

An early Dutch study of *déjà vu* experiences

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SYNOPSIS In 1904 and 1906, Heymans reported the results of two prospective questionnaire surveys on *déjà vu* experiences and depersonalization in a sample of mainly students. *Déjà vu* experiences appeared to be more frequent than episodes of depersonalization. Emotional sensitivity, unstable mood fluctuations, apathetic episodes and irregular working rhythm emerged as predisposing personality traits. With the exception of the working rhythm, these traits were more prominent among the respondents with episodes of depersonalization than among those with *déjà vu* experiences. Heymans inferred that these findings supported his hypothesis that *déjà vu* experiences and depersonalization both resulted from the diminishing or disappearance of a sense of familiarity due to a momentary reduction of psychological energy. A re-analysis of Heymans' data partly confirmed his findings and conclusions as to the predisposing factors. The authors conclude that his studies and his hypothesis have been hitherto undervalued and would deserve more attention.

INTRODUCTION

In the famous novel by Charles Dickens (1849), something strange happened to David Copperfield when Uriah Heep informed him of his plans to marry Agnes Wickfield one day: 'He seemed to swell and grow before my eyes; the room seemed full of the echoes of his voice; and the strange feeling (to which no one is quite a stranger) that all this had occurred before, at some indefinite time, and that I knew what he was going to say next, took possession of me.' (Sno *et al.* 1992*a*). This strange feeling is generally known as a *déjà vu* experience and has been defined as a subjectively inappropriate impression of familiarity of a present experience, with an undefined past (Neppe, 1983). David's assumption that no one is quite a stranger to this experience accords with the reported frequency rates that vary from 30 to 96%. As to its psychopathogenesis, the phenomenon has been linked to memory disturbances, attention deficits, time or reality perception disorders, dreams, defence mechanisms and unconscious fantasies or wishes (Sno & Linszen, 1990).

Empirical research on the *déjà vu* experience is scanty and the results as to possible predisposing factors have been far from conclusive (Sno *et al.* 1992*b*). The frequency rate of *déjà vu* experiences is generally held to be uninfluenced by gender. Most authors assume a predilection for younger ages and an association with depersonalization. However, Neppe (1983) and Harper (1969) did not observe any correlation with age. There appears to be no consensus as to a relation with other socio-demographic variables, e.g. education, socio-economic status or ethnicity. Richardson & Winokur (1968) concluded that *déjà vu* experiences occur significantly more frequently among psychiatric patients. Harper (1969) noted, however, that these experiences occur less frequently among individuals with 'marked neurotic features'. Neppe (1979, 1983) argued that *déjà vu* experiences might have a diagnostic value with respect to epilepsy, an opinion refuted by Bernard-Leroy (1898) and Harper (1969) (see Table 1).

In The Netherlands the psychologist Gerard Heymans was the first and up to now the only worker to have performed systematic research on *déjà vu* experiences (1904, 1906). In the psychiatric literature, only a few authors have made any reference to either his studies or his

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Table 1. Results of empirical studies on déjà vu experiences

	Neppe 1983	Neppe 1979	Harper 1969	Richardson & Winokur 1967/1968	Chapman & Mensh 1952	Heymans 1904/1906	Bernard- Leroy 1898	Lalande 1893
Gender	— ¹	—	No	No	No	—	No	No
Age	No ²	—	No	Negative	Negative	—	Negative	Negative
Education/ Intelligence	—	Positive	—	Positive	Positive	—	—	No
Occupation/ SES	—	Positive	—	Positive	Positive	—	No	No
Travel	—	—	—	Positive ³	Positive	—	—	—
Ethnicity	—	—	—	Whites ⁴	—	—	No	—
Depersonalization	—	—	Positive	—	—	Positive	Positive	—
Epilepsy	Positive ⁵	Positive	No	No	—	—	No	—
Neuroses	—	—	Negative ⁶	Positive	—	Positive ⁷	No ⁸	No ⁹
Schizophrenia	Positive	—	—	Positive	—	—	—	—
Depression	—	—	—	Positive	—	—	—	—

¹ No information provided.

² No correlation.

³ In neurosurgical group.

⁴ Whites more often than blacks.

⁵ Positive correlation.

⁶ Negative correlation.

⁷ Emotional sensitivity, mood fluctuations, apathetic episodes, irregular working rhythm.

⁸ *Neurasthéniques, hystériques, déséquilibrés de toutes sortes sans délire systématisé*.

⁹ *Les gens les plus nerveux, c'est-à-dire, vifs, impressionnables, irritables*.

explanatory hypothesis on *déjà vu* experiences (Bergson 1908; Linzwurzy 1909; Ellis 1911; Ebbinghaus 1915; Berndt-Larsson 1931; Neppe 1983). In this article, we attempt to demonstrate that his studies and his hypothesis deserve more attention. After a short biographical introduction, 'the state of the art' as regards research on *déjà vu* experiences in 1904 is reviewed. Subsequently, Heymans' 1904 and 1906 studies are summarized and his data re-analysed with statistical tests. Finally, after discussing his theory on *déjà vu* experiences, Heymans' contribution is compared with other more recent studies.

BIOGRAPHICAL INTRODUCTION

Gerard Heymans was born in 1857, the only child of a County Secretary of Ferwerd, a small village in Friesland, one of the northern provinces of The Netherlands. After high school, Heymans studied political science and philosophy (including psychology) at the University of Leyden. In 1881 Heymans completed his Ph.D. thesis entitled *Zur Kritik des Utilismus* (On the critique of utilism). Two years later he was appointed at the University of Leyden as an unsalaried lecturer in philosophy. In the 1880s,

Heymans published a number of articles on political science, ethics and epistemology.

In 1890 he accepted a chair as professor at the University of Groningen in 'the history of philosophy, logic, metaphysics and psychology'. Two years later, Heymans founded the first laboratory for experimental psychology in The Netherlands. At his laboratory, Heymans performed experimental research, including studies on optical illusions, inhibitory processes in perception and perception thresholds. His book *Einführung in die Metaphysik (Introduction to Metaphysics)* published in 1905, in which he elaborated his theory of the psychological monism, was praised by William James as 'a masterpiece of clear composition' (Le Clair, 1966). With his studies on *déjà vu* experiences and depersonalization, Heymans introduced the method of the psychological survey in The Netherlands. He then conducted another two questionnaire surveys on the hereditary aspects of personality traits, character types and gender differences. Heymans reported the results in various articles and in 1910 he published the book *Die Psychologie der Frauen (The Psychology of Women)*.

In 1920, Heymans was one of the founders and the first chairman of the Dutch Society of

Psychical Research (DSPR). His experimental research, providing him in his view with evidence for the existence of telepathy, was internationally acclaimed. Numerous researchers, including Whately Carington, visited Heymans at his laboratory. Since in the DSPR there was wider interest in spiritualistic seances than in scientific research, Heymans resigned in 1925. Three years after his retirement as a professor, Heymans died in 1930 (van der Veen, 1983).

STATE OF THE ART IN 1904

At the turn of the century the majority of the authors focused on the phenomenological characteristics, definition, nomenclature and classification of *déjà vu* experiences. Recurrently described characteristics included the paroxysmal features, accompanying feelings of tension and secondary anxiety, the ability to predict the events of the next few moments (precognition) and the inability to situate the alleged original experience at a circumscribed point in the past.

Various terms have been introduced to refer to *déjà vu* experiences, e.g. 'sentiment of pre-existence', '*Emfindungsspiegelung*' and '*fausse reconnaissance*' (Sno & Linszen 1990). This divergence in nomenclature reflects the wide range of theoretical interpretations. Wigan (1844) claimed that *déjà vu* experiences resulted from the transient non-simultaneous functioning of the cerebral hemispheres. Jensen (1868) asserted that *déjà vu* experiences were based on a double perception by the two hemispheres, resulting in some sort of mental diplopia. Other researchers attributed *déjà vu* experiences to a partial similarity between the present experience and a previous experience (Boirac, 1876) or dream (Sully, 1881; Lapie, 1894). Anjel (1878) and Lalande (1893) suggested that *déjà vu* experiences could be based on the entering of consciousness by images that were unconsciously perceived several seconds earlier.

Based on a number of published case histories, the Frenchman Eugène Bernard-Leroy (1898) developed a 36-item self-administered questionnaire. A thousand copies were distributed and the questionnaire was published in two journals, *Revue de l'hypnotisme et de la psychologie physiologique* and *Proceedings of the Médico-légal Société of New York*. Some of the

questions focused on a possible relation between the frequency of *déjà vu* experiences and gender, age and memory functioning. Other questions addressed the phenomenology of *déjà vu* experiences, including duration, accompanying affect and precognition. Lastly, questions on predisposing conditions, e.g. depersonalization, and precipitating circumstances, were included.

The response rate of this unspecified population amounted to 67 completed questionnaires, 49 of which were included unprocessed in the appendix of his thesis. Because of the low response rate, Bernard-Leroy confined himself to a global discussion of the 'tendencies' evident from his material (see Table 1).

THE 1904 STUDY

Heymans prefaced his report of the 1904 study with two critical notes on Bernard-Leroy's methodology. First, the French questionnaire did not contain any questions on the general psychological state of the respondent. It consequently could not provide any information on whatever correlations there might be between *déjà vu* experiences and such variables as personality traits, intellect or temperament. Secondly, a retrospective design would seem to doom any possible relation with specific conditions or circumstances to remain unnoticed. Heymans argued that for every *déjà vu* experience they could remember under specific circumstances or conditions, the respondents were apt to remember other *déjà vu* experiences under totally different situations.

Heymans' study was focused on *déjà vu* experiences and depersonalization. *Déjà vu* experiences were defined as 'a state, with equal sudden onset and disappearance, during which we have the feeling that we have experienced the present situation on some occasion in a distant past in precisely the same manner down to the very last detail'. Heymans defined depersonalization as 'a usually highly transitory state with a sudden onset, during which everything that is perceived seems to be unfamiliar, new, seen more in a dream than in reality; the people we speak to make the impression on us of being machines; our own voice also sounds strange to us, as if it were someone else speaking and in general we have the feeling that we are not acting and speaking ourselves, but are just

passive spectators, watching ourselves act and speak'.

In his questionnaire, Heymans rectified Bernard-Leroy's first omission by including questions on the respondent's psychological state. In a series of 'general questions', Heymans addressed the respondent's sleeping pattern, diurnal rhythm, imaginative faculty, emotional sensitivity, mood fluctuations, activity pattern, working rhythm, sociability, absent-mindedness and aptitude for mathematics or languages. The last question pertained to word alienation, the feeling that a familiar word suddenly seemed 'odd, strange, a sound- or letter-complex without any meaning'.

Heymans dealt with Bernard-Leroy's second omission, i.e. no specification of the facilitating factors, by developing a prospective design. For each *déjà vu* experience or episode of depersonalization during the research period, respondents were asked to document the preceding and coinciding conditions and circumstances. In a series of 'special questions,' they were asked to note the exact time of occurrence, whether they were in a familiar environment, alone or with others, speaking or listening, in a state of fatigue or relaxation, whether there had been physical or mental exertion, whether they had just had a meal or more alcohol than usual and so forth.

Heymans' study differed from Bernard-Leroy's on two other points. First, Heymans had a relatively homogeneous population as regards age and educational level: in 1903 he distributed the questionnaires among 35 male and 10 female psychology students between the ages of 20 and 25. In May 1904 Heymans was able to collect 42 completed questionnaires, yielding a response rate of 93%. Secondly, the respondents were to answer the general questions even if they had not had *déjà vu* experiences or episodes of depersonalization during the research period, thus providing Heymans with useful comparative material.

Eight of his respondents prospectively reported *déjà vu* experiences or episodes of depersonalization. Two of these respondents each reported one episode of depersonalization, the other 6 reported a total of 13 *déjà vu* experiences. In addition, another 14 respondents indicated that they were familiar with the phenomena, although these had not occurred during the research period. Nine respondents

stated that they had never experienced either of the two phenomena. In short, the prospectively reported *déjà vu* experiences ($N = 13$) were more frequent than the episodes of depersonalization ($N = 2$). On a life-time basis, the respondents with *déjà vu* experiences ($N = 17$) also outnumbered those with episodes of depersonalization ($N = 13$).

Despite reservations related to the small number of respondents, Heymans concluded, be it without any verifiable statistical analysis, that '*Ein Blick in diese Tabelle lässt sofort nicht weniger als vier Korrelationen vermuten...*' ('one glance at this table is sufficient to presume no fewer than four correlations'). Here he was referring to the four personality traits he observed more frequently among the respondents with *déjà vu* experiences or episodes of depersonalization than among the respondents who were unfamiliar with these phenomena. These traits were emotional sensitivity, unstable mood fluctuations, apathetic episodes and irregular working rhythm. In addition, his data indicated a correlation with an aptitude for languages instead of mathematics. Contrary to Heymans' expectations (see discussion), the respondents with *déjà vu* experiences as well as episodes of depersonalization did not differ from those who exclusively had *déjà vu* experiences. The respondents with exclusively episodes of depersonalization scored lower on the personality traits referred to above than the other respondents. The answers to the 'special questions' did not permit definite conclusions regarding the predisposing conditions or precipitating circumstances. However, the majority of *déjà vu* experiences and episodes of depersonalization had occurred in the evening, usually in the company of others, while the respondent was listening, often in a state of fatigue, following unpleasant or confusing mental or physical exertion or after excessive alcohol consumption. In other words, as Heymans concluded, these experiences coincided with moments of distractibility due to a reduction of psychological energy.

THE 1906 STUDY

Since the small size of the 1904 sample, Heymans replicated the study in a new group of students, which resulted in 46 completed questionnaires.

Table 2. Results on alleged predisposing personality traits to *déjà vu* experiences or depersonalization

General questions	1904			1906			Combined		
	D/DV*	Absent	Total	D/DV	Absent	Total	D/DV	Absent	Total
4. Emotional sensitivity									
More	13(11.3)†	4(5.7)	17	40(37.9)	11(13.1)	51	53(49.3)	15(18.7)	68
Less	1(2.7)	3(1.3)	4	12(14.1)	7(4.9)	19	13(16.7)	10(6.3)	23
Total‡	14	7	21	52	18	70	66	25	91
5. Mood fluctuation									
Stable	7(10.0)	7(4.0)	14	25(28.1)	15(11.9)	40	32(38.1)	22(15.9)	54
Unstable	13(10.0)	1(4.0)	14	34(30.9)	10(13.1)	44	47(40.9)	11(17.1)	58
Total	20	8	28	59	25	84	79	33	112
6. Activity pattern									
Active	12(13.5)	7(5.5)	19	42(44.8)	21(18.2)	63	54(58.2)	28(23.8)	82
Apathy	5(3.5)	0(1.5)	5	17(14.2)	3(5.8)	20	22(17.8)	3(7.2)	25
Total	17	7	24	59	24	83	76	31	107
7. Working rhythm									
Regular	10(12.7)	8(5.3)	18	30(32.5)	16(13.5)	46	40(45.1)	24(18.8)	64
Irregular	9(6.3)	0(2.7)	9	30(27.5)	9(11.5)	39	39(33.9)	9(14.2)	48
Total	19	8	27	60	25	85	79	33	112
10. Aptitude									
Mathematics	8(6.9)	2(3.1)	10	31(31.7)	13(12.3)	44	39(38.6)	15(15.4)	54
Languages	3(4.1)	3(1.9)	6	13(12.3)	4(4.7)	17	16(16.4)	7(6.6)	23
Total	11	5	16	44	17	61	55	22	77
11. Word alienation									
Often	6(4.3)	0(1.7)	6	20(15.2)	2(6.7)	22	26(19.6)	2(8.4)	28
Rarely	14(13.5)	5(5.5)	19	32(34.7)	18(15.3)	50	46(48.2)	23(20.8)	69
Never	2(4.2)	4(1.7)	6	7(9.0)	6(4.0)	13	9(13.3)	10(5.7)	19
Total	22	9	31	59	26	85	81	35	116

* DV = depersonalization; DV = *déjà vu* experience.

† The numbers in brackets indicate the expected value (E).

‡ The column and row totals are different because the non-response category has not been included.

He also obtained the completed questionnaires from an additional 42 respondents (mainly students and some few lecturers). Thus, including the 1904 study results, by the end of 1906 Heymans had collected data from 130 respondents.

Because questions on 'sleeping pattern', 'diurnal rhythm' and 'imaginative faculty' had proved irrelevant, these questions were replaced in the new questionnaire by questions on whether there had been *déjà vu* experiences or episodes of depersonalization in the past two or three years. The 'special question'-section had remained unaltered, though a possible precipitating circumstance was added ('upon entering a room filled with lots of people').

During the research period, 31 of the 88 respondents reported 94 *déjà vu* experiences and/or episodes of depersonalization. As in 1904, the number ($N = 55$) of respondents with *déjà vu* experiences during their lifetime surpassed the number ($N = 38$) of respondents with

episodes of depersonalization. The prospectively reported 94 cases yielded a similar difference: 55 *déjà vu* experiences and 35 episodes of depersonalization (in 4 additional cases the two phenomena concurred). With the exception of 'aptitude for languages instead of mathematics', Heymans once again observed a positive correlation between the cluster of the alleged predisposing personality traits and *déjà vu* experiences or depersonalization.

The responses to the 'special questions' as to time of day, predisposing conditions and precipitating circumstances did not yield the desired insight into the possible association between *déjà vu* experiences and specific conditions or circumstances. Heymans did observe, however, that in 77 of the 94 cases reported prospectively, conditions and circumstances were described that could be indicative of a momentary reduction of psychological energy.

Contrary to the 1904 conclusions, Heymans inferred on the basis of the frequency rates in the

Table 3. Results of statistical tests on correlations of predisposing factors with *déjà vu* experiences and depersonalization ($P < 0.05$)

General questions	1904	1906			Combined		
	Fisher†	χ^2	df	P	χ^2	df	P
1. Sleeping pattern	—‡						
2. Diurnal rhythm	6.35						
3. Imaginative faculty	0.32						
4. Sensitivity	0.08	1.69	1	0.19	3.96	1	0.05*
5. Mood fluctuation	0.02*	2.19	1	0.14	6.38	1	0.01*
6. Activity pattern	0.12	2.48	1	0.12	4.57	1	0.03*
7. Working rhythm	0.02*	1.39	1	0.24	4.64	1	0.03*
8. Sociability	0.36						
9. Absent-mindedness	0.23						
10. Aptitude	0.2	0.22	1	0.64	0.06	1	0.81
11. Word alienation	‡	6.96	2	0.03*	11.92	2	0.01*

† Fisher's exact probability test.

‡ Not applicable since there are more than two response categories.

Table 4. Correlation between depersonalization and *déjà vu* experiences

Depersonalization	<i>Déjà vu</i> experiences		Total
	Yes	No	
Yes	31 (23.7)*	7 (14.3)	38
No	24 (31.3)	26 (18.7)	50
Total	55	33	88

* Numbers in parentheses indicate the expected value (E).

combined samples that with the exception of 'working rhythm', the cluster of predisposing personality traits in the group of respondents with episodes of depersonalization was more prominent than in the group with *déjà vu* experiences.

A RE-ANALYSIS

Heymans interpreted his data without any verifiable statistical analysis. The nowadays more stringent standard for statistical inferences necessitated a re-analysis with statistical tests, e.g. Fisher's exact probability test and the χ^2 test. In this context it is noteworthy that these methods have been in existence for over 50 years and some of this analysis could have been performed during Heymans' lifetime. Each of Heymans' conclusions was tested separately using one independent variable at a time. The purpose of this re-analysis was to test Heymans' conclusions, rather than to test new hypotheses

on these antiquated data. Thus, it was merely our aim to confirm or reject the significance of the alleged correlations. Further analysis, for example on the interaction of the variables, would warrant a new study and consequently goes beyond the scope of this article.

In Table 2, the results of Heymans' 1904 and 1906 studies are summarized in absolute figures. The questions on 'sleeping pattern', 'diurnal rhythm' and 'imaginative faculty' have not been included because these were excluded by Heymans from the 1906 questionnaire. In his opinion, the questions on 'sociability' and 'absent-mindedness' similarly, failed to produce significant results and were thus also excluded from the Table. In Table 2, the totals for the combined samples vary between 77 and 116. This would seem to indicate that there were many incomplete replies.

Because of the small number of respondents and the consequently low (< 5) expected values (E), the Fisher exact probability test was used to re-analyse the 1904 data. This test only yielded significant correlations of *déjà vu* experiences and depersonalization with 'mood fluctuations' and 'working rhythm'. Fisher's exact probability test could not be applied to the results regarding 'word alienation' since there were more than two response categories. The larger number of respondents of the 1906 study permitted performance of the χ^2 test. This resulted in only one significant correlation, i.e. with 'word alienation' (see Table 3).

Thus, no more than a small minority of the

Table 5. Frequencies of alleged predisposing personality traits to *déjà vu* experiences or depersonalization in the combined samples

General questions	<i>Déjà vu</i> experiences		Depersonalization		<i>Déjà vu</i> + Depersonalization		Total
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
4. Emotional sensitivity							
More	17(17.8)	77	9(8.9)	82	25(24.3)	83	51
Less	5(4.2)	23	2(2.1)	18	5(5.7)	17	12
Total	22	100	11	100	30	100	63
5. Mood fluctuation							
Stable	15(12)	52	5(4.6)	45	12(15.4)	32	32
Unstable	14(17)	48	6(6.4)	55	25(21.6)	68	45
Total	29	100	11	100	37	100	77
6. Activity pattern							
Active	23(20.6)	79	8(7.8)	73	23(25.6)	64	54
Apathy	6(8.4)	21	3(3.2)	27	13(10.4)	36	22
Total	29	100	11	100	36	100	76
7. Working rhythm							
Regular	16(15.4)	53	8(5.6)	73	16(19)	43	40
Irregular	14(14.6)	47	3(5.4)	27	21(18)	57	38
Total	30	100	11	100	37	100	78
11. Word alienation							
Often	3(10.2)	10	3(3.9)	25	20(11.8)	56	26
Rarely	21(16.9)	68	7(6.5)	58	15(19.6)	42	43
Never	7(3.9)	23	2(1.5)	17	1(4.6)	3	10
Total	31	100	12	100	36	100	79

Numbers in parentheses indicate the expected value.

correlations Heymans had ascertained with 'one glance at this table' were sufficiently solid for a confrontation with statistical tests. This was probably partly due to the fact that taken separately, the numbers of respondents in the 1904 and 1906 studies were small and whatever correlations there might have been did not easily reach the level of significance. If the 1904 and the 1906 samples are combined the results are quite different. Now the χ^2 test yields significant correlations for all questions of interest except 'aptitude for languages instead of mathematics' (see Table 3).

In the theoretical interpretation of his results, Heymans stressed the association between *déjà vu* experiences and depersonalization (see Discussion). Applied to the results of the 1906 study, the χ^2 test indeed yields a significant correlation between the phenomena ($\chi^2 = 10.4$, $df = 1$, $P < 0.01$) (see Table 4).

In the combined samples, the total numbers of respondents with *déjà vu* experiences or episodes of depersonalization were 72 and 51, and the number of these prospectively reported phenomena amounted to 68 and 37. The numbers of *déjà vu* experiences and respondents

with *déjà vu* experiences were both significantly higher (binomial test, $P = 0.04$ and $P = 0.02$).

Heymans' conclusion that predisposing traits were more prominent among depersonalization than among *déjà vu* respondents was based on the results of the combined samples (see Table 5). In this group he observed that with the exception of 'working rhythm', the respondents with episodes of depersonalization displayed higher scores on these personality traits than the respondents with *déjà vu* experiences (see Table 5). As stated above, no similar tendency was observed in the 1904 research group.

To establish the statistical significance of the differences between the respondents with episodes of depersonalization and those with *déjà vu* experiences, the results of the predisposing personality traits were re-analysed with Fisher's exact probability test and the χ^2 test. In view of the small number of respondents in the separate samples, this re-analysis was confined to the results of the combined samples. With Fisher's exact probability test, none of the differences proved to be significant. With the χ^2 test, only the differences as to 'word alienation' were significant (see Table 6).

Table 6. Results of statistical tests on frequency differences of alleged predisposing factors to *déjà vu* experiences or depersonalization

General questions	Fisher*	χ^2	df	P
4. Emotional sensitivity	0.34	0.31	2	0.86
5. Mood fluctuation	0.26	2.57	2	0.28
6. Activity pattern	0.29	1.87	2	0.39
7. Working rhythm	0.7	3.03	2	0.22
11. Word alienation	—†	18.38	4	0.01‡

* Fisher exact probability test.

† Not applicable since there were more than two response categories.

‡ $P < 0.05$.

DISCUSSION

In Heymans' view, his findings indicated a relation between *déjà vu* experiences and depersonalization. Re-analysis of his data confirmed the statistical significance of the correlation. This finding is in concert with the more recent observations by Harper (1969), Brauer *et al.* (1970) and Myers & Grant (1972). Heymans noted that these two phenomena occurred in respondents with similar personality traits and in similar facilitating conditions. He therefore considered hypotheses that could solely explain *déjà vu* experiences, to be of limited value. Explanations in terms of partial similarities between present and earlier events, double perceptions or the delayed processing of perceptions could not elucidate the fact that subjects with *déjà vu* experiences were predisposed to episodes of depersonalization.

Heymans' explanatory hypothesis on *déjà vu* experiences and depersonalization was based on the assumption that the quality of familiarity would be determined by the associations between a present and an earlier event. The intensity and the number of these associations would serve as an indication for the elapsed time: the vaguer and the smaller the number of the associations, the more time has elapsed between the present and the alleged remembered event. Due to a momentary reduction of psychological energy and an attention deficit, the associations that determine a quality of familiarity can be vague or absent. Depersonalization was thought to be the results of the absence of associations, so that all the aspects of the situation or sensation lose their quality of familiarity. *Déjà vu* experiences were thought to surface when the associations

were vague and few in number. In the individual's consciousness, there is then the illusion that the present event is actually a memory from 'some indefinite time'. According to this interpretation, depersonalization is a more extreme manifestation of the same process that causes *déjà vu* experiences. More recently the involvement of the quality of the associations was suggested by Neppé (1983) who stated that 'loosening of associations,' a diagnostic criterion for schizophrenia according to DSM-III-R (APA, 1987), is concomitant with a high frequency of *déjà vu* experiences. Heymans failed to define the concept of 'psychological energy' so crucial to his hypothesis. The context suggests that this concept referred to the 'psychological tension' described by Pierre Janet (van der Hart & Friedman, 1989). (Janet held that the reduction of psychological tension or 'psycholeptic crisis' resulted in an erroneous evaluation of the present perception. In his view, *déjà vu* experiences were due to a denial of the present rather than a confirmation of the past (Sno & Linszen, 1990).)

Based on his hypothesis Heymans formulated two quantitative consequences:

(1) *déjà vu* experiences are more frequent than depersonalization;

(2) the predisposing personality traits are more prominent among respondents with episodes of depersonalization than among those with *déjà vu* experiences.

Re-analysis of his data confirmed the first consequence. The second consequence, however, could not be confirmed. Re-analysis of the results that led Heymans to conclude that predisposing traits were more prominent among respondents with episodes of depersonalization than among those with *déjà vu* experiences did not produce any significant differences.

Heymans supported his explanatory hypothesis with converging evidence. First, *déjà vu* experiences and depersonalization often coincided with situations or conditions in which a reduction of psychological energy could be assumed. Secondly, the frequency of these phenomena correlated with personality traits such as 'emotional sensitivity', instable 'mood fluctuations' and 'irregular working rhythm'. These personality traits—in Heymans' view indications of 'psychological instability'—would seem to increase the vulnerability for

conditions that reduce 'psychological energy'. These observations concur with the more recent findings of Richardson & Winokur (1967). In a group of psychiatric patients, these authors noted that *déjà vu* experiences occurred significantly more frequently in the personality disorders and mixed diagnoses categories ($P < 0.05$). The first category included patients with an 'emotionally unstable' personality, and the second category comprised 'adolescents with adjustment disorders'.

Heymans' results and interpretations would seem to warrant a number of critical notes. The generalizability of his findings is restricted by the non-random selection of his samples. Moreover, the respondents in the 1906 sample were less defined than in 1904. Since the questionnaires were altered and the translations were not completely identical, comparison of the two samples is questionable. Upon re-analysis, most of Heymans' conclusions did not appear to be statistically valid. It was only in the combined samples that any significant correlations or differences could be established. Lastly, although a prospective design could have yielded interesting information, Heymans' questionnaire did not include any questions on the qualitative aspects of *déjà vu* experiences. Due to this omission, Heymans was unable to present data on possibly differing types of *déjà vu* experiences.

However, as to methodology and theory, Heymans' studies compare favourably with subsequent as well as prior studies. Until now, Heymans is the only researcher to have gathered his data prospectively, thus obviating various elements that in the case of subjective phenomena like *déjà vu* experiences or depersonalization, can bias the results. In addition, although the selection was not random, the sample was relatively homogeneous as regards age and educational level, which would tend to enable such variables as personality traits to come into prominence. Moreover, the number of respondents, a total of 130 in the two studies, was relatively large. Of the later authors, only Chapman & Mensh (1952), Richardson & Winokur (1967, 1968) and Myers & Grant (1972) succeeded in presenting a larger group of respondents.

By far Heymans' greatest contribution is that he performed the first systematic study of *déjà vu* experiences. He was also the first in attempting

to confirm an explanatory hypothesis on *déjà vu* experiences with empirical data. In this sense Heymans marked the beginning of a new era, replacing reflections with research (Draaisma, 1988). Heymans' hypothesis was original, sophisticated and less speculative than many of the interpretations formulated by other authors (cf. Sno & Linszen, 1990).

In summary, Heymans' work has been hitherto undervalued and deserves more attention from contemporary researchers. His studies and explanatory hypothesis warrant further research on the clinical relevance of *déjà vu* experiences. At present an empirical study is in preparation by the first author of this article to investigate several of the topics which Heymans was the first to explore.

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