questions. When this is considered alongside the fact that there are a small number of established, memory-related manipulations associated with hypnosis, it would appear to be a very useful tool for the further, experimental investigation of the role played by consciousness in memory.

Posthypnotic Amnesia

The most established hypnotic memory manipulation is posthypnotic amnesia. An amnesia suggestion given to the participant prior to deinduction (the process of going from hypnosis into normal, 'wakeful' consciousness) can cause some participants to experience a compelling failure to recall material learned during hypnosis (Barnier, Bryant & Briscoe, 2001). However, this failure of recall is generally thought to only apply to explicit memory (memory that manifests itself through conscious expression) rather than implicit memory (which manifests itself unconsciously) and is reversible following a pre-determined cue. For example, I could present a hypnotized, highly suggestible participant with 20 words, and then suggest posthypnotic amnesia for those words. Following deinduction, even if I were to offer them a per-word financial reward, the participant would not be able to recall the words that they were shown during hypnosis. However, if I were to show them pairs of words, one previously presented and one distractor, and ask them to choose which they preferred, the participant would unknowingly be more likely to choose the one they were implicitly familiar with (the previously presented word), than the distractor. Intriguingly, if I were to shake my keys in front of the participant and whistle, if that was what I had suggested would cancel the amnesia during hypnosis, then this explicit memory failure would be reversed and the participant would be able to remember everything. In fact, this process seems very similar to

what can occur with people who have psychogenic amnesia. Psychogenic amnesia is a rare, but scientifically documented, disorder whereby without any brain damage or organic cause, a person has complete memory loss – usually as a result of trauma. For example, ‘Sharon’ a case reported by Eisen (1989), was found naked, unconscious and near starvation in a park. She could not identify herself, and had no idea of how she came to be in the park. For seven months in hospital she had no idea of who she was, until a media campaign reunited her with her family. Her amnesia was nearly total and affected a large chunk of her life. And yet, in hypnotherapy she recovered some memories of the events surrounding her disappearance and was able to shed light on how she came to be in the park. In this case, hypnotic procedures reversed the amnesia, suggesting that conscious processes disrupted memory function.

Posthypnotic amnesia appears only to affect conscious processes. So are participants consciously manipulating their responses to match the suggestions? After all you cannot control a response you are not conscious of making. The answer to this question delves deep into the heart of hypnosis research, and is one of the reasons why it is often viewed quite critically by scientific empiricists. Consistent with the psychological research detailed so far, the best way to find out about someone’s conscious processes seems to involve asking them. In post-experimental interviews with participants experiencing unbreachable amnesia (the amnesia experienced by most participants eventually breaks down if they are questioned and challenged resolutely enough - the 10 per cent for whom it does not are generally extremely hypnotizable and often referred to by hypnotists as *hypnotic virtuosos*) two sorts of *cognitive style* predominate. McConkey, Glisky and Kihlstrom (1989) examined two participants displaying these two differing styles. The first is a passive style which appears very naturalistic to participants: “...when you asked me questions it was like nothing, like dumbfounded. It was totally erased from anything you had done” (p. 136). Participants are

unable to remember because it feels as though there is nothing there to remember. The second is an active style which is more constructive: "It was like there was a wall there" (p. 137).

Participants do not remember because they have utilized a number of cognitive strategies to help with the success of the amnesia. The passive style appears not to have any consciously detectable signs of self-control, whereas the participant engaging the active style appears to be aware of why they cannot remember.

The two cognitive styles discussed tell us that there is no clear-cut argument that resolves whether posthypnotic amnesia results from processes that participants are aware of or not- in some participants it does, in some it does not. Nevertheless, because a participant is aware of why they are experiencing amnesia, it does not mean that they are consciously controlling the amnesia. To complicate matters further, suggestions either side of this middle ground have been made. Spanos, Radtke and Bertrand (1985) argued that conscious control over memory processes is maintained during posthypnotic amnesia, and that memory is manipulated to be consistent with a 'deeply hypnotized' self-presentation. On the other hand, Raz, Shapiro, Fan and Posner (2002) used posthypnotic suggestion (this time that highly suggestible participants would be unable to read) to eliminate an extremely robust measure of automatic processing known as the Stroop effect which indicates that the explicit-implicit distinction resulting from posthypnotic amnesia can be eliminated in favour of a total and complete amnesia with additional posthypnotic suggestion. We clearly have a great deal to learn about the way in which posthypnotic amnesia is formed and experienced. The important issue however, is that the subjective experience can be explored to elucidate the intricacies of the various processes which are responsible for producing objectively indistinguishable effects, and just as memory produces conscious states, so it seems altering conscious states interferes with normal memory processes.

DÉJÀ VU

Defining déjà vu

What happens when the normal relationship between memory and consciousness is disrupted in daily life? To explore this we turn full circle and revisit déjà vu, the strange conflict of sensations that results from feeling that we have experienced the same situation previously whilst knowing that we do not actually have any memory for it. Although patients such as AKP can experience this sensation many times a day, its occurrence in the neurologically unimpaired population is much less frequent, but still extremely common; it is experienced by the vast majority of the population at least once in their lives (Brown, 2003). Many theories have been proposed to explain the occurrence of the phenomenon. There are those who see it as evidence of reincarnation, it was also thought that it occurred as a result of slight delays in processing the input from one eye and not the other (this seems unlikely as blind people experience déjà vu in much the same way as sighted individuals do, O'Connor & Moulin, 2006) and Freud believed that it results from the memory of an unconscious fantasy (Freud, 1901/1914). However current psychological explanations have gravitated towards memory-based explanations which incorporate the role of subjective, conscious experience. We can look at déjà vu as resulting from the conflict between the absence of a memory and the conscious awareness of the sensation of familiarity. Once again, this is of particular interest to us, because it is possible to use traditional memory test methodologies to manipulate the contents of memory, and measures of recollective experience to try and understand exactly how we experience the conscious aspects of the sensation.

The recollective experience of déjà vu

If we were to experimentally test the conscious state associated with déjà vu, we would need some theoretical background on which to base our hypothesis. Vernon Neppe provided this background when he defined déjà vu as “*any subjectively inappropriate impression of familiarity of a present experience with an undefined past*” (p.3, Neppe, 1983). If we examine this definition, the notion of recognition related to an undefined past should strike you as being very similar to something we have already examined in detail: the ‘know’ response according to the recollective experience paradigm. According to Neppe’s definition, individuals experiencing déjà vu should be recognizing the trigger without experiencing any recollective experience for it. So we have a definition-based hypothesis with a strong body of recollective experience literature to draw on. The only problem remaining for us would-be déjà vu-researchers is to develop a way by which to administer a test of recollective experience during or immediately after a déjà vu experience; what would seem like a thankless task unless you wanted to follow participants around for months on end.

Conveniently for us, an old procedure involving posthypnotic amnesia is often mentioned in reviews of the scientific literature on déjà vu. Banister and Zangwill (1941) showed 10 participants pictures for which they then suggested posthypnotic amnesia. Following the hypnosis, the experimenters presented the to-be-forgotten pictures to participants again, whilst they were still amnesic for them, and asked that they talk about them. Over the course of the experimental procedure, three of the participants experienced *restricted paramnesia*, a sensation the authors compared to déjà vu. We revived this methodology, presenting participants with words, some of which they were amnesic for and asking participants to make recollective experience judgments of them. We found that 6 (of 10) participants

reported a sensation like *déjà vu* on encountering to-be-forgotten words and that these participants reported higher levels of ‘know’ responses than ‘remember’ responses, whereas those who did not experience *déjà vu* reported the opposite pattern of responding.

So this goes part of the way to ascertaining the sort of conscious state that gives rise to experimentally induced *déjà vu*. But there are still a number of questions to answer. How comparable is this ‘experimental’ *déjà vu* to normal *déjà vu*? Is it really a surprise that we do not feel recollective experience for something we do not have a memory for (whether that is as a result of never having experienced it before, or of having amnesia for it)? It is hard to answer these questions conclusively without further investigation, but one of the reassuring aspects of this research is that, thanks to the growing emphasis on conscious experience in the field, it can be done, and it is being done.

Déjà vecu

The finding that *déjà vu* is associated with recognition without recollective experience is, however, surprising when comparing participants under hypnosis to patients such as AKP. When Moulin et al. (2005) administered recollective experience tests to AKP and another patient with the same condition, they found that they gave an increased number of ‘remember’ responses compared to control participants, in direct contrast to the pattern shown by people in hypnosis, suggesting that the phenomenon experienced by AKP may not actually be *déjà vu* as we have conceptualized it, but a more compelling, clinical form of the experience, *déjà vecu* (already lived). Yet again this distinction is down to a difference in conscious experience.

One of the most apparent differences between what we experience, and what AKP experiences lies in how we respond to our respective déjà experiences. When you or I experience déjà vu, we may tell those who are around us about the strange sensation we feel, but we certainly do not act on our feelings in the same way that AKP does. I don't change channels when I experience déjà vu whilst watching television, because I do not actually remember having watched the television programme before: AKP does. That is because AKP's feelings are more overwhelmingly conscious, he cannot ignore them. Not only does he modify his behaviour based on the erroneous memory he experiences, but he also confabulates explanations of how he could possibly have such improbable memories. These confabulations are not lies because AKP is basing what he says on the truth that he perceived. Herein lies the difference between a sensation which may or may not be wrong, déjà vu (already seen), and a conscious experience, which is so overwhelming and overpowering that every time you interrogate it you get the same answer "You *remember* doing this before", déjà vecu.

We do not yet fully understand what causes patients like AKP to experience déjà vecu. They have certainly not been presented with a number of semantically related distracters, as they would need to have done if we were to explain their sensations as resulting from a DRM-like effect. In fact, you might say the opposite is true, patients with déjà vecu tend to find more novel situations familiar (Moulin, Turunen, Salter, O'Connor, Conway, & Jones, 2006). For instance, AKP will notice and comment on the day-after-day monotony of the bird singing on the telephone wires as if he has never encountered the situation before. The causes of déjà vecu are to do with the underlying neuropathology, as these patients are usually in the process of cognitive decline related to dementia. However, we can begin to understand sensations similar to déjà vecu if we approximate experiences such as déjà vu with the

overpowering sensation of infallibility associated with the certainty of conscious experience. As we have discovered over the course of this chapter, we often learn most about how conscious processes influence our experience of memory and awareness when these systems go wrong. Unlike thermostats, we do not cease to function when one aspect of our everyday functioning departs from its normal behaviour. Consciousness provides us with a grasp of our internal states and some degree of awareness for these entirely subjective, but wholly human states of functioning: it is this conscious understanding that will ultimately help us unravel the impact of consciousness on everyday memory.

CONCLUSIONS

This chapter has reviewed two large research enterprises which are currently enjoying a lot of attention amongst memory researchers: metacognition and recollective experience. We have seen that both draw on contemporary views of consciousness, incorporating subjective feelings, knowledge about internal processes and have at their core some aspect of privileged first-person only access to ongoing memory processes. Moreover, these two approaches are illuminating our understanding of the real world. Despite the belief that consciousness should be ignored or treated as a by-product of processing by early psychologists, it is clearly driving some novel research themes central to daily life. For instance, the *déjà vu* phenomenon, which has long been ignored by psychologists, has been reinvigorated by a consciousness and cognition viewpoint – and it would appear we have the tools to research this intriguing sensation further. Reports of subjective experience are also helping us understand more mundane activities like student learning.

As a final note, the subjective focus in studies of consciousness and memory has opened the field up to academics wishing to share their cognitive failures with the academic world – but

their errors are much more idiosyncratic than the memory failures outlined by Erber, Szuchman, and Rothberg above.

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