

Schema Theory and Autobiographical Memories

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Abstract

This study examines autobiographical memories of personal schemata. The participants reported life-historical memories that were prototypical for the respective schema. The selected schemata were "emotional neglect", "submission" and "emotional inhibition". The corresponding memories were classified by participants on given scales, such as vivid – not pictorial; personally very significant – insignificant; very intense – not intense; pleasant – unpleasant; frequently – rarely etc. Two factors of subjective evaluation were extracted for memories of episodes of emotional neglect and emotional inhibition as part of a factor analysis: "personal conciseness and pictoriality" and "emotional importance of repetition in the previous biography". The general factor of pictoriality, repetition and personal significance were generated for the memories of subjugation episodes. Significant correlations with the first factor were found with all three schema-specific episodes in bivariate product-moment correlations of the factor scores. Canonical correlations were used to analyse the infrastructure of the first factors of the three schema-specific memories. The items of pictoriality and personal involvement were correlated. Significant correlations were found in the memories related to situations of neglect and subordination. As far as the memories of emotionally inhibiting situations are concerned, this correlation could be proven in a multiple regression.

Introduction

Identity is rooted in autobiographical memories. These "self-defining memories" (Singer & Salovey, 1993; Singer & Blagov, 2004) contain open conflicts and are characterized by emotional intensity, liveliness and interpersonal issues; they are repeated in inner, subvocal dialogues and thus linked to other memory contents in a coherent context. Similarly, Young et al. (2005) define a schema as a pattern that is grounded in autobiographical memories. It involves open and thus persistent frustrations from childhood and is characterized by intense emotions. These emotional and social schemata include, for example, emotional neglect, subordination and emotional inhibition (Roediger, 2011).

The issue of the specificity of autobiographical memories is clinically relevant.

Major depressions and traumatic events are linked to reduced specificity of memory or over-generalized memories. The tendency to brood, functional avoidance and a disturbance of executive functions are discussed as causes (Raes et al., 2006; Sumner 2012; Williams 1996; 2006; Williams et al., 2007).

On the one hand, autobiographical memories (Conway 2001; 2005; Conway and Pleydell-Pearce, 2000) contain a certain structure and, on the other hand, are generated or evoked by certain processes. The structural model involves a knowledge base and a self-memory system. The knowledge base comprises temporal epochs and intervals to which the life events are assigned. Different events are represented globally and abstractly or specifically and concretely. The self-memory system decides whether an event or an object is spontaneously recognized or remembered or must be searched for in the memory. The process model concerns the search or memory process. The retrieval model represents the search process. It begins with complex and abstract biographical topics and is oriented towards increasingly differential aspects and motivational and emotional clues.

The working self compares these emotional and motivational clues with the current emotional and motivational situation. If current and past affects match, the search process is terminated. The event has been remembered. If there are differences, a change of priorities is necessary. Interdependence between the structural and the process

models of autobiographical memories can be deduced from this theory, more specifically: the interaction between the knowledge base and the working self. The interdependence between the structural and the process models of autobiographical memories should be presented in the context of evaluating the level of concreteness and emotional intensity linked to autobiographical memories regarding motivational and social conflicts and emotional frustrations. This model does not allow to differentiate whether emotional and social schemata are remembered or evaluated in the same way or in different ways.

Empirical Part

Questions and Hypotheses

This study examines how autobiographical memories regarding episodes of emotional neglect, subjugation and emotional inhibition are evaluated. The autobiographical memories of these episodes are evaluated with given items.

- 1) Which factors impact the evaluations most?
- 2) Do these evaluation factors correlate among the schema-specific episodes?
- 3) Regarding the internal structure of factors, is there a correlation between the items within the factors?

The Experiment Procedure

The autobiographical memory test (AMT) was used for the experiment (Brittlebank et al., 1993). The participants have been asked to report life events as concretely as possible as triggered by stimuli presented. These reports can be recorded to be evaluated afterwards.

Participants

A sub-sample from a larger project was employed for the purposes of this study. A total of 13 individuals (n=13) from a larger sample were included in this study. They were students of psychotherapy sciences at the Sigmund Freud University of Vienna. The participants wished to remain anonymous; therefore, only approximate socio-demographic information is available. Their age ranged between 25 to 35 years. We strived to keep the numbers of female and male participants

approximately equal.

Variables

This study examines how autobiographical memories of schema-relevant episodes are evaluated. The *predictor variables* are the schemas “emotional neglect”, “emotional submission” and “emotional inhibition”. The participants had been instructed to report autobiographical memories of these schemas.

The *criterion variables* are items (Conway et al., 2001; Roth, 1967) employed to classify the memories of schema-relevant episodes. The items include the vividness of the memory image, personal relevance and emotional intensity of the episode and the frequency of its repetition as well as its repetition during the biography (see the appendix for a detailed description of the items).

Statistical Evaluation

The first question concerns the structure employed to evaluate the autobiographical memories of schema-relevant episodes. This question was investigated with a factor analysis using Varimax rotation.

The second question deals with correlations between the factors of evaluation. It was answered with a product-moment correlation.

The third question investigates the internal structure of the factors. It was examined with a canonical correlation.

Results

The first question:

Regarding the estimation of memories of episodes of *emotional neglect*, two factors emerged. These account for 73,052 % of the total variance. Factor 1 accounts for 49,027 %, and factor 2 accounts for 24,026 % of the rotated sum of the squared loadings. Items with double loadings from $\geq .35$ were not included in the interpretation.

Items with high loadings on factor 1 include the pictoriality, accuracy and personal involvement. Items with high loadings on factor 2 include the frequency of occurrence of these episodes.

Two factors were extracted with regard to the assessment of memories of episodes of *subjugation*. These account for 72,204 % of the total variance. Factor 1 accounts for 58,020 %, and factor 2 accounts for 14,184 % of the rotated sum of squared loadings. Items with double loadings from $\geq .35$ were not included in the interpretation.

Items with high loadings on factor 1 include the pictoriality, intensity, accuracy and personal involvement. As far as factor 2 is concerned, only one item shows a high loading; it includes the correspondence of the episode with the previous experience until present.

Two factors were extracted regarding the assessment of memories of episodes of *emotional inhibition*. These account for 71,523 % of the total variance. Factor 1 accounts for 47,125 %, and factor 2 accounts for 24,389 % of the rotated sum of squared loadings. Items with double loadings from $\geq .35$ were not included in the interpretation.

Items with high loadings on factor 1 include personal importance, intensity and accuracy. Factor 2 loads items like the consistency of the episode with previous experience and the frequency of individual preoccupation with it.

If a one-factor solution were postulated, it would explain 67,384 %, 75,848 % and 62,753 % of the total variance for the individual schema-relevant episodes. The item loads range from .549–.953 for memories of emotional neglect, .741–.839 for memories of submission, and .357–

.9456 for memories of emotional inhibition. The items of this general factor include the vividness, complexity and accuracy of the memory, personal significance and self-centredness, emotional intensity and the frequency of occurrence.

The characteristics of this general factor do not differ significantly between the different schema-relevant episodes ($F=.057$; $df=2$; 22; $p=.945$).

The second question:

The correlations of the first factors between the memories of schema-relevant episodes are as follows:

Factor 1 of emotional neglect correlates with factor 1 of subjugation $r=.699$ ($p=.000$). Factor 1 of emotional neglect correlates with factor 1 of emotional inhibition $r=.600$ ($p=.001$). Factor 1 of submission correlates with factor 1 of emotional inhibition $r=.689$ ($p=.000$). The factors of personal involvement and the vividness of memories correlate across all three episodes of the schemas.

The third question:

The answer to the first question implies that the general factor does not differ between schema-relevant episodes. The answer to our third question is to shed light on the structure of this general factor. Do items that express personal and emotional involvement correlate with the items of the pictoriality and accuracy of the memory image within the first factor?

The general factor comprises the items (a), (b), (c), (d), (e), (i) and (j). To answer this question, the items (a), (i) and (j) were assigned to set 1. These items were used to assess the conciseness and vividness of the memory image. Items (b), (c) and (e) were assigned to set 2. These items were used to assess the emotional intensity and the personal relevance of the memory image.

Wilks statistics shows a significant canonical correlation in the canonical correlation analysis of the factor of *emotional neglect*.

Canonical correlations							
	Correlation	Eigenvalue	Wilks-statistic	F	Df1	Df2	sig.
1	.994	84,962	.010	10,720	9,000	17,187	.000
2	.327	.119	.866	.298	4,000	16,000	.875
3	.174	.031	.970	.282	1,000	9,000	.608

The Wilks test assumes as H_0 that the correlations in the current and following lines are zero.

The analysis of the canonical correlations shows negative loadings. The negative loadings can be interpreted as a “compensatory” relationship between the variables (see Holz-Ebeling, 2017). The less precise and vivid the picture is, the less intense and the less affected the individual is by the event.

Set 1 Canonical loadings			
Variable	1	2	3
Item a	-.719	.218	.660
Item i	-.679	-.706	.201
Item j	-.967	.232	.107
Set 2 Canonical loadings			
Variable	1	2	3
Item b	-.533	-.134	-.835
Item c	-.932	-.346	.107
Item e	-.969	.244	-.028

The different signs between the charges and in factor analysis and canonical correlation could be based on a moderator effect (Bühner & Ziegler, 2009) of variable (e) on variable (j). In this effect, a relationship between two variables is altered by the influence of a third variable.

The Wilks λ statistics show a canonical correlation as significant in the canonical correlation analysis of the factor of *subjection*.

Canonical correlations							
	Correlation	Eigenvalue	Wilks-statistic	F	Df1	Df2	Sig.
1	,943	7,983	,065	3,971	9,000	17,187	,007
2	,616	,612	,582	1,245	4,000	16,000	,332
3	,250	,066	,938	,598	1,000	9,000	,459

The Wilks test assumes as H0 that the correlations in the current and following lines are zero.

Set 1 Canonical loadings			
Variable	1	2	3
Item a	-,904	,423	,056
Item i	-,853	-,150	-,499
Item j	-,910	-,412	,058

Set 2 Canonical loadings			
Variable	1	2	3
Item b	-,996	-,091	-,013
Item c	-,964	-,041	,262
Item e	-,669	-,734	,113

The negative charges can also be interpreted as a “compensatory” relationship between the variables (Holz-Ebeling, 2017). The less precise and vivid the picture is, the less intense and the less affected the individual is by the event.

The Wilks λ statistics do not show a canonical correlation as significant in the canonical correlation analysis for the factor of *emotional inhibition*.

Canonical correlations							
	correlation	Eigenvalue	Wilks-statistic	F	df	df	sig.
1	,932	6,577	,104	2,523	9,000	14,753	,055
2	,462	,271	,784	,452	4,000	14,000	,770
3	,054	,003	,997	,024	1,000	8,000	,881

The individual significance (item e) is the only significant predictor ($R=.717$; $F=10,571$; $df=1,10$, $p=.009$) for item j (the agreement with other memories). The relevance (item b) is the significant predictor ($R=.916$; $F=52,002$; $df=1,10$, $p=.000$) for vividness (item a).

The internal structure of the assessments of autobiographical memories of subordination and neglect is characterised by a compensatory relationship between personal relevance and pictoriality of the memory image. The estimations of the memories of inhibition are shaped by the subjective relevance.

Conclusions

The assessments and evaluations of autobiographical memories can be summed up into a single factor of pictoriality and personal meaning. This factor underlies the evaluation of memories of different emotional injuries.

The “internal structure” of this global evaluation factor differs in the memories of various emotional situations. Emotional neglect and episodes of subordination are characterized by a synchronous down-

regulation of emotional involvement and pictoriality. The situations of emotional inhibition are influenced only by the individual emotional involvement. These two components do not down-regulate each other.

This result is consistent with the assumption of an interaction between a retrieval model and a working self by Conway & Pleydell-Pearce (2000) and Williams (1996; Williams et al., 2007). Memory processes always take place in the retrieval model and always begin on an abstract level. The search process aimed at identifying an event takes into account increasingly differential and concrete features. However, the search process is always evaluated by the working self with regard to motivational and emotional aspects. Memories of aversiveness trigger fear and a corresponding evaluation in the working self, i.e., termination of the search process on an abstract level, as each concretization intensifies the fear.

The autobiographical foundation of schemata is a scientifically and therapeutically relevant issue. This approach could be followed up with the protocol analyses of the memory reports. The evaluations reflect a conscious and explicit attitude towards the biography, and the linguistic analyses of the linguistic protocols provide an insight into unconscious and implicit attitudes.

This research approach to autobiographical memories of autobiographically shaped schemata also enables a complex experimental approach. This allows for the investigation of process characteristics of memory, their correspondence with structural features of memory and the effects of habitual schemata and attitudes (Conway et al, 2001).

This research approach to autobiographical memories of autobiographically shaped schemata also allows for a neurophysiological approach. A study by Conway et al (2001, 516f) showed that autobiographical memories were constructed in frontal networks and maintained and developed in detail in posterior networks. Holland et al. (2011) stipulated that specific memories were constructed in prefrontal and medial temporal areas, whereas general memories were constructed mainly in the right prefrontal cortex.

References

1. Brittlebank, A. D. Scott, J. Williams, J. M. G. Ferrier, I. N. (1993). Autobiographical memory in depression: State or trait marker? *British Journal of Psychiatry*. 162, 118–121.
2. Bühner, M. & Ziegler, M. (2009). Statistik für Psychologen und Sozialwissenschaftler. München: Pearson Studium
3. Conway, M. (2001). Sensory-perceptual episodic memory and its context: autobiographical memory. *Philosophical Transactions of the Royal Society London B*, 356, 1375 – 1384.
4. Conway, M.A. (2005). Memory and the self. *Journal of Memory and Language*, 53, 594 – 628.
5. Conway, M.A. & Pleydell-Pearce, C.W. (2000). The Construction of Autobiographical Memories in the Self-Memory System. *Psychological Review*, 107, 261 – 288.
6. Conway, M. A., Pleydell-Pearce, W. & Whitecross, S.E. (2001). The Neuroanatomy of Autobiographical Memory: A Slow Cortical Potential Study of Autobiographical Memory Retrieval. *Journal of Memory and Language*, 45, 493 - 524.
7. Holland, A.C., Donna Rose Addis, D. R. & Kensinger, E.A. (2011). The neural correlates of specific versus general autobiographical memory construction and elaboration. *Neuropsychologia*, 49, 3164–3177. doi:10.1016/j.neuropsychologia.2011.07.015.
8. Holz-Ebeling, F. (2017). Erfolg und Misserfolg beim selbstregulierten Lernen. Münster: Waxmann.

9. Raes, F., Hermans, D., Williams, J. M.G., Beyers, W., Brunfaut, E. & Eelen, P. (2006). Reduced Autobiographical Memory Specificity and Rumination in Predicting the Course of Depression. *Journal of Abnormal Psychology*, 115, 699 -704.
10. Roediger, E.(2011). *Praxis der Schematherapie*. Stuttgart: Schattauer
11. Roth, E. (1967). *Einstellung als Determination individuellen Verhaltens*. Göttingen: Hogrefe.
12. Singer, J. A. & Blagov, P. (2004). The Integrative Function of Narrative Processing: Autobiographical Memory, Self-Defining Memories, and the Life Story of Identity. In: D. R. Beike, J. M. Lampinen & D. A. Behrend (Eds.). *The Self and Memory*. New York: Psychology Press, 117–138.
13. Singer, J. A. & Salovey, P. (1993). *The Remembered Self.- Emotion and Memory in Personality*. New York: The Free Press.
14. Sumner, J. A. (2012). The mechanisms underlying overgeneral autobiographical memory: An evaluative review of evidence for the CaR-FA-X model. *Clin Psychol Rev*. 32, 34-48. doi:10.1016/j.cpr.2011.10.003.
15. Williams, J.M.G. (1996). Depression and the specificity of autobiographical memory. In: D.C. Rubin (Ed.). *Remembering our past*. Cambridge University Press, 244 – 267.
16. Williams, J. M.G. (2006). Capture and rumination, functional avoidance, and executive control (CaRFAX): Three processes that underlie overgeneral memory. *Cognition and Emotion*, 20, 548 – 568.
17. Williams, J.M.G., Barnhofer, Th., Catherine, C., Hermans D., Raes, R., Watkins, E. & Dalgleish T. (2007). Autobiographical Memory Specificity and Emotional Disorder. *Psychological Bulletin*, 133, 122 – 148.
18. Young, J.E., Klosko, J.S. & Weishaar, M. E. (2005). *Schematherapie – Ein praxisorientiertes Handbuch*. Paderborn: Junfermann