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Evaluating a Possible Association Between Déjà Vu Frequency and Memory Performance to Explain Déjà Vu

Duncan Prince
Portland State University

Caleb Archuleta
Portland State University

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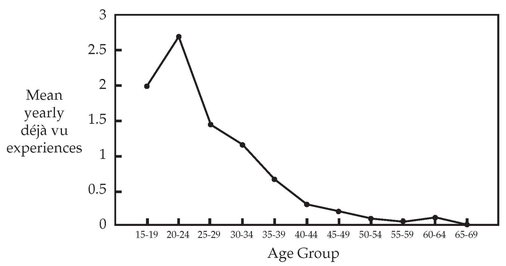
Duncan Prince and Caleb Archuleta
West Linn High School and Portland State University, West Linn and Portland, Oregon

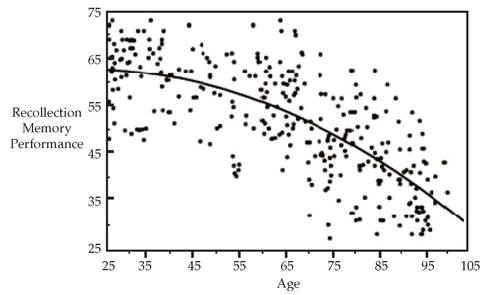
Introduction

"You are suddenly overcome with a feeling that you have done this exact same thing once before—been in this place, engaged in this activity. However, it is impossible because to the best of your memory, you have *never* been in this place before, or engaged in this activity" (1). This experience, déjà vu (French for "already seen"), is described as both common and universal. Although déjà vu lacks a scientific explanation, the most consistent research finding is that yearly frequency of déjà vu experiences declines with age. Recollection memory performance also declines with age, while familiarity remains largely intact.

Yearly Incidence for Déjà vu Experience by Age Groups (2)



Age-Related Decline in Recollection Memory Performance (3)



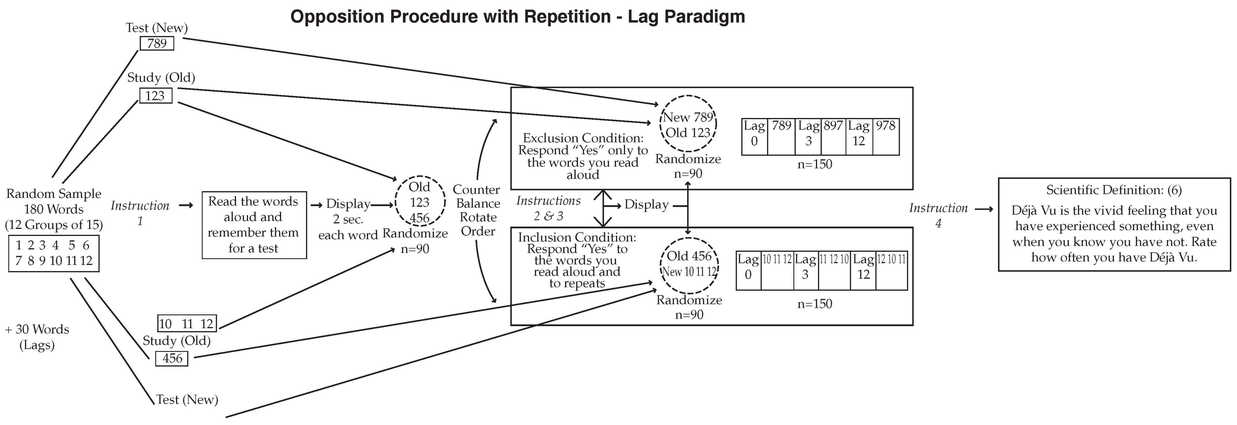
Healthy déjà vu is thought to be the result of a strong feeling of familiarity without the experience of conscious recollection. In clinical déjà vu (temporal lobe epilepsy), only those patients with intact recollection experience déjà vu. All of these findings present a dilemma for interpretation of déjà vu.

Research Question: What is the association, if any, between déjà vu frequency and familiarity or recollection?

Hypothesis: There will be a positive correlation between recollection performance and déjà vu frequency, and there will not be a correlation between familiarity and déjà vu frequency.

Materials and Methods

Opposition Procedure with Repetition - Lag Paradigm



- Frequency of déjà vu quantitated using The Inventory for Déjà Vu Experiences Assessment (4)
- Memory recognition test constructed according to the methods of Jennings & Jacoby (5) and specialized research computer software designed for repeated trials and timed displays
- Process-dissociation procedure with intervening items (lags) used to separately measure automatic and consciously controlled memory processes
- Random sample (n=66) recruited from student population of Portland State University
- Tests administered by two student researchers using separate laptops

Results

- Memory performance was estimated using the probability of responding Yes to stimuli during opposing conditions (Exclusion and Inclusion):
  Recollection (R): Inclusion – Exclusion
  Familiarity (F): Exclusion ÷ (1-R)
- Criteria for memory performance and comprehension of instructions were established; data of 25 participants met both criteria and were used in analysis

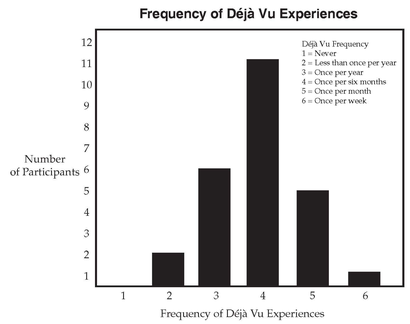
Comparison of Mean Probabilities of Responding Yes to Old, New, and Repetition Items by Condition and Sample

	Old	New	Repetitions (Lag Intervals)			
			0	3	12	Mean 0,3,12
Exclusion						
Ideal	1	0	0	0	0	0
Jennings & Jacoby (n = 24)	.63 (.13)	.10 (.10)	.02 (.03)	.06 (.06)	.12 (.09)	.07
Our Data (n = 25)	.62 (.48)	.10 (.31)	.27 (.45)	.21 (.41)	.19 (.39)	.22
Inclusion						
Ideal	1	0	1	1	1	1
Jennings & Jacoby (n = 24)	.63 (.21)	.09 (.08)	.98 (.04)	.96 (.06)	.94 (.09)	.96
Our Data (n = 25)	.69 (.46)	.11 (.31)	.81 (.39)	.80 (.40)	.81 (.40)	.81

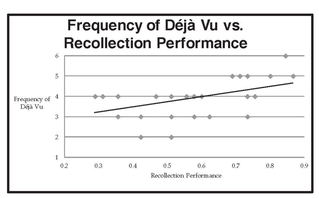
Mean Estimated Probabilities of Basing a Decision on Recollection and Familiarity at Each Lag Interval

	Recollection				Familiarity			
	0	3	12	Mean	0	3	12	Mean
Jennings & Jacoby	.96	.90	.83	.90	N/A	.64	.66	.65
Our data	.54	.59	.61	.58	.59	.51	.50	.53

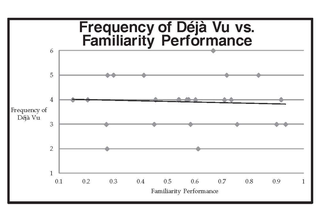
Frequency of Déjà Vu Experiences



Frequency of Déjà Vu vs. Recollection Performance



Frequency of Déjà Vu vs. Familiarity Performance



Recollection Performance Association with Déjà Vu

Null Hypothesis (H_0): There is no correlation between recollection performance and frequency of déjà vu experiences. ($\beta_1 = 0$)

Alternate Hypothesis (H_A): There is a positive correlation between recollection performance and frequency of déjà vu experiences. ($\beta_1 > 0$)

A test for linear correlation between recollection performance and déjà vu frequency found $r^2 = .3044$, $r = .5518$. A plot of the residuals confirmed a linear model was the proper choice. Since the hypothesis was an expected positive linear correlation between recollection and déjà vu, a Pearson correlation coefficient chart (one-tail) was used. With $p = 0.002$ ($\alpha = 0.01$), H_0 was rejected. Significant evidence was found to suggest a positive linear correlation between recollection performance and frequency of déjà vu experiences.

Familiarity Performance Association with Déjà Vu

Null Hypothesis (H_0): There is no correlation between familiarity performance and frequency of déjà vu experiences. ($\beta_1 = 0$)

Alternate Hypothesis (H_A): There is a negative correlation between familiarity performance and frequency of déjà vu experiences. ($\beta_1 < 0$)

A test for linear correlation between familiarity performance and déjà vu frequency found $r^2 = .0036$, $r = .0600$. A plot of the residuals confirmed a linear model was the proper choice. Since the hypothesis was an expected negative linear correlation between familiarity and déjà vu, a Pearson correlation coefficient chart (one-tail) was used. With $p = 0.388$, H_0 could not be rejected. There was no evidence to suggest an association between familiarity performance and frequency of déjà vu experiences.

Conclusions

- The Leeds Memory Group (7) recommends scientists examine correlations between memory performance and déjà vu. This study is among the first.
- In clinical studies of patients with memory impairments, frequency of déjà vu is lower compared to healthy groups. Examining correlations in healthy young participants ($\bar{x}$ age 27) when déjà vu frequency and memory are greatest, is logical and yet novel.
- In this study of college-age participants, recollection performance is positively correlated with frequency of déjà vu experiences, and familiarity is not.
- Because correlation does not imply causation, it cannot be assumed that greater recollection memory causes a higher frequency of déjà vu.
- Finding a significant relationship between recollection memory performance and frequency of déjà vu experiences should not be ignored. It may help develop an explanation for déjà vu. Because age is a confounding variable, a future experiment could (selectively) restrict recollection performance in order to learn about the role of age in déjà vu frequency.

Literature Cited

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Further Information

To learn more about this research please contact Duncan Prince, prince3@pdx.edu.