Scientific Theories on the Déjà Vu Phenomenon

Rickard Redgård
School of Humanities and Informatics
University of Skövde, Sweden
Scientific Theories on the Déjà Vu Phenomenon

Submitted by Rickard Redgård to the University of Skövde as a dissertation towards the degree of M.Sc. by examination and dissertation in the School of Humanities and Informatics. This dissertation has been supervised by Monica Bergman.

2010-01-11

I hereby certify that all material in this dissertation which is not my own work has been identified and that no work is included for which a degree has already been conferred on me.

Signature: _______________________________________________
ABSTRACT

The term “déjà vu” was first introduced around the 1890s in order to separate the phenomenon from other paramnesias, but a clear consensus on its definition was not reached until mid 20th century. Since the middle of the 19th century, several dozens of parapsychological, pseudoscientific and scientific theories have been proposed to explain the déjà vu phenomenon, ranging from “messages from God” to “delayed neural transmission speed”. Most scientific theories can be divided into four categories: dual-processing, neurological, memory and attentional. This paper discusses and compares some of these theories. Memory and attentional theories are concluded to have most explanatory power and potential to demystify the phenomenon through future research.

Keywords: déjà vu, familiarity, neurology, memory, attention, cognition
# Déjà vu phenomenon

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>3</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>4</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>5</td>
</tr>
<tr>
<td>1.1. CONCEPTUAL HISTORY</td>
<td>6</td>
</tr>
<tr>
<td>1.2. RESEARCH METHODS ON DÉJÀ VU</td>
<td>8</td>
</tr>
<tr>
<td>1.3. THE NATURE OF DÉJÀ VU</td>
<td>9</td>
</tr>
<tr>
<td>1.4. THE FREQUENCY OF DÉJÀ VU</td>
<td>12</td>
</tr>
<tr>
<td>1.5. RELATED PHENOMENA</td>
<td>13</td>
</tr>
<tr>
<td>1.5.1. Jamais Vu</td>
<td>14</td>
</tr>
<tr>
<td>1.5.2. Capgras’ Syndrome</td>
<td>14</td>
</tr>
<tr>
<td>1.5.3. Fregoli’s Syndrome and Intermetamorphism</td>
<td>15</td>
</tr>
<tr>
<td>1.6. RELATION TO PATHOLOGY AND DRUG USE</td>
<td>16</td>
</tr>
<tr>
<td>1.7. WHY STUDY DÉJÀ VU?</td>
<td>17</td>
</tr>
<tr>
<td>2. SCIENTIFIC THEORIES ON DÉJÀ VU</td>
<td>18</td>
</tr>
<tr>
<td>2.1. DUAL-PROCESSING THEORIES</td>
<td>19</td>
</tr>
<tr>
<td>2.1.1. Familiarity and Retrieving</td>
<td>19</td>
</tr>
<tr>
<td>2.1.2. Encoding and Retrieving</td>
<td>19</td>
</tr>
<tr>
<td>2.2. NEUROLOGICAL THEORIES</td>
<td>20</td>
</tr>
<tr>
<td>2.2.1. Single Pathways</td>
<td>21</td>
</tr>
<tr>
<td>2.2.2. Dual Pathways</td>
<td>21</td>
</tr>
<tr>
<td>2.3. MEMORY THEORIES</td>
<td>23</td>
</tr>
<tr>
<td>2.3.1. Single Element Familiarity</td>
<td>23</td>
</tr>
<tr>
<td>2.3.2. Multiple Element Familiarity</td>
<td>24</td>
</tr>
<tr>
<td>2.3.3. Gestalt Familiarity</td>
<td>25</td>
</tr>
<tr>
<td>2.4. ATTENTIONAL THEORIES</td>
<td>25</td>
</tr>
<tr>
<td>2.4.1. Perceptual Occlusion</td>
<td>25</td>
</tr>
<tr>
<td>2.4.2. Inattentional Blindness</td>
<td>26</td>
</tr>
<tr>
<td>3. DISCUSSION</td>
<td>27</td>
</tr>
<tr>
<td>3.1. THE NATURE OF DÉJÀ VU</td>
<td>27</td>
</tr>
<tr>
<td>3.2. THE FREQUENCY OF DÉJÀ VU</td>
<td>28</td>
</tr>
<tr>
<td>3.2. EVALUATION OF SCIENTIFIC THEORIES ON DÉJÀ VU</td>
<td>31</td>
</tr>
<tr>
<td>3.2.1. Dual-processing Theories</td>
<td>32</td>
</tr>
<tr>
<td>3.2.2. Neurological Theories</td>
<td>33</td>
</tr>
<tr>
<td>3.2.3. Memory Theories</td>
<td>34</td>
</tr>
<tr>
<td>3.2.4. Attentional Theories</td>
<td>35</td>
</tr>
<tr>
<td>3.3. LIMITATIONS ON RESEARCH METHODS</td>
<td>36</td>
</tr>
<tr>
<td>3.3.1. Retrospective and Prospective Reports</td>
<td>36</td>
</tr>
<tr>
<td>3.3.2. Case Reports</td>
<td>37</td>
</tr>
<tr>
<td>3.4. LIMITATIONS ON THE PRESENT PAPER</td>
<td>38</td>
</tr>
<tr>
<td>4. CONCLUSION</td>
<td>39</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>41</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

The déjà vu experience is widely experienced, with a majority of the population having experienced it at least once in their lifetime (Brown, 2003). To those who have experienced it, the déjà vu phenomenon is a peculiar one and has a very strong, long-lasting impact. To those who have not, the phenomenon might be nearly impossible to even imagine (Wild, 2005). Despite the large general interest in the phenomenon, very little research has been published on the subject. The déjà vu experience lacks a clearly identifiable eliciting stimulus, which makes it difficult to study, and its conceptual history has for long made it difficult to agree on a definition, and thus exactly what to study (Berrios, 1995; Brown, 2004). Recently, new findings in e.g. cognitive research has been related to the déjà vu phenomenon and a new interest in the scientific community has sparked (Brown, 2004).

Several dozens of theories have been proposed to explain the déjà vu phenomenon since the mid 19th century, ranging from reincarnation and messages from gods to perceptual occlusion and delayed neural transmission speed (Berrios, 1995; Brown, 2004). Due to the vast number of parapsychological, pseudoscientific and scientific theories, this paper is limited to describing only a small number of scientific theories. Most scientific theories can be categorized as one of four types of theories: dual-processing theories, neurological theories, memory theories and attentional theories (Brown, 2003). All of these categories are represented in this paper, but only a few theories from each category are described, with the purpose of presenting the general ideas and shared assumptions of each category, as opposed to the ideas and assumptions of individual theories. The specific theories described have been selected by criteria of perceived interest for the scientific community, as well as inter-categorical relations. Certain theories were chosen above others to maintain a clear thread between theories and best represent the categories as wholes.
Although the potential brain areas responsible for the elicitation of déjà vu experiences are touched upon in the descriptions of some theories, this paper is limited to only discussing the general cognitive frameworks behind those theories. Some theories are more detailed than others and given more support from related research, but due to time restraints it is not the author’s intention to go into great depth to discuss the exact biological mechanisms enabling the déjà vu phenomenon. Such a discussion could easily cover a whole paper in its own right. The aim of this paper is to present a summary of scientifically interesting theories on the déjà vu phenomenon and discussing and evaluating these theories. The evaluation is made with explanatory power and scientific falsifiability in mind. Theories that have strong explanatory power and/or considered easily falsifiable are regarded more highly than unfalsifiable theories or theories with less explanatory power.

The paper at hand begins with a summary of the conceptual history of déjà vu, descriptions on the nature and frequency of the experience, relation to other recognition dysfunction phenomena, pathology and drug use, and a discussion on the reasons to study the déjà vu phenomenon. Descriptions of selected theories follow, starting with dual-processing theories, then neurological theories, memory theories, and finally attentional theories. The paper ends with a discussion on the nature and frequency of the déjà vu experience, an evaluation of the presented theories, and a discussion on déjà vu research limitations.

1.1. CONCEPTUAL HISTORY

The term “déjà vu” has a long history, in both clinical and popular use, but the exact nature of the déjà vu phenomenon and the underlying mechanisms activating it are still largely unknown. This lack of knowledge is partly due to the term’s long conceptual history and the diversity of definitions proposed (Berrios, 1995).
There are documented mentions of phenomena similar to the déjà vu concept of today reaching as far back as Aristotle, Plato and Pythagoras, but the phenomenon was not introduced to scientific research until early 19th century, led by scholars in France (Brown, 2004). Memory research was highly popular at this time, which led to déjà vu being labelled as a memory dysfunction from the start (Berrios, 1995). A large emphasis was also put on the phenomenon’s secondary features, e.g. feelings of conviction and prediction, however, and many parapsychological theories were proposed to explain these more mystical qualities (Berrios, 1995; Brown, 2004). As Brown (2004) points out, a rather logical conclusion to having a feeling of conviction of something having happened before is that it actually has happened before, which could be the reason behind theories on e.g. reincarnation. This parapsychologically inspired trend obscured scientific research and researchers might have had to think twice before publishing their scientific articles, in fear of being associated with the parapsychological stigma.

Toward the end of the 19th century, scientific interest in memory dysfunctions, or paramnesias, peaked, and with it the study of déjà vu. The actual term “déjà vu” was not introduced until the middle of the 1890s, however, and up until that point a multitude of terms were suggested to cover the phenomenon: “sentiment of pre-existence”, “phantasms of memory”, “sensation of reminiscence”, “fallacies of memory”, etc (Berrios, 1995). A problem with terms such as “paramnesia”, “reminiscence” and “phantasms/fallacies of memory” was that they all assumed a memory dysfunction (Brown, 2004). This changed during two big debates where researchers gathered to all give their input on the phenomenon: the Revue Philosophique and the Société Médico-Psychologique. During these debates, several alternative theories to memory dysfunction were proposed, ranging from telepathy and double personality to delayed perception and parallel hallucination. A framework for the nature of

---

1 See Brown (2004) for a summary of a debate on the origin of the term
déjà vu was narrowed down and many distinguishing qualities proposed then are still used today to describe the phenomenon, e.g. the false recognition being instantaneous, the feeling of recognition being identical, not only similar, to an unidentifiable source, and the conviction of predictability (Berrios, 1995). The actual term “déjà vu” was also introduced during these debates, which was quickly put to popular use to differentiate the phenomenon from other paramnesias and memory disorders, but a clear consensus was not reached until the middle of the 20th century (Brown, 2004).

At the end of the 19th century and beginning of 20th century, the behaviourist movement grew stronger in psychological research. As the déjà vu phenomenon did not come with any external and noticeable cues, and was thus not objectively measurable, it was from then on largely bypassed by mainstream psychological research in the US, Britain and Germany (Brown, 2004). At the same time, the big memory theories in France were narrowed down with subsequent research, leaving no room for the complex descriptive qualities of déjà vu, and it was considered a “symptom without psychological function” (Berrios, 1995, p. 123). For many decades little research was done and little interest was shown until the later years of the 20th century when new findings in several fields of cognitive science once again brought out interest and hopes of explaining the mysterious phenomenon (Brown, 2004).

In the following section, the research methods used to study the nature and frequency of the déjà vu experience are presented.

1.2. RESEARCH METHODS ON DÉJÀ VU

Most research on déjà vu has been made through retrospective reports, i.e. asking subjects to answer questions about what they have experienced in the past, but some information has also been gathered from prospective reports, e.g. keeping a ”déjà vu diary”
over a period of time, and case reports, most notably on temporal lobe epileptics (TLE) (Brown, 2003; Weinand et al., 1994). Retrospective reports come in two forms: short surveys containing only one or two questions, designed solely to assess déjà vu frequency; and longer questionnaires designed to evaluate the many different physical and psychological aspects of the déjà vu experience, including the psychological and emotional response of the subject and the circumstances surrounding the experience, as well as more auxiliary information about the subject, such as age, sex, dream recall and travel frequencies (Brown, 2003). Case reports with information about déjà vu experiences have mostly been gathered from epileptics, especially in the past when déjà vu was seen as indicative of pathology (cf. Jackson, 1888). In modern times, case reports are more frequent from TLEs during brain operation. While mapping out the areas focal to the seizures with electrical stimulation sometimes déjà vu experiences are elicited (Weinand et al., 1994). In the next two sections, the results and findings of these research methods are presented.

1.3. THE NATURE OF DÉJÀ VU

Despite the widespread awareness of the déjà vu phenomenon in the general population, very little is actually known about its nature. Some people might have experienced something that they themselves interpret as a déjà vu, as it touched upon a strange feeling of familiarity, while others that have never experienced anything like it might have a very unclear idea of the phenomenon in general, and big problems even imagining what it could be like. Because of the difficulties in grasping the nature of the déjà vu phenomenon, it has become a very wide label, encompassing all sorts of hard-to-explain feelings of familiarity where the person cannot clearly identify the source (Funkhouser, 1996). The term “déjà vu” has also been adapted in cultural use to refer to a myriad of familiarity
related events or situations, which do not have anything to do with the actual phenomenon. This easy-going use of the term has further clouded its original meaning (Brown, 2004).

Very little scientific research has been published on the precise nature of the déjà vu experience. Most research has been directed at the quantitative measures, e.g. frequency and life-time incidence (Brown, 2003). The few qualitative characteristics that have been published include an instantaneous detection of the familiarity as inappropriate, a strong conviction that the experienced familiarity is identical, not just similar, to a previous experience, as well as a feeling of predictability; feeling as if one knows exactly what is going to happen next (Berrios, 1995; Brown, 2004). The déjà vu experience can last for several minutes, but usually only lasts a few seconds (Brown, 2003; 2004).

The definition most commonly used in scientific literature these days is as follows: “any subjectively inappropriate impression of familiarity of a present experience with an undefined past” (Neppe, 1983e, p.3, in Brown, 2003; see also Sno & Linszen, 1990; Wild, 2005). This definition catches the most important qualities of the phenomenon but it does not say much about the subjective feelings accompanying this experience. The following quote from “David Copperfield” by Charles Dickens clearly captures some of the most distinguishing subjective qualities of the experience:

“We have all some experience of a feeling, that comes over us occasionally, of what we are saying and doing having been said and done before, in a remote time—of our having been surrounded, dim ages ago, by the same faces, objects, and circumstances—of our knowing perfectly what will be said next, as if we suddenly remember it!” (1952, p. 537)
In the technical sense, déjà vu is translated as “already seen”, however the common use has expanded its meaning to encompass many different subtypes of familiar experiences (Brown, 2004). Table 1 below lists many of these different subtypes. “Déjà vu” usually functions more as an umbrella for all the different subtypes of déjà experiences, including all kinds of modalities. This umbrella function also has its uses in scientific inquiry, as most people experiencing déjà vu experience it as a more global phenomenon and might not be able to narrow it down to just one specific mode. Further, the random subject answering surveys might not have enough insight regarding subtypes of déjà vu and would get confused about their respective meanings, leading to an unrepresentative survey result (Brown, 2004).

<table>
<thead>
<tr>
<th>Déjà ...</th>
<th>Already ...</th>
<th>Déjà ...</th>
<th>Already ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrivé</td>
<td>Happened</td>
<td>Pressenti</td>
<td>Sensed</td>
</tr>
<tr>
<td>Connu</td>
<td>Known (personal)</td>
<td>Raconté</td>
<td>Told</td>
</tr>
<tr>
<td>Dit</td>
<td>Said (spoken)</td>
<td>Recontré</td>
<td>Encountered</td>
</tr>
<tr>
<td>Entendu</td>
<td>Heard</td>
<td>Rêvé</td>
<td>Dreamed</td>
</tr>
<tr>
<td>Eprouvé</td>
<td>Experienced</td>
<td>Senti</td>
<td>Felt, smelt</td>
</tr>
<tr>
<td>Gouté</td>
<td>Tasted</td>
<td>Su</td>
<td>Known (intellect)</td>
</tr>
<tr>
<td>Fait</td>
<td>Done</td>
<td>Trouvé</td>
<td>Found (met)</td>
</tr>
<tr>
<td>Lu</td>
<td>Read</td>
<td>Vécu</td>
<td>Lived</td>
</tr>
<tr>
<td>Parlé</td>
<td>Spoken</td>
<td>Visité</td>
<td>Visited</td>
</tr>
<tr>
<td>Pensé</td>
<td>Thought</td>
<td>Voulu</td>
<td>Desired</td>
</tr>
</tbody>
</table>

Table 1: Different subtypes of déjà vu (Brown, 2004)
In the technical sense, what is commonly referred to as “déjà vu” is more accurately “déjà vécu”. This is the feeling that what is being experienced, e.g. speech or action, has been experienced just like that once before and of being able to predict exactly what is going to happen next. These experiences can incorporate any other modality, such as hearing, tasting, or even proprioception (Funkhouser, 1996).

One particularly interesting subtype of déjà vu is “déjà visité”. As opposed to déjà vécu, it is not the actual situation and narrative of events that is recognized and predicted, but only the location. It feels as if one has visited that specific location once before, and as if one could make ones way around the place perfectly, predicting where things are located (Funkhouser, 1996). Interestingly, déjà visité seems to be particularly common in relation to castles, e.g. when approaching the main entrance of a castle or going from one room to another (Brown, 2004).

1.4. THE FREQUENCY OF DÉJÀ VU

The déjà vu phenomenon is not a universally experienced phenomenon but is still very common. About two thirds of the population experiences a déjà vu at least once in their life. It is also highly likely that individuals who have ever experienced a déjà vu have experienced it more than once, whereas only one experience in a lifetime is much less common. The relative frequency of déjà vu experiences, i.e. among subjects who have experienced at least one déjà vu in their lifetime, decreases with age, with the exception of teenagers. The frequency peaks in young adults and then consistently decreases for older subjects. There is a lower reported frequency in older studies, both regarding relative frequency and absolute frequency, i.e. number of subjects having experienced a déjà vu at least once (Brown, 2003; 2004). There is a positive relationship between education years and frequency of déjà vu incidence (Brown, 2003), but taken the education factor aside, there
Déjà vu phenomenon seems to be a negative relationship between socioeconomic class and the déjà vu frequency (Brown, 2004). Déjà vu experiences seem to be more common among individuals who travel, but the amount of travel itself does not seem to be of direct importance. A positive relationship has also been observed between déjà vu frequency and dream recall (Brown, 2003; 2004). No shared factors between déjà vu and dream recall that contribute to higher frequencies have been reported (see Farthing, 1992).

Common triggers for the phenomenon include physical and psychological distress (Brown, 2004), stress, fatigue, alcohol consumption, visiting new locations and experiencing novel situations (Brown, 2003). Three quarters of déjà vu experiences are triggered inside buildings, both public and private, with only one quarter being triggered outdoors or in a vehicle. Most experiences are triggered during recreational activity or while the individual is relaxing, as opposed to routine activity, e.g. eating or working. The déjà vu phenomenon is rarely experienced in solitude, but most often while the individual is socializing with friends. Socializing with relatives or strangers does not seem to have the same positive effect, however. The phenomenon seems to be slightly more frequent in the afternoons and evenings, as well as in the later half of the week (Brown, 2004). Next, four recognition dysfunction phenomena considered related to déjà vu are presented.

1.5. RELATED PHENOMENA

Our ability to recognize up around thousands of different people as unique individuals is one of our brain’s most amazing skills. We can recognize people with their face alone, their whole body, or even just certain behaviours, e.g. the way a person walks. It is important to be able to separate different people, not only those close to us that make a very strong impact or those that stay with us for a very long time of our lives, but also those that we only meet temporarily, e.g. waiters in restaurants (Hirstein, 2005). This also holds true for
events, locations and simple objects. When these identification processes malfunction, phenomena arises that show correlations with the déjà vu phenomenon. The déjà vu experience has for long been considered analogous to certain misidentification syndromes (Berrios, 1995). In this section, the following of these syndromes will be described shortly and related to the déjà vu phenomenon: jamais vu, Capgras’ syndrome, Fregoli’s syndrome and intermetamorphosis.

1.5.1. Jamais Vu

As the déjà vu experience is defined as an inappropriate feeling of familiarity, the jamais vu experience can be seen as its mirror-case: an inappropriate feeling of unfamiliarity. “Jamais vu” literally means “never seen”, and a person experiencing a jamais vu interprets an objectively familiar situation, something already seen, as unfamiliar, i.e. never seen before (Brown, 2004). E.g., one could imagine walking into one’s own bedroom and feeling as if one has never been there before, despite being certain that it really is your bedroom and that you have been there before. Jamais vu experiences are much less frequent than déjà vu experiences but they seem to share common triggers, e.g. stress and fatigue (Brown, 2004).

1.5.2. Capgras’ Syndrome

A similar case to jamais vu is Capgras’ syndrome. Capgras’ patients claim that people close to them, typically a parent, spouse or child, have been replaced by impostors. These impostors can be interpreted as either benevolent or malevolent. The misidentification can also be directed at the patient itself, even claiming that the image in the mirror is of someone else. The exact cause for the syndrome is not known but it has been related to e.g.
Déjà vu phenomenon

Alzheimer’s disease, schizophrenia and head trauma (Hirstein, 2005). Capgras’ syndrome has been paralleled with the jamais vu phenomenon, being seen as jamais vu about people, as the two phenomena share the same absent feeling of familiarity. Capgras’ syndrome can however be seen as a more pathological case of jamais vu (Berrios, 1995).

1.5.3. Fregoli’s Syndrome and Intermetamorphosis

The reversed case of Capgras’ syndrome comes in the form of Fregoli’s syndrome. Fregoli’s patients claim that several unfamiliar people are actually all one familiar person, i.e. the same person. The patient can recognize all the people as looking different from each other, as they do, but still maintains that they are all the one familiar person (Hirstein, 2005). To relate this to Capgras’ syndrome, the patient would here see its parent, spouse or child instead of a stranger. Random people on the streets would be misidentified as this familiar person.

Intermetamorphosis is very similar to Fregoli’s syndrome, with the biggest difference being that it is another familiar person that is misidentified as a familiar person. Sometimes one person can even seem to change into another person right in front of the patient’s eyes (Hirstein, 2005). These two phenomena have been paralleled with the déjà vu phenomenon, as they share the same inappropriate feeling of familiarity. Where déjà vu is related to situations, Fregoli’s syndrome and intermetamorphosis are related to people only (Berrios, 1995). In the next section, the relationship between déjà vu and pathology and drug use is presented.
1.6. RELATION TO PATHOLOGY AND DRUG USE

Much of the early research on déjà vu assumed an underlying pathology. Epilepsy has been of special interest, but déjà vu has also been associated with consumption or withdrawal from various types of drugs, as well as schizophrenia (Brown, 2004).

Jackson (1888) noted the phenomenon of déjà vu (or a “dreamy state”) preceding epileptic seizures and proposed that it was connected to epilepsy in general, as a pre-seizure aura. Overall, though, statistical analysis of the prevalence of déjà vu in relation to epilepsy has shown no compelling evidence for the déjà vu phenomenon being any more common in epileptics compared to the normal population. However, epilepsy is generally accompanied by a dullness of consciousness, which might make it difficult to detect déjà vu. Thus, the incidence of déjà vu in relation to epilepsy might be higher than reported (Brown, 2004).

A higher incidence of déjà vu has also been related to drug use and withdrawal. Some studied drugs include amphetamine, toluene-based solvents, medication for bi-polar disorder, and alcohol. Especially alcohol has shown a strong positive relationship with déjà vu experiences (Brown, 2004).

The déjà vu related research on schizophrenia presents a similar difficulty as that of epilepsy, as the nature of the disorder might distort or cloud the cognitive functions and perception of the individual, making it difficult to detect the déjà vu phenomenon, even if it is present. It has been proposed that there is both a qualitative and quantitative difference in the phenomenon compared to the normal population but very few studies have actually tried to analyse these differences (Brown, 2004). Adachi et al. (2006) even detected a lower frequency of déjà vu experiences in schizophrenics compared to a control group. Overall, there is no clear support for either quantitative or qualitative differences in the déjà vu experiences of schizophrenics and healthy subjects (Brown, 2004).
Déjà vu phenomenon

Although there is no clear evidence for déjà vu having any positive relationships with epilepsy or schizophrenia, the big scientific interest in this pathological perspective caused déjà vu to become related to pathology in the common man’s eyes and in a way stigmatized as indicative of mental disorder (Brown, 2004). In the following section, reasons for conducting further study on the déjà vu phenomenon are discussed.

1.7. WHY STUDY DÉJÀ VU?

There is a widespread cultural awareness in the general population regarding the déjà vu phenomenon. It is referred to in fictional literature, newspaper articles and magazines (Funkhouser, 1996). Only very few memory phenomena are talked about by the general population, e.g. forgetting, tip-of-the-tongue phenomenon (presque vu) and déjà vu (Brown, 2004). Taken aside “forgetting”, which is undoubtedly the most commonly mentioned memory phenomenon, a search on Google’s search-engine with the terms “déjà vu” and “tip-of-the-tongue”2 gave 5 140 000 and 170 000 hits respectively3. Clearly, there is a uniquely high interest in the déjà vu phenomenon in the general population.

Similarly, the phenomenon holds a special position for researchers. Among other metacognitive phenomena it is unique in the regard that there are no clearly identifiable causes and no objectively measurable behavioural components (Brown, 2004). Déjà vu is a purely subjective and mental experience, and this poses a unique challenge for memory and psychology researchers. Although a challenging subject to study, the findings of déjà vu research could surely provide much information about memory functions in general, and is thus of great value to cognitive scientists. Alas, the déjà vu phenomenon has gotten a reputation of mysticism over the years and many researchers have thought twice before

2 The alternative search term ”presque vu” gave 30 200 hits. Combined, the two search terms gave 200 200 hits.
3 The results were obtained on March 25th 2009.
writing anything, with fear of themselves being associated with this label. A survey of textbooks on memory and cognition, spanning the 30 years between 1964 and 1994, presented 39 books with no mention of the déjà vu phenomenon at all, three books that touched on the phenomenon in passing, and only two books that dedicated whole sections to the phenomenon.

The highly subjective quality of the déjà vu experience, and perhaps especially the feeling of tapping into a memory that cannot be identified as having its source in one’s own prior experiences, is probably what has made the phenomenon so attractive to parapsychological theories and connections with e.g. reincarnation. There are, however, several theories in cognition and neuroscience that have the potential to demystify and explain the déjà vu experience in scientific terms, with new research on cognitive processes constantly shedding stronger light on the phenomenon (Brown, 2004). In the next section, some of these theories are presented.

2. SCIENTIFIC THEORIES ON DÉJÀ VU

Below follows a limited presentation of theories on déjà vu found in scientific literature. The theories are divided into four main categories: dual-processing theories, neurological theories, memory theories and attentional theories, based on the respective functions and processes put in focus. Although some theories consider functions and processes belonging to more than one of these categories and are not as easy to categorize, this division is made to highlight certain shared traits of the theories and string them together for purpose of better overview.
2.1. DUAL-PROCESSING THEORIES

The central idea of dual-processing theories is that déjà vu is the result of two otherwise parallel and synchronized cognitive processes becoming momentarily out of synch (O’Connor & Moulin, 2006; Brown, 2004). Déjà vu is thus a byproduct of the disruption of normal cognitive operations. It could express itself through a spontaneous activation of one function in the absence of another, when they should be activated in parallel, e.g. familiarity and memory, or the reversed case, where two related but separated functions are merged together, e.g. encoding and retrieving. Below, two theories on dual processing will be presented, one focusing on familiarity and retrieving, and one on encoding and retrieving.

2.1.1. Familiarity and Retrieving

In his research of experiential phenomena in relation to temporal lobe epilepsy, Gloor (1990) proposed that déjà vu is a byproduct of the disrupted function of familiarity and retrieving. They are two independent cognitive functions that work in coordination, with familiarity always coming after retrieval. This is the normal function of recollection as it occurs in everyday life, but sometimes one of these functions could become spontaneously activated independently of the other, giving rise to various experiential phenomena. The déjà vu phenomenon should be the result of familiarity being activated without a retrieval cue. The reversed case, retrieval being activated without familiarity, can be associated with the relating case, jamais vu (Brown, 2003).

2.1.2. Encoding and Retrieving

Also encoding and retrieval are separate cognitive functions, input and output respectively, operating independently of each other (Brown, 2004). They maintain a strict
coordinated relation where they are aware of each other’s activation but unable to both activate at the same time. However, if one could imagine a situation where they would both be activated at the same time – new information being encoded while old information being retrieved – the resulting impression could be that of the new experience/information being directly retrieved from memory. de Nayer (1979) devised a metaphor for the déjá vu phenomenon in this sense using a tape recorder where he likened the record and play buttons with the encoding and retrieving cognitive functions respectively. Under normal circumstances, the tape recorder can have either the record (encoding) or play (retrieval) function turned on. Although de Nayer does not present any ideas on how it could happen, the déjá vu phenomenon is explained as the accidental activation of both the record and play functions at the same time, giving rise to an interpretation of the new encoding as an old memory.

2.2. NEUROLOGICAL THEORIES

A second way of scientifically interpreting the déjá vu phenomenon is that it is the result of some form of momentary neurological dysfunction (Brown, 2004). There are two main ideas on what kinds of dysfunctions could give rise to the déjá vu experience: 1) a spontaneous neural activation in relation to seizure, and 2) a disturbance of the neural transmission speed (Brown, 2003). This article will only discuss the neural transmission speed theories in order to keep a coherent thread throughout the section and to avoid having to get into too complex biological terms to explain the phenomenon. It is interesting to note, though, that some of the researchers that have contributed to these theories were active more than a hundred years ago and that their speculations still hold up remarkably well to modern science and our current understanding of the nervous system (Brown, 2004).
Déjà vu phenomenon

2.2.1. Single Pathways

One way for this dysfunction to express itself is by a momentary change of neural transmission speed in a single neural pathway between any perceptual organ and subcortical or cortical processing centers, either by speeding up the transmission or by slowing it down (Brown, 2004). Grasset (1904) has proposed that a temporary slowing down could express itself in the typical déjà vu symptoms. The slight delay in delivery is misinterpreted as the information being old. Brown (2004) adds that the resulting false recognition could be caused by the slower transmission bringing the experience under more thorough analysis. He compares it to the way we do not usually think about the way we walk until we e.g. pull a muscle and the mechanics are brought to our conscious level of attention.

2.2.2. Dual Pathways

The pathway delay can also involve two pathways working in synchrony (Brown, 2004). Perceived stimuli are transmitted over several different pathways on their way to the higher processing centres. When they converge in the cortical areas, they usually arrive at slightly different times. This is normally adjusted for automatically and the two sets of information are merged into one impression. An interruption of the transmission speed could, however, delay one of the sets of information long enough for the merging process to interpret the two messages as unique to each other.

One version of this type of explanation is the optical pathway delay theory (O’Connor & Moulin, 2006; Osborn, 1884). Information from our eyes travel through several pathways on its way to the cortical areas (Goodale & Milner, 1992; Brown, 2004). In the higher cortical areas, the information is synthesized from first a primary pathway and then a secondary pathway. When the transfer from the second pathway is slightly delayed, the otherwise seamless synthesis of two sets of information into one perception is disrupted and
Déjà vu phenomenon

experienced as two separate messages (Comfort, 1977). Déjà vu is explained as the two sets of sensory information arriving at different times due to this momentary delay creating a sense of familiarity:

“…the supposed uneven action of the nerves supplying the eyes, one side of the brain thus receiving the image before the other, and causing the secondary image to appear as a familiar repetition of the first.” (Osborn, 1884, p. 480)

The first set of information from one of the eyes barely has time to reach the visual cortex before the information from the second eye arrives. The difference in time between the two inputs is so short that the first eye’s information is not encoded as an event of its own. When the second eye’s information is received and encoded as a separate event, a sense of familiarity comes with it. The individual experiences the oncoming information as being experienced for the second time, but cannot locate the source of the previously experienced event as it has not been encoded for memory (O’Connor & Moulin, 2006).

A similar theory says that it is the primary pathway, not the secondary as above, that becomes delayed (Comfort, 1977). The information from the primary pathway is normally interpreted as the initial perception so when this set of information arrives after an already experienced set of information from the secondary pathway it comes with a feeling of prediction of what is going to happen next. Brown (2004) suggests that the nature of the déjà vu experience could possibly best be described as the brain shifting focus from comparing the primary input to the secondary input, to comparing the secondary input to the primary input, while a delay has separated the two. In the one case, a perceived ability to predict what will happen next is experienced, and in the other case, a novel but seemingly old experience is
Déjà vu phenomenon detected. These two focuses could change rapidly during the few seconds that a déjà vu experience lasts, explaining both distinguishing features.

2.3. MEMORY THEORIES

One of the most central, and perhaps most intriguing, characteristics of the déjà vu experience is the sense of familiarity without any objective reference, i.e. false memories (Brown, 2004). It is imaginable that complete situations have previously been experienced in their entirety, forgotten, and then retrieved subconsciously during a déjà vu experience, but perhaps a more plausible interpretation of these false memories is that only some aspect of the situation has been experienced before. The sense of familiarity tied to this one or few aspects is then misattributed to the whole situation. In this section, theories relating to the memory function alone are presented.

2.3.1. Single Element Familiarity

The single element familiarity theory is one of the most popular interpretations of the déjà vu phenomenon (Brown, 2004). The main idea is that any single element in the present setting that is objectively familiar but not (momentarily) consciously recognized could elicit the déjà vu experience. The single element familiarity is misinterpreted to cover the entire setting or situation. As an example, you walk into your friend’s living room, where you have never been before, and there is a grandfather clock identical to one of your relative’s clocks. You feel a very strong sense of familiarity but are unable to locate the source, and so you mistakenly attribute the sense of familiarity to the whole situation. Reed (1979) compares this feeling to encountering someone you know only casually, e.g. your barber, in a completely different setting where you do not expect to see him. Seeing him will create a
Déjà vu phenomenon

sense of familiarity without you being able to clearly identify where you know the person from.

### 2.3.2. Multiple Element Familiarity

An alternative to the single element familiarity theory is the multiple familiarity theory (Wohlgemuth, 1924). The two theories share the same principle idea, that some subconsciously recognized element in any given situation can give rise to the déjà vu experience, only the latter requires more than just one. Wohlgemuth analysed a personal déjà vu experiences and found that several almost identical elements had previously been experienced, and argued that the combination of these elements is what produced the déjà vu. It is possible that the individual elements also compete for awareness, thus blocking each other out from conscious recognition (Brown, 2004). Similarly, Fleminger (1991) argues that structural codes used to identify faces may elicit déjà vu experiences in cases where certain features overlap (cf. Bruce & Young, 1986). Brown (2004) argues that the same mechanism probably handles inanimate objects, as well, thus expanding Fleminger’s theory to the multiple element familiarity theory. Osborn (1884) theorizes that the phenomenon could be the result of not necessarily the physical objects in a setting subconsciously recognized but the revisited pattern of cognitive processing that e.g. seeing an identical grandfather clock at both your friend’s and relative’s forms:

“… if at any time in our past lives we passed in actual experience or in imagination over a mental track, say a b c d e, and if to-day this track is again traversed, although the former experience itself may have been long forgotten, we have a sense that it has been through the mind before … if the mind passes
Déjà vu phenomenon

over only part of the former track, say b c d, we sometimes, in the dim
recognition that arises believe we have been over the whole before …” (p.481)

2.3.3. Gestalt Familiarity

The gestalt familiarity theory is similar to the multiple element familiarity
theory in that it requires several elements to elicit the déjà vu experience, however, it differs
in that it is not the actual elements that cause the elicitation but the overall organization of
those elements (Reed, 1974). If a scene is organized very similarly to a previously
experienced one, e.g. a sofa in one corner, an oriental rug in the middle of the floor and a
grandfather clock next to it, the familiarity of that organization could trigger a sense of
familiarity to the entire experience. The elements do not have to be identical to the previously
experienced ones, as long as the organization is similar enough (Brown, 2004).

2.4. ATTENTIONAL THEORIES

Attentional theories on déjà vu try to explain the phenomenon as a momentary
break in one’s perception, of which one is completely unaware, that gives rise to an
impression of there being two separate yet identical experiences. The two experiences are
separated by an indeterminate period of time, giving the impression of “oldness” (Brown,
2004). Two attentional theories will be discussed in this section: one on perceptual occlusion
and one related to inattentional blindness.

2.4.1. Perceptual Occlusion

The way a déjà vu occurs according to the perceptual occlusion theory is by
immediately following an occluded initial perception with a second perception in full clarity.
There is actually only one ongoing perceptual experience; one perception of focal stimulus, but the switch from initial occlusion to full clarity cuts the experience in two and gives rise to the feeling of familiarity. The initial perception can be degraded by other means than occlusion, e.g. through distraction or misdirected attention (Brown, 2004).

### 2.4.2. Inattentional Blindness

The inattentional blindness phenomenon has been discussed in relation to déjà vu. A person experiences inattentional blindness when perceiving an above threshold stimulus but do not consciously attend to it, e.g. because the person was concentrating on some other focal stimulus at the same time (Mack & Rock, 1998). Subjects in experiments on inattentional blindness claim that they have not seen the stimulus presented to them, but through e.g. priming tests the stimulus can be shown to have been subconsciously processed.

Brown (2004) theorizes that if this subconsciously processed stimulus were to be immediately followed by a conscious processing of the same stimulus then the previous subconscious processing might prime the following conscious processing so that a sense of familiarity accompanies it. This theory differs from the previous in that perceptual occlusion assumes that both processed stimuli are identical and focal whereas the theory based on inattentional blindness assumes that the first processed stimulus is peripheral and the second, immediately following, stimulus is focal. Brown (2004) exemplifies this process by imagining walking into a hotel lobby, looking for the front desk. As this is the attended to stimulus, even though many other stimuli (plants, paintings, coat rack) are processed at the same time, they are not consciously processed. As you turn around to quickly survey the room, putting all these objects in direct attention and process them consciously, the processing matches that made previously and you are struck by a sense of familiarity, possibly eliciting a déjà vu experience.
3. DISCUSSION

3.1. THE NATURE OF DÉJÀ VU

The nature and definition of “déjà vu” has a long history behind it and even today there is not a completely clear consensus regarding its use. Most research has been concentrated on quantitative measures, meaning that one has not typically been interested in a precise and unmistakable description and definition of the phenomenon. Among laymen, perhaps because not everyone has actually experienced the phenomenon, the term ”déjà vu” has come to encompass a myriad of familiarity related phenomena, out of which only some are actually related to déjà vu. Among scientists, one definition has in recent times become more or less standard: “any subjectively inappropriate impression of familiarity of a present experience with an undefined past”. In addition, a strong conviction of the impression being identical, not only similar, to a previously experienced one, and a feeling of predictability have frequently been discussed as part of the déjà vu experience. The experience itself usually lasts for only a few seconds but is sometimes several minutes long. What determines how long the experience is would most probably be explained differently for each group of theories but none of the theories presented in this paper have mentioned this aspect.

The term ”déjà vu” has come to function as an umbrella for all phenomena that fits under this definition (and similar ones). Many subtypes have been mentioned in scientific literature, focusing on different senses and activities – others’ and personal ones. This collection of subtypes probably helps to confuse matters more for the laymen, and it could possibly cause confusion among scientists, too, if it is not made entirely clear if one is discussing déjà vu as a whole or as a specific subtype. The demarcation between subtypes seems very difficult to make in some cases, e.g. between ”déjà pressenti” and any specific
Déjà vu phenomenon

sense subtype, and between “déjà arrivé” and ”déjà éprouvé”. These subtypes most probably find their conceptions in the individual researchers’ creativity and are not yet standardized. As research on déjà vu is becoming increasingly popular it is important to find an agreement on what terms to use, as well as how and when to use them.

3.2. THE FREQUENCY OF DÉJÀ VU

First of all, déjà vu is not a universal phenomenon. Only two thirds of the population are estimated to ever experience a déjà vu in their lifetime, but out of those who do experience a déjà vu, it is highly likely that they will experience more than one. Most déjà vu experiences are triggered during recreational or relaxing situations and/or while socializing with friends. This does not seem to be targeted at a specific group of people. Save for a few exceptions, everyone relaxes from time to time and most have time to socialize with friends. Nevertheless, only two thirds experience the phenomenon. Perhaps some people are more prone to déjà vu experiences than others, regardless of what social and recreational activities are engaged.

There are two specific groups of people that do seem to be more prone to déjà vu experiences: those who travel and those with a higher education. One of the typical triggers is novelty. Experiencing new situations has a positive effect on the probability of experiencing a déjà vu. People who travel often see many new locations and experience novel situations, ideas and routines. This could explain why the frequency of déjà vu experiences is higher among people who travel, but interestingly enough the amount of travel does not seem to have any positive effect. One would imagine that more travel would result in more novelty, and thus more frequent déjà vu experiences. Perhaps there is a limit as to how much novelty alone can affect the frequency. It is also probable that people who travel regularly do so along with one or several friends, with whom they will socialize a great deal, and become fatigued...
Déjà vu phenomenon

more often than non-travelers. Highly educated people also have a higher reported frequency of déjà vu experiences. This could probably be explained by the higher amount of novelty, as well, by learning about new things, meeting new people in new settings and often work on new projects, and by the amount of stress and fatigue many students experience. It is not as simple to draw conclusions, however, about why this higher frequency of déjà vu experiences would remain even after one has stopped studying and moved on to other things. One possible reason is that people with a higher degree have a higher probability of getting jobs that have more room for triggers, e.g. higher tempo and demand, stressful situations and/or more diversified tasks.

Despite stress being an important trigger, most déjà vu experiences are triggered in the weekends and afternoons to evenings during recreational or relaxing situations where one would imagine the stress-levels to be very low. Probably, the fatigue from the rest of the week sets in, perhaps in combination with an increase in alcohol. The fact that most déjà vu experiences are triggered during relaxing situations could simply be because people seek out such situations when fatigued. Thus, the actual trigger could still be fatigue, not necessarily relaxation in itself. The higher frequency during recreational activities could also be attributed, in part, to them probably taking place in the weekends when fatigue is present. It would also seem likely that people often carry out these activities along with friends, with whom socializing has a positive effect. There is probably also a higher degree of novelty in recreational activities as one tries to find something new and exciting to experience.

Both relative and absolute frequencies of déjà vu experiences seem to decrease with age. Relative frequency, i.e. the number of déjà vu experiences among those who have already experienced at least one déjà vu, peaks in young adulthood and then steadily decreases. This might be due to young people experiencing more diversity in their everyday lives and have yet to become heavily routinized. It might also be due to cognitive sensitivity
Déjà vu phenomenon

in general decreasing with age. Younger people might be more sensitive and attentive of
minor mental events, whereas older people might not even take notice of them. The
decreasing absolute frequency, i.e. the number of people who have had one or several déjà vu
experiences in their lifetime, with age is more probably due to social factors. Déjà vu was
long regarded as a mental disorder and several attempts have been made to find a connection
between e.g. schizophrenia and frequency of déjà vu. The phenomenon was, and perhaps still
is to some, regarded as something negative; as a sign of something abnormal. In later years,
people have become more open and accepting of the phenomenon and scientific research has
shown that there is no definite relation between the déjà vu phenomenon and mental
disorders. This might explain why the reported frequency is lower among the older
generations. Out of shame and fear, perhaps, people simply did not want to report any déjà vu
experiences.

There are a few points that are especially interesting to consider regarding the
frequency reports: 1) frequency is higher in higher educational classes but lower in higher
socioeconomic classes, 2) socializing with friends is a strong trigger but socializing with
relatives and strangers seems to have no effect, at all, 3) frequency is higher among people
with higher dream recall, and 4) approaching, and moving inside, castles is a unique trigger.

Regarding the first point, it is usually assumed that higher education leads to
higher socioeconomic class, but of course it is not always so. Following the idea that higher
education leads to higher frequency of déjà vu, one would think that this is something that
remains regardless of future socioeconomic paths taken. Apparently, there is something
special about the actual belonging to a lower socioeconomic class that elicits more déjà vu
experiences, and less experiences in belonging to a higher class. The reasons for this could be
many but are difficult to speculate about without specific survey results or similar
information. Perhaps belonging to a lower socioeconomic class creates more stress in
everyday living compared to higher socioeconomic class? It is possible that higher socioeconomic class presents less novel situations, as well, but such a generalisation is probably not possible to make.

Regarding the second point, it is possible that the differing aspect is that while socializing with friends one more frequently engages in more diverse activities and have more frequent novel experiences compared to the socializing with relatives. Socializing with strangers should, per definition, include novelty, in a sense, but perhaps this interpersonal interaction alone is not enough to cross the threshold for a déjà vu experience elicitation.

Regarding the third point, it is difficult to imagine any links between high dream recall and high déjà vu frequency, considering the selection of contributing factors presented in this paper. Perhaps dream recall is higher during periods of fatigue or stress? Perhaps dream recall is higher during travel or other situations where novel situations are experienced? More specific research on the factors contributing to the relative dream recall frequency is needed to compare the two phenomena and see what they have in common.

Regarding the final point, perhaps castles, being impressive and rare buildings for most people, elicit déjà vu experiences through its novelty-value, along with stress and fatigue related to carrying out a trip to a castle. Castles are usually remotely located and visited as part of a larger travel arrangement. The castle itself might simply be the last drop that pushes the experience over the threshold. Arguably, there should then be a much broader spectrum of locations and objects that have a stronger chance of eliciting déjà vu experiences, e.g. popular tourist attractions in general.

### 3.2. EVALUATION OF SCIENTIFIC THEORIES ON DÉJÀ VU

All scientific theories on déjà vu presented in this paper explain the phenomenon as some sort of byproduct or mistake; the result of brain functions failing to do
what they are supposed to. The processes discussed in dual-processing theories are usually coordinated in a specific pattern. When this pattern is disturbed, déjà vu supposedly arises. The information transfer via neural pathways discussed in neurological theories is supposedly slowed down or interrupted from its normal function in cases where déjà vu is experienced. Memory theories proposes that the déjà vu experience arises from the function of familiarity failing to identify the feeling of familiarity in a situation to the correct object or milieu and instead identifying it to the whole experience in general. The attentional theories proposes that distracting and/or causing a momentary break in a person’s perception could result in the interpretation of there having been two separate perceptions, leading to undefined familiarity and déjà vu.

Some theories are more clearly constructed to allow testing of these premises, while some are more theoretical in nature and function more as general ideas than concrete hypotheses. Below, short summaries of each category of theories follow with discussions on their explanatory power and usefulness in future déjà vu research.

### 3.2.1. Dual-processing Theories

The dual-processing theories assume that two normally coordinated cognitive processes are momentarily separated to elicit a déjà vu experience. One such separation occurs when one of the two processes becomes active at the wrong time, e.g. how familiarity and retrieving are normally activated together, but with the activation of familiarity in the absence of retrieval, déjà vu occurs. Two cognitive processes that are normally separate, yet coordinated, can also become simultaneously activated and merge together to elicit a déjà vu experience, such as in the case of encoding and retrieving.

Among the scientific theories presented in this paper, the dual-processing theories are the most difficult to test. It would require much greater knowledge of how these
cognitive processes operate in order to properly design a satisfactory test. Although the theories gain support from large-scale surveys on contributing factors, they are based around more abstract descriptions of cognitive processes and are not easily traced to more concrete events in the brain. Due to the level of abstract, it is also difficult to find support from other literature on cognitive science. The dual-processing theories are thus much too vague to be considered scientifically plausible explanations.

3.2.2. Neurological Theories

The neurological theories presented in this paper assume that there is a momentary alteration in neural transmission speed that gives rise to the déjà vu experience. This alteration in transmission speed can occur in two ways, either by a single or dual neural pathway. With a single neural pathway, the neural transmission is delayed slightly, which, because of the expected delivery, results in a sense of familiarity when the transmission is actually delivered. With dual pathways, only one of the pathways’ transmission speed is altered. If the neural transmission speed of the primary pathway is slowed down, focusing on the comparison between the primary and secondary transmissions results in a feeling of prediction, and focusing on the comparison between the secondary and primary transmissions results in a feeling of familiarity. A rapid change of focus between these two could be the cause of the déjà vu experience. The dual pathway neurological theory is alone in the ability to adequately explain the feeling of predictability.

The neurological theories are based on previous neurological findings and are possible to test and falsify but the only way to do this is by measuring neural transmission speeds, something that is very difficult to do. A possible way to test the premise is to present a single stimulus to a subject, but with a slight delay in either left or right visual or auditory field. This could possibly simulate the natural transmission delay and give rise to a feeling of
Déjà vu phenomenon

familiarity in the subject. From hereon the test could be further restricted to find the exact
delay necessary to elicit déjà vu experiences, as well as experimenting with different types of
delays – on the primary and secondary pathways, and in different senses. The theories also
gain support from large-scale surveys on contributing factors, although it is unclear why déjà
vu is elicited only sometimes.

3.2.3. Memory Theories

The memory theories presented in this paper have focused on element
familiarity – objects from one setting, or a whole setting itself, giving rise to a sense of
familiarity in a different setting. The single and multiple element familiarity theories suggest
that seeing identical objects in different settings could in some cases elicit déjà vu experiences
if the sense of familiarity is generalized from the object to the whole setting. The gestalt
familiarity theory similarly suggests that two settings with comparable organization could
give rise to the same sense of familiarity.

These theories are quite similar to the attentional theories and are also based on
implicit memory. As such, they are more easily testable. For the single and multiple element
familiarity theories, one could have subjects look at various scenes and reuse certain objects
in attempt to elicit a generalized sense of familiarity. The same idea could be used for testing
the gestalt familiarity theory, with similarly organized whole settings. The complexity of live
environments might be too much for test situations, but perhaps virtual reality could prove
useful for exploring these types of settings in controlled tests. The question is, if only single
objects and similar organisation is required to elicit déjà vu experiences, why do we not
experience them more often? What separates one object from a déjà vu-eliciting one, and just
how similar do settings have to be in order to give rise to this experience? Are the objects
completely random or do they share certain features that make them more prone to
familiarity? The type of testing described above might be able to address these questions adequately.

### 3.2.4. Attentional Theories

Attentional theories are based on the assumption that two quickly following perceptions of an identical stimulus could elicit a déjà vu experience. This might happen by perceiving something under full awareness and becoming distracted for an instant, a quick break in ones attention or by the initial perception becoming degraded by some means. Inattentional blindness as a phenomenon has been used to explain how this might occur – implicitly registering an unattended stimulus and then directly following with an explicit registration of the same stimulus in full attendance. During the right circumstances, these seemingly separate perceptions (perceptual occlusion) or matching memory registrations (inattentional blindness) could give rise to déjà vu experiences.

Using simple recognition tasks on inattentional blindness where focal stimulus is presented either at the center of a screen with flanker stimulus presented in the periphery, or at the periphery with flanker stimulus at the center could possibly trigger déjà vu experiences. If the flanker stimulus of trial N is presented as focal stimulus on trial N+1 this should give rise to the same feeling of familiarity as in the lobby example. For more complex tests, one could use live settings or objects with the same distribution of focal and flanker stimuli. Questions still remain on whether any stimulus is capable of triggering déjà vu experiences or if there are certain characteristics in some objects that can more easily push the experience over the threshold. It is also interesting to consider special groups of subjects for these tests, e.g. amnesics. If the déjà vu experience is elicited by matching a previously implicit memory with an explicit, identical memory, would amnesics experience déjà vu more frequently than healthy subjects? Properly designed and executed tests of this type should be able to address
Déjà vu phenomenon

these questions. Attentional theories also gain support from large-scale surveys on contributing factors, and if the tests described above give results, these theories show great potential for further research.

3.3. LIMITATIONS ON RESEARCH METHODS

The déjà vu phenomenon is a very difficult subject to study as the experience is completely subjective with no external cues. Although two thirds of the population experiences a déjà vu at least once in their lifetime, the intervals between experiences can be quite long, especially in adult years, making it hard to remember everything surrounding the experiences. Unless prepared, it might be difficult to even take note of the surrounding factors as the experience can be quite imposing. Three types of research methods have been presented in this paper: retrospective reports, prospective reports and case reports.

3.3.1. Retrospective and Prospective Reports

As with surveys in general, a big difficulty with retro- and prospective reports on déjà vu has been finding representative subjects (Brown, 2003). Many researchers have used psychology students from their own workplace or gathered subjects from parapsychological forums. These subjects might be more willing to please the researcher and contribute to a positive result, as well as consisting to a larger extent of people who are drawn to similar phenomena, perhaps because of an overrepresentation of personal experience with such experiences. On the other hand, psychology students will more probably have better understanding of the phenomenon than others and can give more accurate and descriptive answers. Several surveys have also lumped the déjà vu phenomenon together with parapsychological phenomena such as telekinesis, clairvoyance and ghost sightings on the same survey. People who have experienced a déjà vu might here feel uncomfortable reporting
Déjà vu phenomenon

so as they either are afraid of the implied connection to the other phenomena or, if they do not believe in the paranormal, might write off their experiences as something else entirely – not as some paranormal mumbo-jumbo.

A specific problem with retrospective reports is the rarity of déjà vu experiences. Unless you only experience one déjà vu in your lifetime, it will probably become difficult to remember the exact number and more importantly the events surrounding it and the possible causes, e.g. if you were exhausted, stressed, what time of the day it was, what you were doing at the time, if there were people around you, etc. It will also be easier to feel pressured into giving an answer if you think you might have experienced something but are not sure exactly what it was and if it corresponds to what the researcher is after.

The prospective reports eliminate the issue of remembrance as subjects are asked to report directly after having a déjà vu experience, not long after. However, it is very time-consuming to accumulate any results, considering the rarity of the phenomenon. Moreover, the subjects have to be motivated enough to keep such a “déjà vu diary” over a long period of time. People who have frequent déjà vu experiences could be asked to keep diaries in order to describe the surrounding factors and the nature of the experience, but the small number of subjects would make the results difficult to generalize.

3.3.2. Case Reports

Case reports on déjà vu were more common in the past when it was still assumed to have ties to pathology. While studying epilepsy, déjà vu would show itself as a symptom rather than an independent phenomenon. As déjà vu was not the focus of attention in these cases, too detailed and analytical descriptions can not be expected. In more modern times, electrically stimulating parts of the brain of TLEs have elicited déjà vu experiences in some cases, which have been subject of study. Although the thought of forcing a déjà vu...
Déjà vu phenomenon

experience is very interesting for research purposes, the fact that it has only worked in some cases and in other cases not makes it a very unreliable method. It is also unknown whether electrical stimulation could elicit déjà vu experiences in healthy subjects, as well, or if it is exclusive to TLEs. Further study in this area might prove fruitful.

3.4. LIMITATIONS ON THE PRESENT PAPER

With the vast number of existing theories on déjà vu, even within only scientific literature, it was impossible to give each and one equal much space and consideration, given the time restraints of the present paper. Instead of analysing all theories from the start and selecting the ones deemed to have the highest explanatory power, a rough selection was divided into categories and from there on analysed relative to each respective category. This made it easier to select interesting theories, group together theories that were very similar, and discard anything that seemed to have very low explanatory power. An attempt was also made to keep a very clear thread within each category so that the theories in each respective category shared only one or two more specific themes. As a negative result of this, the final selection of theories became very limited, especially as whole themes of theories were discarded in favour of keeping the thread simple and clear.

Another selective decision that was made was to discard any theories that focused too much on the biology of déjà vu as it was expected to demand much more in-depth and complicated explanations with necessary support from a wide array of literature on the anatomy of the brain. The neurological pathway delay theories are based on brain anatomy but do not demand much knowledge of the anatomy of the brain to be fully understandable. There are many theories on the role of epileptic seizures in the elicitation of déjà vu experiences and although there is much mention of epilepsy in relation to déjà vu in this paper, none of those theories are presented. Theories on epilepsy and déjà vu especially
Déjà vu phenomenon

seemed very demanding to describe as it involves specific brain regions, both shallow and deep, and those brain regions’ functions would also have to be described in order to clearly explain the effects of a seizure originating in those regions.

All in all, there are dozens of scientific theories not mentioned in this paper. Due to space constraints, it would be very difficult to mention all theories in just one paper. Even though the number of theories is very limited here, this paper should be seen as a more general summary of theories. It would be interesting to reuse the present categorization and re-gather theories on e.g. memory, and go more in-depth with each theory.

4. CONCLUSION

Déjà vu is a common but not universal phenomenon with about two thirds having experienced at least one déjà vu in their lifetime, although most people who have experienced it have done so several times. It is most common in young adulthood after which the frequency decreases with age. The frequency seems to be positively influenced by travel, stress and fatigue. The commonly used definition of déjà vu is “any subjectively inappropriate impression of familiarity of a present experience with an undefined past” to which a feeling of predictability is often added.

The phenomenon has ever since it was first studied been linked to pathology, especially epilepsy and schizophrenia, but there are no compelling evidence for any such relation. Drug use and withdrawal, however, have shown positive relations to the frequency of déjà vu experience. The mystic nature of the phenomenon has paved way for many parapsychological theories, which stigmatized déjà vu early on in the scientific community, restricting the amount of interest in the subject. The speculated link to pathology also
stigmatized the phenomenon among common people who were afraid to admit having experienced déjà vu – something that has only recently become more accepted.

The scientific theories discussed in this paper can be divided into four groups: those that explain the phenomenon as the result of 1) two normally synchronous cognitive processes becoming separate or merging, 2) altered neural transmission speed, 3) misidentified and/or generalized familiarity, and 4) degraded or misdirected attention. Although no category of theories can adequately explain the phenomenon with today’s findings, it is concluded that the third and fourth categories hold the greatest potential for doing so with future research because of its easily testable hypotheses and support from already existing findings in cognitive sciences.
REFERENCES


Grasset, J. (1904) La sensation du “déjà vu.” *Journal de Psychologie, Normale et
Déjà vu phenomenon

Pathologique, 1, 17.


