

Getting to grips with déjà vu

I was at a friend's house for the first time, and his mother was serving dinner. All the food was on the table except the ham, and immediately after it was placed on the table, the room sort of froze into a still frame in my mind. The entire scene, background and foreground, reminded me of something I was sure that I had experienced before. It was over in a few seconds, and felt like it had happened in a dream.

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I walked into a coffee shop with two of my friends on a Sunday afternoon, and we started talking about a new song that we had all heard. Suddenly, I had the eerie feeling that I had experienced this exact same conversation before and even knew what my friends were going to say next. This was impossible because we had never been there before.

THE déjà vu experience, defined as 'any subjectively inappropriate impression of familiarity of a present experience with an undefined past' (Nepe, 1983, p.3), has presented a tantalising puzzle for philosophers, physicians, poets, psychologists and mystics for centuries. Even though this memory illusion has spawned more than 50 different interpretations (see Brown, 2003, 2004), a clear and credible explanation has yet to emerge. Why has the scientific study of déjà vu remained so elusive?

To establish a clear scientific grasp on any psychological phenomenon, two things are required: a likely cause, and an observable behaviour. Unfortunately, the déjà vu experience lacks both. A person experiencing déjà vu can pinpoint exactly when it starts and how long it lasts, but rarely has a clue about what triggered it, and when you look at someone, you can't tell that they are having a déjà vu experience. Even the person experiencing the illusion will have trouble describing the mental experience.

Other apparently strange elements associated with déjà vu also keep scientists at arm's length. As in the above vignette, people may feel that the events transpiring during déjà vu felt like they had been dreamt. In addition, some feel a sense of



ALAN S. BROWN asks whether we can hope to study this intriguing phenomenon scientifically.

precognition during déjà vu – they know exactly what someone will do or say next.

Another impediment to scientific scrutiny of déjà vu is related to the theoretical foundation of early déjà vu research: the experience was seen as a sign of pathology, rather than a routine memory glitch. Over a century ago déjà vu was interpreted as seizure activity in the brain, specifically associated with temporal lobe epilepsy (Crichton-Browne, 1895; Jackson, 1888). Déjà vu has also been viewed as a recognition disturbance associated with schizophrenia and other types of severe mental instability (e.g. Harriman, 1947).

Given all of this baggage, it is not surprising to find only a few scientific investigations relating to déjà vu (Bernstein & Welch, 1991; Jacoby & Whitehouse, 1989; Seamon *et al.*, 1983). Twenty years ago the answer to the question 'Is a scientific study of déjà vu possible?' would have been 'No'. However, the technological and theoretical advances in the areas of brain science and cognition have changed this. Although we may never be able to create a déjà vu experience under controlled conditions in the laboratory, important headway in understanding the possible mechanisms underlying this memory glitch is being made on a number of fronts.

Brain dysfunction

An extensive research effort has been directed at determining if the déjà vu experience is symptomatic of epilepsy (Brown, 2004). These investigations were stimulated by the presence of déjà vu in the pre-seizure aura of some temporal lobe epileptics. Although precisely locating where the déjà vu experience originates in the brain is clearly difficult, much of the evidence gathered from patients who experience déjà vu associated with epilepsy and brain tumors suggests that the experience probably originates in the

hippocampus and parahippocampal area in the *right* hemisphere (Brown, 2004).

Although this line of investigation has failed to prove that déjà vu is predictive of epilepsy, this research may have pointed us in the correct direction. Brain pathology could underlie déjà vu, but involve an innocuous variety that we all experience. Spontaneous firing of neurons in our brain (seizures) happens occasionally, and this experience is similar to a hiccup or a muscle cramp. Most seizures go unnoticed, but if they occur in brain structures that process familiarity (e.g. the hippocampus), such a misfiring may create a feeling of intense familiarity seemingly disconnected from the present experience (Spatt, 2002).

Another brain dysfunction that could possibly lead to déjà vu involves a brief disruption in the normal course of neural information transmission. Information is usually transmitted from our sense organs to the higher brain centres in a rapid and dependably regular manner. Suppose that

a very brief delay occurs along one of these neural chains – a slight disruption at one juncture (synapse) between neurons. Our brain is accustomed to a precise rhythm in its circuitry, and any disturbance gets its attention. When we trip over a rock, we immediately refocus our attention on the act of walking. Similarly, a slight neural hiccup changes our level of awareness, and we misinterpret this as familiarity.

Extending this possibility, let's involve *two* neural pathways rather than one (Milner & Goodale, 1995). Both paths carry duplicate messages, but follow different routes to the final destination in the higher brain centres, where both messages converge. If one pathway is delayed, this gap in the arrival of the two messages may make the late message appear to be a repeat of an earlier one, even if the first copy arrived only milliseconds earlier. The brain usually merges these separate neural messages, but a small temporal gap creates the illusion of two separate experiences leading to déjà vu.

Perhaps this temporal gap interpretation also explains the sense of precognition that occasionally accompanies déjà vu (see above vignette). If one focuses on the *lagging* message, there is the feeling that this has happened before (déjà vu). But if one focus on the *leading* message, it elicits a sense of 'I know what will happen next' (precognition). Switching between the two messages could cause déjà vu and precognition to alternate with each other during the few fleeting moments of the experience.

How can we test some of these ideas? Recent advances in brain imaging and electrical brain recording techniques may soon allow us to track small changes in the electrochemical activity of very specific parts of the brain. Technology also is available to present visual and auditory perceptual information asynchronously to each hemisphere, which could enable an experimental laboratory analogue of the neural delay theory of déjà vu (cf. Brown, 2004).

Implicit familiarity

Research in implicit memory has repeatedly demonstrated that aspects of our prior experiences unavailable to our conscious awareness can influence our current behaviour (Roediger & McDermott, 1993; Schacter, 1987). Along this line, some suggest that a match between an inaccessible childhood memory and a present experience may elicit a déjà vu (see Brown, 2004). Perhaps a literary passage may paint a beautifully precise scene in your mind, and a subsequent encounter with a similar setting could trigger a déjà vu, especially if one is not immediately aware that the 'memory' is only a mental construction (Hawthorne, 1863). Could the same thing happen when scenes from a TV show, movie or magazine article match our real experience? False information can readily be implanted in our memory, and we can come to believe false stories told to us about our own childhood (Loftus & Pickrell, 1995).

Déjà vu could also be elicited by *part* of the present experience that is familiar but unrecognised as such. Familiar objects, people, odours and sounds may be difficult to identify when removed from their normal setting. In spotting your dentist standing in the grocery line, you know they are familiar but are unable to recognise who they are. Out of their usual environment, you have difficulty placing them. Something similar could cause a déjà vu. You stroll into a hotel lobby, and a large floor lamp off to the left is identical to one in your favourite coffee shop. The lamp triggers a strong sense of familiarity, but you fail to identify it because it is disconnected from its normal surroundings. A déjà vu occurs, as the familiarity triggered by this unrecognised object (sight, sound, smell) is misattributed to the *entire* setting.

Scientific research with both words (Jacoby & Whitehouse, 1989) and visual

WHAT WE KNOW ABOUT DÉJÀ VU (BROWN, 2004)

Most people (two thirds) experience it. It is brief (10–30 seconds), and common reactions include surprise, curiosity, confusion.

If you have experienced déjà vu, you probably have had more than one episode.

It is triggered by the global setting, although spoken words sometimes elicit déjà vu.

It is more likely indoors, while relaxing or enjoying recreation, and in the company of friends.

It occurs more often in the afternoon or evening, and towards the end of the week. It decreases with age.

It is more common in those who travel and remember their dreams.

It occurs more frequently in those with higher levels of education and income.

It is less common in people with conservative politics and fundamental religiosity.

forms (Seamon *et al.*, 1983) provides support for such speculation. Some items (words, objects) that we encounter are registered in memory implicitly, outside of our conscious awareness. This could perhaps explain the feeling that déjà vu experiences are presaged in dreams. Maybe bits and pieces of our dreams stick in our unconscious memory, and a later waking experience contains elements resembling these dream fragments. When they connect to these latent dream memories, it automatically pulls them to the forefront of our consciousness, triggering a déjà vu. Or perhaps the odd feeling during a déjà vu is similar to a dream state, leading us to believe that a dream memory is being duplicated.

Inattentive blindness

Have you ever overlooked something staring you right in the face? When our attention is intently focused on a particular object or person, we may not notice something else that is right in front of us. Mack and Rock (1998) call this inattentive blindness, and show that even though we are not consciously aware of seeing this item (object, word) we still register it in our memory.

Applying this to déjà vu, imagine strolling down the sidewalk while talking on your cell phone, not fully plugged into the world around you. You enter a hotel and face a statue in the lobby as you

continue talking. After hanging up, you take a second look at the statue when fully aware, and this elicits a strange sense that you have seen it before. The prior glance at the statue was sufficient to implant it in memory, but insufficient to make a conscious impression. The second look elicits (correctly) a sense of familiarity, but when unable to connect this with the preceding quick glance we assume that the experience happened days or weeks earlier, resulting in a déjà vu.

Current cognitive research paradigms examine the influence of undetected – but perceptible – visual and auditory experiences on later behaviour. When research participants direct their attention to one location (right ear; centre of computer screen), while another stimulus is presented in a different location (left ear; top of computer screen), the unattended stimulus can bias later responding in the absence of conscious recollection (Eich, 1984; Mack, 2003).

Drugs and déjà vu

Various medications have been connected with déjà vu experiences: amphetamines (Ellinwood, 1968), carbamazepine and clonazepam (Garbutt & Gillette, 1988), amantadine hydrochloride and phenylpropanolamine hydrochloride (Taiminen & Jääskeläinen, 2001). Also intriguing is the positive relationship

between alcohol consumption and déjà vu frequency. More specifically, it was discovered in a large-scale survey that déjà vu experiences are reported by a significantly higher proportion of those who drink, compared with those who don't drink (Brown, 2004). With a growing understanding of neurotransmitters, future research should examine more closely the association of déjà vu with various medications and recreational drugs.

A space programme for the mind

In summary, numerous scientific tools are presently available to help us triangulate on the déjà vu experience: brain stimulation and monitoring, implicit memory designs, and inattention blindness paradigms. Like a space programme for the mind, the procedures and techniques developed to explore the déjà vu experience may yield additional information about normal memory function.

Future scientific explorations of déjà vu should address why it often happens during mundane rather than unusual experiences (e.g. eating a meal), why older adults experience it less frequently than younger persons, if there are different varieties of déjà vu (visual, auditory) and how it is manifest in individuals with clinical memory disorders (amnesia). Furthermore, the recent availability of virtual reality technology may prove to be especially useful in simulating the type of whole-setting resonance so uniquely characteristic of a déjà vu experience.

■ Alan S. Brown is Professor of Psychology at Southern Methodist University, Dallas. E-mail: abrown@smu.edu.

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WEBLINKS

Types of déjà vu:

home.cc.umanitoba.ca/~mdlee/dejavu.htm

'The tease of memory' by David Glenn:

chronicle.com/free/v50/i46/46a01201.htm

The Skeptic's Dictionary: skepdic.com/dejavu.html

