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The power of bad information:

how social influence extends false memory vulnerability

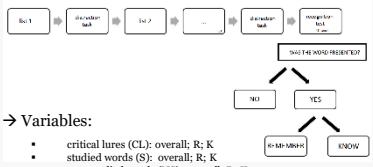
Introduction

→ Although the generative character of human memory, due to its construction, is not being undermined since '60 (Neisser, 1967), some from the possible consequences still remains unexplored, e.g.:

1. every influence - during the stage of encoding memory trace, as well as storing or recalling - may affect the content and quality of arising memory traces (Olszewska & Ulatowska, 2013; Strobeck, 2013; Maciaszek, 2012).
2. individual vulnerability to yield suggestion is strongly dependent on one's cognitive abilities, (especially among working memory and attentional control; see also: Orzechowski, 2012; Smith & Engle, 2011; Oberauer et. al., 2003; Johansson & Sternebrg, 2002). As a consequence, people demonstrate considerably diversified tendency to undergo suggestion and distort memory traces towards consistently with an external influencing factors (Pohl, 2013; Gallo, 2006, 2014; Dehon, Laroi i Linden, 2011).

Presented study was conducted to establish if **people encode true and false memory traces in a similar way** (Experiment 1) and to verify the **impact of positive / negative suggestion on memory accuracy** (Experiment 2) (Schacter 2013; Fiedler, Lundy & Sheehan, 2012).

→ General method:
DRM - false memory paradigm - (Deese, 1959; Roediger & McDermott, 1995; adapted: Olszewska & Ulatowska, 2013; Maciaszek, 2012) + ***remember-know judgement*** (Tulving, 1985; Gardiner & Java, 1991)



→ Variables:

- critical lures (CL): overall; R; K
- studied words (S): overall; R; K
- non-studied words (NS): overall; R; K
- total nr of recognized words (SUM): overall; R; K
- memory accuracy (AC)
- critical lures proportion (CLP)*
- reaction Times (RTs): overall, CL, S, NS
- certainty rate (0-100%): overall, CL, S, NS

*calculated by dividing the substracted rate of CL „remembered" and CL „known" to CL (overall)

Experiment 1

N= 61 (av. age: 21,8; SD = 1,17)
Procedure: as above

H1a: High memory accuracy, shown by individuals, enables to predict lower rate of false memories in DRM procedure.

H1b: Strong confidence, defined as „sense of remembering" memory traces accurately, affects generating false memories by individuals

Results:

Tab.1.1. Recognition results for critical lures (considered as false memories), studied and non-studied items in Experiment 1.1.

Item type	Proportion of responses: overall	R	K
studied	.61	.70	.30
critical lures	.52	.60	.40
non-studied	.12	.31	.69
mean memory accuracy: 69%			

Note. R= remember judgment; K-know judgment

$r_{AC, CL}$ **= -0.48**, p<0.01;
r_{AC, CL_R} **= -0.41**, p<0.01;
$r_{AC, CLP-}$ = -0.30, p<0.05;
r_{CL, CL_R-} **= 0.70**, p<0.01

Fig. 1.1. Perason's correlation matrix – chosen results.
Note: rates from „known" distinction did not achieved saliency

Table 1.2. Regression analysis modeling memory accuracy and proportion of „remember" responses as a predictors of false memories occurence.

variable	B	SE	b	t
constant	5,80	1,06		5,47
memory accuracy	-,06	,01	-,378	-4,47
R judgments	4,45	,61	,62	7,31
R=. ,772 ; R^2= . 583; F(2, 58) = 42,91; p < 0.001				

Note: "R judgments" refer to a summary number of remember judgments made by participants.

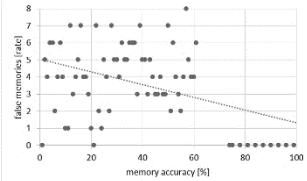


Fig. 1.2. The relationship between false memories rate, delivered from the numer of critial lures appeared in DRM procedure and the measures of memory accuracy [proportion

Summary:

1. The more **accurate memory**, the lower FM occurence probability
2. The higher **remembering confidence**, the more FM created

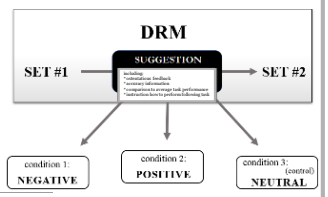
→ Results extended in experiment 2

Experiment 2

N= 88 (av. age: 20,9; SD=1,89)
Procedure – modified by providing suggesting information, expected to have an effect on memory accuracy

H2: Suggestion content affects memory of 3 different words categories: studied, non-studied & critilal lures

Fig. 2.1 Scheme of experiment 2.



Results:

Tab. 2.1. Recognition results for critical lures (considered as false memories), studied and non-studied items in Experiment 2. Due to observe an effect of suggestion implementation, only data derived from a second list of words related presentation was analyzed.

Item type and condition	Mean proportion of responses: overall	R	K	RT (ms)	C- level (%)	C-level RT(ms)
negative suggestion (N=31)						
studied	.43	.59	.41	1129	81%	3147
critical lures	**.58**	1	0	1122	82%	3396
non-studied	.12	.53	.47	1067	74%	3154
mean memory accuracy: **71%**						
positive suggestion (N=30)						
studied	.53	.61	.39	1061	80%	2890
critical lures	.63	.64	.36	1088	71%	2987
non-studied	.20	.60	.40	1090	80%	2748
mean memory accuracy: **56%**						
control (N=25)						
studied	.47	.67	.33	1104	83%	1067
critical lures	.50	.62	.38	1072	79%	2937
non-studied	.23	.56	.43	1068	77%	2563
mean memory accuracy: **54%**						

Note. R = remember judgment; K = know judgment. „C- level" refers to mean level of subjective certainty declared by participants to each item in every condition and „C-level RT" - mean time certainty decision took.

Summary:

Negative suggestion led to:
- slower responses
- recognizing less non-studied words with similar rates of false memories and studied items...

As an effect: higher memory accuracy observed due to deeper processing during encoding & increased source monitoring (Tse & Neely, 2005; Johansson & Stenberg, 2002; Craik & Lockhart, 1972)

However, certainty level between item categories, **differ significantly** in both experimental conditions (negative & positive suggestion), compared to control (see: table 2.2).

Tab. 2.2. Certainty level of remembering& time demanded to make decission: between group comparison.

condition	variable	F	df	p
1	C- level (%)	4.70	4, 693	<0.001
	C-level RT (ms)	116.54	8, 1099	<0.001
2	C- level (%)	7.84	2, 642	<0.001
	C-level RT (ms)	24.52	8, 1286	<0.001
3	C- level (%)	2.41	2, 471	n.s.
	C-level RT (ms)	20.70	8, 939	<0.001

Note: Significant differences between percentage level of certainty, declared by participants in reference to studied, non-studied and critical items were revealed only under condictions including suggestion.

GENERAL DISCUSSION

Conducted experiments lead to at least 3 crucial conclusions:

1. Better memory (in presented studies, defined by accuracy rate) enables remembering stimuli more precisely and, as an effect of encoding valid memory traces avoid creating distortions (including false memories). Such results stay in line with other researchers findings (Loftus et al., 2013; Zhe, 2010), pointing at the role of discrimination ability, that is strongly dependent on individuals cognitive efficiency (Kantner & Lindsay, 2014; Nichols, 2014).

2. It was also revealed, high level of confidence, referring to memory traces in general, affects creating memory distortions (Dehon, 2012; Gallo, 2013, 2006).

3. However impact of suggestion on memory traces remains incongruent, obtained results show that negative suggestion probably elicits deeper encoding (compared to positive or neutral). Such explanation seems sufficient concerning observed effects, especially the occurrence of critical lures (considered as false memories, Monds et. Al., 2013) judged by participants as "remembered' (Rose & Craik, 2012). Compellingly, negative suggestion causes increase of false memory rate, simultaneously improving general memory accuracy, by decreasing inaccurate, unrelated recognitions. Such results demand further investigation.

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Abstract:

Jonathan Carroll in "Bathing Lion", claims that "memory is always and for everything an unreliable witness. Never trust it to tell you the truth about who you are or how you got here." The aim of presented studies is to shed some light into this issue with use of experimentally evoked false memories .

First study allows to describe false memories as long-lasting, sustainable memory traces, which are comparable to true ones, as accompanied by a similar level of confidence and subjective sense of remembering declared by participants (43% and 33% respectively compared to 4% for random mistakes).

Second study was designed to verify whether subjects show significant difference among tendency to generate FM under influence of suggestion-content differing conditions (positive/negative/neutral). Obtained results demonstrated vast impact of suggestion on a tendency to generate false memories: both positively (63%) and negatively (58%) suggested groups notably extended false memories production, compared to neutral (50%) and control conditions (50% and 38%, respectively).

Compellingly, analysis revealed **"sense of remembering" under the negative-suggestion condition** achieved **100%** false recollection! Prevalent effect of providing negative suggestion were discussed in terms of source monitoring biases (Johansson & Stenberg, 2002) and general discrimination ability (Zhu et. al., 2013).

Key words: *memory; false memories; susceptibility; suggestion; vulnerability*