

The Déjà Vu Illusion

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ABSTRACT—*The déjà vu illusion occurs when a person has an inappropriate feeling of familiarity in a situation that is objectively unfamiliar or new. The amorphous nature of this experience has made identifying its etiology challenging, but recent advances in neurology and understanding of implicit memory and attention are helping to clarify this cognitive illusion. More specifically, déjà vu may result from (a) a brief change in normal neural transmission speed causing a slightly longer separation between identical messages received from two separate pathways, (b) a brief split in a continuous perceptual experience that is caused by distractions (external or internal) and gives the impression of two separate perceptual events, and (c) the activation of implicit familiarity for some portion (or all) of the present experience without an accompanying conscious recollection of the prior encounter. Procedures that involve degraded or occluded stimulus presentation, divided attention, subliminal mere exposure, and hypnosis may prove especially useful in elucidating this enigmatic cognitive illusion.*

KEYWORDS—*illusion; déjà vu; implicit memory*

“Last week, I visited my boyfriend’s new apartment for the first time. As I entered his place, I could have sworn that I had been there in that situation before, and walking through his front door seemed like a repeated action. The experience is so weird and mind-boggling that I usually discard the thought and move on, and it seems to happen at strange times with little importance.”

This scenario, provided by a college student, typifies the déjà vu illusion, in which there is a jolting confrontation between our subjective sense of familiarity and our objective evaluation of unfamiliarity. For more than 170 years, this most puzzling of memory illusions has intrigued scholars across a broad range of subdisciplines within philosophy, religion, neurology, and psychology. What makes the experience unique is the lack of either a clearly verifiable trigger or an observable response.

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Unfortunately, systematic scientific exploration of the déjà vu experience has been impeded, in part because of these lacunae, which put the experience off limits during the behaviorist era in psychological research, as well as because a plethora of para-psychological and psychodynamic interpretations of the illusion have been suggested. However, there have been recent efforts to connect the déjà vu illusion to various theories and models of cognitive function (Bernstein & Welch, 1991; Brown, 2003; Hoffman, 1997; Jacoby & Whitehouse, 1989; Seamon, Brody, & Kauff, 1983), and Roediger and McDermott (2000) argued that a better understanding of déjà vu is likely to help clarify our understanding of other more mundane cognitive phenomena.

THE DÉJÀ VU EXPERIENCE

More than 50 surveys on déjà vu indicate that approximately two thirds of individuals have experienced at least one déjà vu in their lifetime, and these individuals typically report multiple déjà vu experiences. The reported incidence of déjà vu has increased in recent surveys, suggesting a growing cultural awareness and acceptance of the illusion. Déjà vu incidence decreases with age, increases with education and income, and is more common in persons who travel, remember their dreams, and have liberal beliefs (political and religious) compared with those who do not travel, do not remember their dreams, and have conservative beliefs.

A déjà vu experience is most likely to be triggered by a general physical context, although spoken words alone sometimes cause the illusion. People experience it mainly when they are indoors, doing leisure activities or relaxing, and in the company of friends; fatigue or stress frequently accompany the illusion. Déjà vu is relatively brief (10 to 30 s), and is more frequent in the evening than in the morning and on the weekend than on weekdays. Personal reactions to déjà vu are more positive than negative, and people typically indicate that they are surprised, curious, or confused when they experience the illusion.

Since the 1800s, researchers have offered more than 30 scientifically plausible explanations of déjà vu (Brown, 2003; Neppé, 1983). The interpretations that appear to be the most promising for guiding laboratory research on the illusion explain it as arising from biological dysfunction, divided

perception, and implicit familiarity in the absence of explicit recollection.

BIOLOGICAL DYSFUNCTION

Early interest in *déjà vu* stemmed from the observation that some epileptics whose seizures originated in the temporal lobe experienced it during their pre seizure aura. Thus, the original question was whether *déjà vu* reflects seizure activity or other brain pathology. Subsequent research suggests that the illusion does not have diagnostic or clinical significance for epilepsy, but a small spontaneous seizure may cause a *déjà vu* experience in nonepileptics if it occurs in the area of the brain that processes familiarity (i.e., temporal lobe; Spatt, 2002).

From another biological perspective, *déjà vu* may involve a minimal dysfunction of the neuronal pathways involved in transmitting perceptual information to the higher processing centers. Incoming sensory data follow several different pathways en route to these centers, and a neurochemical event that slightly alters transmission speed in one pathway only (e.g., momentary depletion of neurotransmitter at some neuronal connection) could lead to an illusion of *déjà vu*. That is, because the brain routinely integrates information received from separate pathways into a unitary experience, a slight delay (or acceleration) in the speed of one pathway relative to another could cause the brain to interpret the data from the two as independent and separate copies of the same experience, even though the two impressions are only milliseconds off. This would then give rise to the sensation that what is happening now has happened before. Similar speculation centers on communication between the two cerebral hemispheres. If incoming information is transmitted directly to the dominant hemisphere, where it is ultimately processed, and a second copy of the information is routed through the nondominant hemisphere prior to traveling to the dominant hemisphere, a slight slowing in those fibers associated with interhemispheric transfer across the corpus callosum could result in *déjà vu*.

DIVIDED PERCEPTION

A *déjà vu* could also result from a perceptual experience that is subjectively split into two parts. A fully processed perceptual experience that matches a minimally processed impression received moments earlier could result in a strong feeling of familiarity disconnected from the initial experience. Titchener (1928) used the following example to illustrate this interpretation:

You are about to cross a crowded street, and you take a hasty glance in both directions to make sure of a safe passage. Now your eye is caught, for a moment, by the contents of a shop window; and you pause, though only for a moment, to survey the window before

you actually cross the street. . . . the preliminary glance up and down [the street], that ordinarily connects with the crossing in a single attentive experience, is disjointed from the crossing; the look at the window, casual as it was, has been able to disrupt the associative tendencies. As you cross, then, you think "Why, I crossed this street just now"; your nervous system has severed two phases of a single experience, both of which are familiar, and the latter of which appears accordingly as a repetition of the earlier. (pp. 187–188)

In Titchener's example, the disconnection between the two perceptual impressions is caused by a physical distraction, but a similar disjunction could also result from a mental distraction, as when we momentarily retreat into our inner thoughts and reflections. *Déjà vu* may also occur when initial processing of a scene is only peripheral and is immediately followed by a more complete processing of the same setting with one's full attention. For example, suppose you enter a museum courtyard for the first time, and your eye is caught by a fountain in the center. A stairway on your left is in your peripheral visual field and receives some minimal processing below a conscious level of awareness. As your gaze shifts directly to the stairway, an unexpected sense of familiarity may grip you as this view connects with the first processing, of which you were unaware. Similarly, you may look directly at the stairway but have your attention directed inward while you are engaged in a deep conversation with a friend or talking on a cell phone (Strayer, Drews, & Johnston, 2003). Then, when you reengage with the world around you (end the conversation or hang up the phone), your direct processing of the stairs may converge on the shallow, superficial processing from moments earlier, and the striking match may evoke a *déjà vu* illusion.

The phenomenon of inattention blindness, in which people can miss seeing something that is right in front of them, confirms the plausibility of such a scenario (Mack, 2003). A clearly visible item can be overlooked if one's attention is directed elsewhere, as when the item is unexpected and an anticipated stimulus is off to one side of the visual field. More important, even though one may be oblivious to this clearly visible stimulus, it is still registered in memory, as demonstrated by the enhanced processing of this "missed" stimulus on a subsequent (implicit) memory test.

Divided perception may also occur when the initial perception is degraded or indistinct. Jacoby and Whitehouse (1989) found that a brief (below-threshold) glance at a new word that immediately preceded a longer (above-threshold) view of the same word increased the likelihood of mistakenly reporting that this word had appeared on a previous list. They likened this misimpression that a new word is actually old to the *déjà vu* experience (cf. Bernstein & Welch, 1991). Brief initial exposure to a word probably leads to faster perceptual processing of the word when it is presented a second time, and such speeded reprocessing may elicit the sense of familiarity underlying the *déjà vu* illusion.

IMPLICIT FAMILIARITY WITHOUT EXPLICIT RECOLLECTION

Déjà vu could occur when the present experience matches some portion (or all) of a prior experience, without the individual being consciously aware of that previous encounter. The familiarity is real and implicitly evoked, but one has no explicit recollection of the source of this feeling.

The most straightforward version of this explanation is that the entire experience that elicits a déjà vu illusion matches a prior experience, but this seems unlikely, especially given that older adults have accumulated more experiences than younger adults yet are much less likely to have déjà vu. An alternative version, documented in several anecdotal reports, is that déjà vu may occur when a person is in a setting that matches one he or she previously experienced as a very young child, or read about in an especially vivid literary description.

A more likely possibility is that déjà vu can be triggered when only a single element of the present experience, rather than the entire setting, is familiar. For example, a lamp in your aunt's house may be identical to one that used to be in your friend's apartment. You may fail to recognize the object yet experience an implicit sense of familiarity associated with it, and this familiarity may overgeneralize to the entire situation. In other cases, the familiar element may match something one only imagined in a dream (or daydream). In still other cases, there may be several familiar elements in the present setting, leading to a strong sense of familiarity, but the unique specific memories associated with these objects may compete with, and cancel out, each other, so that the net result is a general feeling of familiarity that leads to déjà vu.

An implicit familiarity with the present setting may also emanate from the global structure of the experience. The living room in your friend's new apartment may elicit a déjà vu because the room's arrangement closely resembles the configuration of a living room you were in years before: Although none of the individual elements are familiar, you have previously experienced an arrangement very similar to this one—a lamp in the corner, a tapestry on the back wall, a couch in the middle of the room.

Finally, some people have speculated that an affective association to some item may trigger a déjà vu: Unable to connect a sudden affective rush in response to a person's look, a picture on the wall, or a perfume, we may misinterpret our feelings as arising from familiarity. Thus, according to this explanation, it is not the case that déjà vu evokes the affective response; rather, an affective reaction elicits déjà vu.

FUTURE DIRECTIONS

Several different investigative directions hold promise for clarifying the nature and etiology of déjà vu. For instance, some rare individuals experience déjà vu almost daily (Leeds, 1944), and identifying the anomalous biological or psychological

processes in these persons could contribute to our understanding of the illusion. Epileptics who experience déjà vu just before their seizure have had the electrical activity of their brains recorded using surface and deep electrodes, and this has helped to locate the brain region most likely associated with the experience (right temporal lobe; Bancaud, Brunet-Bourgin, Chauvel, & Halgren, 1994). Capturing an actual déjà vu through such sophisticated electrophysiological recording techniques could provide additional clues about the brain structures involved with the illusion. Some connections between brain chemistry and déjà vu have also been reported. Various prescription (clonazepam) and recreational (alcohol, amphetamine) drugs have been implicated as causing déjà vu (cf. Brown, 2003), and excessive levels of neurotransmitters (dopamine) in the temporal cortex of the brain may lead to déjà vu (Taiminen & Jääskeläinen, 2001).

It is unlikely that researchers will be able to develop a laboratory paradigm that can reliably elicit a "full blown" déjà vu experience, but several procedures have the potential to successfully evoke the strong contrast between subjective familiarity and objective unfamiliarity so characteristic of déjà vu. For example, an experience similar to déjà vu can be produced by giving research subjects a hypnotic suggestion to forget a stimulus and subsequently exposing them to the "forgotten" material (Marcuse, Hill, & Keegan, 1945). The subliminal mere-exposure paradigm has also been likened to the déjà vu illusion (Seamon et al., 1983). In this paradigm, subjects rate their liking (positive affect) for various stimuli, some of which have previously been presented subliminally (i.e., too briefly for conscious perceptual awareness). The ratings show that subjects like the previously exposed stimuli more than those not seen before. Repeated subliminal exposures, coupled with a long delay before the stimuli are rated, could possibly create a more intense affective reaction resembling a déjà vu (Seamon et al., 1983).

In other paradigms, a briefly presented (or minimally processed) stimulus creates a subjective sense of familiarity in the absence of conscious recollection. Jacoby and Whitehouse (1989) pointed out this possibility, and other approaches also evaluate how unattended stimuli can later evoke a strong sense of familiarity even when the original exposure is unclear, degraded (masked), or peripheral, or when attention is directed elsewhere. Standard memory paradigms could easily be modified to test the implications of single-element or Gestalt familiarity, and this research should focus on obscuring the source of the repeated (previously exposed) item, such as by using different settings for the input and test sessions. Also, given that entire settings appear to be involved in the illusion, virtual-reality technology and equipment (goggles) may prove especially valuable in simulating déjà vu.

Several important issues should guide future research. Why does the incidence of déjà vu decrease with age? Is this because compared with young adults, older adults are less tuned

into contextual details in the environment, are more likely to forget their déjà vu experiences, are less likely to encounter new surroundings, or are less surprised when they experience anomalies of familiarity? Why is déjà vu usually associated with mundane activities? Individuals often report that they know what will happen next during the déjà vu. Although such reports have encouraged parapsychological interpretations, reasonable explanations can be derived from theories that attribute déjà vu to temporary neurological dysfunction (cf. Brown, 2003). A fundamental question is whether the déjà vu experience is universal. If it is universal, we need to determine why some individuals fail to be aware of or to report it. If it is not universal (as surveys suggest), the goal should shift to identifying specific physical or psychological factors associated with the experience.

Although a considerable literature concerning déjà vu exists, we are only on the threshold of a scientific exploration of the illusion. Attempts to grapple with this puzzle experimentally will certainly provide us with insights into routine cognitive experience and help us integrate findings from different areas of behavioral and brain research. Over the past two decades, several cognitive models with the potential to elucidate this experience have emerged. The joint efforts of researchers working in diverse areas will be needed to help untangle this tantalizingly amorphous deception of memory.

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