# Overgeneral Memory Retrieval and Ineffective Problem-Solving in Depressed Patients with Suicidal Ideation: Implications for Therapy

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## ABSTRACT

The present study was designed to extend our knowledge around cognitive aspects of memory retrieval and problem-solving in two groups of clinically depressed patients. We administered an autobiographical memory test, a means-ends problem-solving task, Beck Depression Inventory, and Beck Hopelessness Scale to measure respectively level of specificity in memory retrieval, problem-solving effectiveness, depression and hopelessness in clinically depressed patients with suicidal ideation and in a matched control group of depressed patients without suicide ideation. Both groups met DSM-IV criteria for major depression disorder without psychotic features. The depressed suicide-ideators were significantly more hopeless than their non-ideator counterparts. Also an overall tendency was found for the ideator group to retrieve less specific memories compared to the non-ideator group. Depressed patients' bias toward negative memory retrieval is broadly documented. Access to non-specific memories in depressed people can lead to ineffective problem solutions and subsequently hopelessness. By this account, this very vicious cycle continues over time to resonate powerfully, perhaps leading to suicidal attempt. An emergence of suicidal ideation when assessing helps clinicians identify those who are most at risk for suicide. They can be targeted then for intensive therapy designed to lower the risk.
*Key words*: depression, suicide ideation, autobiographical memory, problem-solving.

## RESUMEN

El presente estudio se diseñó con el propósito de ampliar el conocimiento acerca de los aspectos cognifivos de la recuperación de memoria y la solución de problemas en dos grupos de pacientes con depresión: pacientes con ideación suicida y pacientes sin ideación suicida. Ambos grupos cumplían los criterios DSM-IV para el trastorno de depresión mayor sin características psicóticas. Se administraron a los participantes una prueba de memoria autobiográfica, una tarea de solución de problemas, el Inventario de Depresión y la Escala de Desesperanza de Beck, para medir el nivel de especificidad en la recuperación de recuerdos, la efectividad en solución de problemas, depression and hopelessness. Los ideadores suicidas puntuaron significativamente más alto en desesperanza que los no ideadores. Se encontró una tendencia global en el grupo de ideadores a recuperar menos memorias específicas en comparación con los no ideadores. Se discuten los resultados de acuerdo al conocido sesgo en la recuperación de memorias negativas en pacientrs depresivos y la emergencia de la ideación suicida como identificador de riesgo para el suicidio..
*Palabras clave*: depresión, ideación suicida, memoria autobiográfica, solución de problemas.

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An underpinning mechanism supported by empirical findings in the field of cognitive psychology emphasizes an association between memory retrieval and problem-solving (e.g. Williams & Hollan, 1981). Impaired access to sufficient specific information from the personal memory database results in ineffective problem-solving strategies, which in turn might lead to a failure in tackling stressful situations. That is, in order to solve a problem, one needs to have access to the information previously stored in a memory database. Shortage of data or lack of precise and specific material in this regard can cause failure in solving problems (including personal problems), and then result in hopelessness. Williams and Broadbent (1986) suggested that the tendency of people with parasuicidal thoughts to retrieve less specific autobiographical memories may precipitate a suicidal attempt. This probable relationship was later experimentally shown (Evans, Williams, O'Loughlin, & Howells, 1992; Goddard, Dritschel, & Burton, 1996, 1997; Sidley, 1997). In one previous research, we also found a significant correlation between autobiographical specificity retrieval and problem-solving effectiveness in depressed patients who had attempted suicide (Kaviani, Rahimi-Darabad & Naghavi, 2005).

This phenomenon is explicable through the hierarchical model of "descriptions" (Norman & Bobrow, 1979). This theory describes autobiographical memory as a hierarchy, with more general information higher in the hierarchy ("top"), and more specific information lower in the hierarchy ("down"). In order to retrieve specific events from the past, one, in normal situation, tries to use a "top-down" procedure using higher level, general descriptions, as intermediate stepladder to access to the lower level, specific material (Reiser, Black, & Abelson, 1985; see Rubin, 1996, for a review). However, in response to a given context, depressed patients seem to be unable to move fluently through the autobiographical memory hierarchy, and thus to reach the sufficient level of specificity (see Williams, 1996, for a review). In this way, in virtue of the assumption that depressed people tend to use their "upper layer" memory as a database to produce solutions to their personal problems (and presumably, due to lack of specific information in this layer), it might not give rise to producing effective and productive problem-solving strategies. There is an array of studies that stress the role of over-general autobiographical memory recall in poor problem solving (Evans *et al*., 1992; Goddard *et al*., 1996, 1997, 2001; Kaviani *et al*., 2005). By this account, a memory search for a specific event in depressed mind would be prematurely aborted, as only the upper, general description level has been reached rather than the lower, specific level that consists of particular place, time, person and situation details.

In a previous study (Kaviani *et al*., 2005), parasuicidal depressed patients retrieved overgeneral memories in response to positive, neutral and negative cue-words, and also produced impaired problem solving strategies. In line with explanations derived from previous studies by others (e.g., Williams & Broadbent, 1986; Evans *et al*., 1992; Kaviani *et al*., 2005), this in turn could exacerbate the severity of depression by itself resulting in a revolving cycle. By this account, this very vicious cycle continues over time to resonate powerfully, perhaps leading to a suicidal attempt. In fact, our previous study extended knowledge of the relationship between mood, suicidal behaviour, and cognitive functioning in a different cultural setting. However, we emphasised the necessity for further investigations to draw a more detailed picture of the complexity and extend these

findings to go beyond any simple account. One main question might arise here asking if on the depression severity continuum starting from no suicidal ideation through suicidal ideation to suicidal attempt there is a cut-off line to identify those who are at suicidal risk. We think the results may allow us to examine the ground for approaching this issue.

Applying an experimental paradigm identical to our previous work with people who attempted suicide, the present study was designed to extend our knowledge around cognitive aspects of memory retrieval and problem-solving in other groups of clinically depressed patients, including those with suicidal ideation and those without such thoughts.

We predicted that: (1) depressed patients with suicide ideation will retrieve less specific memories; and (2) in instances where depressed patients with suicide ideation do generate specific memories, it is hypothesized that they will take longer to retrieve, compared to performance of those without suicide ideation. Furthermore, we predicted that over general retrieval in autobiographical memory in the group with suicidal ideation would be positively linked, producing less effective strategies in problem solving, again compared with the comparison depressed group who did not show suicidal ideation. The results might allow us to draw on possible implications for therapeutic considerations which should be taken into account when treating depressed patients.

## METHOD

### Participants

44 participants were recruited from consecutive admissions referred to the clinic with emotional complaints. Those reported here were 20 depressed patients with suicide ideation (10 men, *average age*= 25.50; and 10 women, *average age*= 29.70), and 20 without suicide ideation (10 men, *average age*= 25.20; 10 women, *average age*= 28.70). They were matched for age (±5 years), sex and educational level and were between 18 to 45 years old. They met DSM-IV (American Psychiatric Association, 1994) criteria for Major Depressive Disorder without psychotic features. Diagnoses were made by consultant psychiatrists. All participants were screened for any background of neurological disorder, mental disorder (except depression) and drug abuse, which would have resulted in exclusion from the study. The criterion to split subjects into two groups was based on a clinical measure, the scale for Suicide Ideation (Beck, Rush, Shaw, & Emery, 1979, see next section). Four participants (3 males and 1 female), owing to the demographic mismatch, were excluded. Furthermore, the mean Scale for Suicidal Ideation (Beck, Kovacs & Weissman, 1979) scores in the group with non-suicidal ideation was 0.5 (range, 0 to 2), and in the -suicide ideation group was 8.6 (range, 5 to 12).

### Clinical Measures

Beck Depression Inventory (BDI) (Beck & Steer, 1984) and Beck Hopelessness Scale (BHS) (Beck *et al*., 1974) were used to measure depression and hopelessness respectively.

Also, in order to divide the depressed patients into suicidal ideation and non-suicidal ideation groups, the Scale for Suicide Ideation (SSI) (Beck, Weisman, Lester, & Trexler, 1979) was used. The SSI quantifies the intensity of current conscious suicide ideation (thoughts, wishes and plans to attempt suicide). This scale contains 19 three-choice questions graded in intensity from 0 to 2, with the maximum total score being 38. The subjects who scored 3 or more (based on the manual) were allocated in the suicidal ideation group; the researcher completed the SSI during a semi-structural interview. The positive intra-class correlation between the ratings of the experimenter and an independent, second rater showed a good inter-rater reliability ($r= 0.81$, $p <0.01$). The final scores used in analyses were the scores of the experimenter's.

### Experimental Measures

*Autobiographical Memory Test*. The same cue-word paradigm as previously used in the lab was used to assess autobiographical memory retrieval. This was a 15-cue-word task, including 5 pleasant, 5 unpleasant and 5 neutral Persian adjectives; the researcher presented the series of adjectives orally in a counterbalanced fashion. After presenting each word, participants had 1 minute to recall a specific personal memory. The time taken to start within the 60-second period was regarded as latency to response onset; if the subject did not retrieve a memory within this time limit, a 60-second time was recorded as the latency. The cue-words have been previously demonstrated to have a specific valence (see Kaviani *et al*., 2005).

The researcher and an independent judge (second rater) used an 11-point scale (from 0 as "very over general" to 10 as "very specific") to rate Specificity-Over generality. To rate the subjects' responses, the two judges used a checklist (including items specifying time, place, persons, objects and situation in a given memory). The intra-class correlation between ratings of the two judges was highly significant ($r=.79$, $p <0.01$). The final scores used in data analysis were the experimenter's ratings. Means-End Problem-Solving Task: A culturally modified task, similar to that presented by Platt and Spivak (1975), and the same as used in our previous study, were applied. They were five different situations (each consisted of a story with a stated need and desired need). After presenting each story, the participant was asked to complete the middle part of the story so that the protagonist would achieve the desired outcome. Latency (first word of response), number of means (including both relevant and irrelevant means), relevancy ratio (number of relevant means/number of means) and means effectiveness were scored in the present study. The two judges quantified effectiveness based on the criteria mentioned by Evans *et al*. (1992) on a three-point scale (0= "not at all"; 1= "effective"; 2= "very effective" with the maximum total score being 10). The experimenter's' scores were used in the final data analysis. The intra-class correlation between the ratings of the two judges was highly significant ($r= .77$,  $p <0.01$).

*Procedure*

Patients referred to a psychiatric out-patient clinic in Tehran were interviewed and screened on the basis of the inclusion and exclusion criteria. The target participants then read and signed an informed consent form (2 declined to participate). First the clinical measures and then the experimental tests and tasks were administered. The assessments were conducted by the experimenter. Total testing time for the experimental part of the study varied 25-40 min. The assessments were audio-taped. An independent judge blind to participants conditions (group allocation) then listen to the tapes and re-rated all variables rated by the researcher. The second rater was blind to the participants' scores and diagnosis.

Approval for the study was granted by the Research Ethics Committee at the Tehran University of Medical Sciences (TUMS). Prior to inclusion in the experiment, participants signed an informed consent form containing information about research procedure details and participants right to withdraw at any time during the experiment.

## RESULTS

A t-test was performed to compare the scores on BDI and BHS in the two groups. Depression levels were higher in the suicidal ideation group (*mean*= 35.00) than the non-suicidal ideation group (*mean*= 30.59), though the difference did not reach significance ($p$ <0.07). However, the level of hopelessness was significantly higher in the suicidal ideation group (*mean*= 11.50) than the non-suicidal ideation group (*mean*= 7.15) ($t_{19} = 3.40$, $p < 0.01$).

A three-way [2 (Group: suicidal ideation, non-suicidal ideation) × 3 (Valence: pleasant, neutral, unpleasant) × 2 (Sex: men, women)] multivariate repeated measures analysis of variance (Wilk's Lambda) was performed to analyze (separately) the data on latency and specificity, using depression and hopelessness scores as covariates. If there was any group interaction effect, the data in each group was separately subjected to a two-way multivariate repeated measures analysis of variance, followed by polynomial contrast tests (assessed by t) on the valence effect (ordered pleasant-neutral-unpleasant). Moreover, to detect further the differences between pleasant/unpleasant and neutral cue-words, a series of paired t-tests was conducted.

The analyses showed no significant main or interaction effect for sex variable. There was not any significant effect for the data on latency. The statistical analysis yielded a significant valence × Group interaction effect [$F_{(2,17)}= 6.13$, $p$ <0.01] for data on memory specificity. Separate analyses for either group revealed significant valence effects [(Suicidal Ideation: $F_{(2,17)}= 3.82$, $p$ <0.05; non-suicidal Ideation: $F_{(2,17)}= 4.170$, $p$ <0.05] with a linear trend for the suicidal ideation group ($t= 3.15$, $p$ <0.01) and a quadratic trend for the non-suicidal ideation group ($t= 1.99$, $p$ <0.05). No significant interaction effects were observed for the covariates in the analysis. That is, in general, those with suicidal ideation tended to retrieve over general information whilst the non-
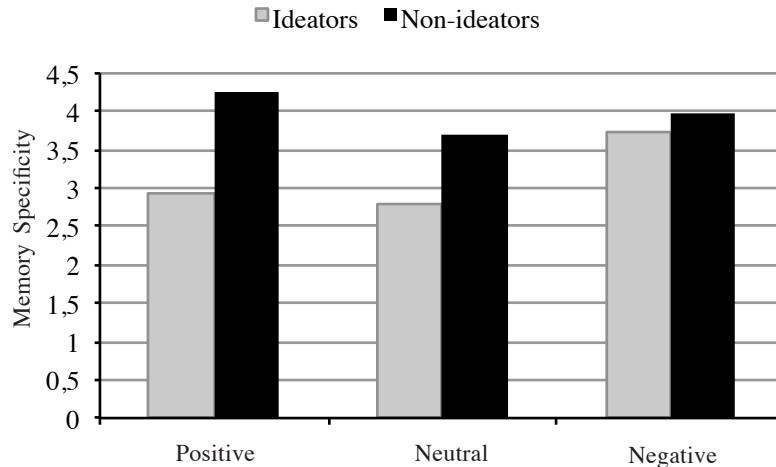
*Figure 1*. Specificity of autobiographical memories in response to the cue-words
in the ideator and non-ideator groups.

suicidal ideation group tended to retrieve more specific information from their memory
(See Figure 1). Supplementary analyses showed that the suicidal ideation group retrieved
more specific memories in response to negative cue-words ($t_{19}= 2.91$, $p <0.01$) compared
to its own neutral condition; and the non-suicidal ideation group retrieved more specific
memories in response to positive cue-words ($t_{19}= 3.07$, $p <0.01$), again compared to
its own neutral condition. However this difference is more pronounced for the positive
cue-words for those with suicidal ideation who produced much less specific responses
to positive cues.

In order to detect the differences between the two groups on problem-solving
performance, a series of paired t-tests was conducted (see Table 1 for details). The
latency difference in the two groups was not statistically significant. A marginally
significant difference was observed for relevancy ratio between the suicidal ideation and
non-suicidal ideation groups. The solutions produced by those with suicidal ideation
were less effective than those produced by those without suicidal ideation ($t_{19}= 2.14$, $p
<0.05$). Neither main nor interaction effect was found for sex factor.

To detect the associations between the cognitive and clinical variables, the
Pearson's correlation method for either group and for all participants was conducted.
No significant correlations appeared in each group. However, when all subjects were

*Table 1*. Statistics on problem-solving measures.

|  | Groups | df | Average (SD) |  | T | p |
|---|---|---|---|---|---|---|
| *Effectiveness* | Ideator<br>Non-ideator | 19 | 3.20 (2.02)<br>4.45 (2.19) |  | 2.14 | 0.046 |
| *Relevancy ratio* | Ideator<br>Non-ideator | 19 | 0.70 (0.27)<br>0.83 (0.17) |  | 1.88 | 0.07 |
| *Latency (seconds)* | Ideator<br>Non-ideator | 19 | 17.35 (13.56)<br>12.15 (5.95) |  | 1.53 | ns |

considered together, four significant correlation coefficients were observed: memory specificity was negatively correlated with memory latency and positively correlated with problem-solving effectiveness and relevancy ratio; relevancy ratio was also positively correlated with effectiveness (Table 2). Moreover, depression and hopelessness were negatively ($p$ <0.01) correlated with specificity, effectiveness and relevancy ratio.

*Table 2.* Pearson's correlations (*r*) and statistical signification (*p*) between autobiographical memory and problem-solving across entire sample (*n*= 40).

|   |   | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | Memory *Specificity* | - 0.55 < 0.001 | 0.42 < 0.01 | 0.40 < 0.01 | -0.65 < 0.01 | -0.71 < 0.01 |
| 2 | Memory *Latency* | | 0.19 n.s. | - 0.06 n.s. | 0.12 n.s. | 0.09 n.s. |
| 3 | Problem-solving *Relevancy Ratio* | | | 0.76 < 0.001 | -0.56 < 0.01 | -0.61 < 0.01 |
| 4 | Problem-solving *Effectiveness* | | | | r = -0.57 < 0.01 | -0.64 < 0.01 |
| 5 | BDI | | | | | 0.69 < 0.001 |
| 6 | BHS | | | | | |

## Discussion

This study followed our previous attempt to examine the relationship between autobiographical memory and problem-solving deficits of people who had attempted suicide, detecting further such deficits in another subgroup of depressed patients, i.e., with or without suicide ideation. The experiment was designed to find out if the levels of depression and hopelessness, and also the existence of suicidal thinking, related to the defected cognitive processes in these two groups, as observed for memory retrieval and problem-solving of people who attempted suicide; and if the differences in these cognitive aspects varied linearly across the suicidal ideation axis.

The current study further replicates our previous findings. The results showed that the depressed participants with suicidal ideation were significantly more hopeless than those without suicidal ideation. Also, an overall tendency was found for those with suicidal ideation to retrieve less specific memories compared to those without suicidal thoughts. Moreover, those with suicidal ideation were more specific in response to negative cue-words, while those without suicidal ideation were so in response to positive cue-words, both relative to their own neutral conditions.

The distinction between the two groups performance, however, is most pronounced for memory specificity in response to positive word cues. Depressed patients' bias toward negative memory retrieval is broadly documented (e.g., Bower, 1981; Clark & Teasdale, 1982; Williams & Broadbent, 1986). This finding is consistent with the constructs accessibility view (e.g. Bower, 1981), which proposes that depression is associated

with increased accessibility to negative constructs. This view has been supported by experimental works showing a pattern of mood-congruent recall; depressed individuals are more likely to recall negative rather than positive experiences (Blaney, 1986; Parrott & Sabini, 1990). However, there exist findings from some other studies which confirm a reverse pattern (e.g., Teasdale, Taylor, Cooper, Hayhurst, & Paykel, 1995).

Other studies have suggested that the memory changes were not mood driven. For instance, Williams, Teasdale, Segal, & Soulsby (2000) conducted mindfulness-based cognitive therapy (MBCT) to examine the possible effect of group-based training on autobiographical memory. Since MBCT includes a certain in-session and out-session tasks to focus more specifically on environment, and to allow thoughts and images to occur without trying to avoid or suppress them, it has a potential to reduce the tendency for overgeneral retrieval. The findings of their study indicated that when recovered depressed patients undertook the MBCT group training, they retrieved more specific memories compared to those who did not receive this training. They additionally found this effect independent of depression variable.

This explanation is clearly not consistent with significant correlation quotients observed in the present results and a series of previous studies (e.g., Evans *et al*., 1992; Kaviani *et al*., 2005), showing that there are positive associations between depression with both over general memory retrieval and ineffective problem solving solutions. This fact leaves open the possibility that autobiographical memory retrieval in depressed patients may be mood-state dependent. We suggest, future studies should be designed in a way that further detection of such a discrepancy would be possible.

Furthermore, compared to participants without suicidal ideation, Suicide-ideators provided less effective and fewer relevant problem-solving strategies. This is consistent with the findings we found in our previous research for (depressed) suicide-attempters (Kaviani *et al*., 2005). Some researchers (e.g. Evans *et al*., 1992) previously asserted that people with serious difficulty in retrieving specific memories also have great difficulty in providing effective problem-solutions. The present findings support the hypothesis that the inability to retrieve specific information (which is largely needed for producing problem-solving strategies) from memory database, could give rise to inadequacy for providing effective solutions. However, it should be emphasized that this finding can not be seen as a support for a causal link.

The positive correlations between specificity in autobiographical memory retrieval with relevancy ratio and effectiveness in problem-solving further support this hypothesis; having access to over-general information facilitates frustration in problem-solving, then probably resulting in hopelessness, and therefore suicidal ideation. Those with suicidal-ideation, who participated in the present study, were more hopeless than those without suicidal ideation. Hopelessness has been described as generalized negative expectations of the future (Beck *et al*., 1974), as one of the most critical risk factors for suicide in clinical populations (Joiner, Brown, & Wingate, 2005), and also as a good predictor of suicide in in-patients (Beck, Steer, Kovacs, & Garrison, 1985) and out-patients (Brown, Beck, Steer, & Grisham, 2000). Hopelessness can even be seen as playing a more crucial role in suicide than depressed mood (for more details, see: Truant, O'Reilly, & Donaldson, 1991).

One of the primary intentions of the present study was to examine whether the results has potentially any important clinical implications. One might suggest that the pathway between different variables in the current research (i.e., depression, hopelessness, overgeneral retrieval, ineffective problem solving), would act as a vicious cycle, perhaps leading to suicidal ideation and eventually suicidal attempt. It can be called a suicide cycle as depicted graphically in Figure 2. However, this is broadly consistent with a conjoint effect of all variables in a spiral aggravating manner. However, describing the results in terms of a suicide cycle might require further sophisticated tests which should be addressed in future experiments.
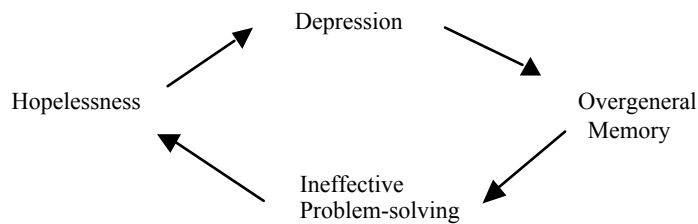


*Figure 2*. Clinical and cognitive variables in a hypothetical suicide cycle.

Comparing the present results with those from our previous report (Kaviani *et al*., 2005), one might notice the similar patterns of performance on cognitive tasks between suicide-attempters (previous report) and suicide-ideators, on one hand, and between non-depressed participants (previous report) and suicide non-ideators, on the other hand. It is by this comparison that one might (from an assessment point of view) suggest a critical cut-off line on a given continuum which (from a therapy point of view) drops the ideators and attempters under the same category. Consistent with these results, an emergence of suicidal ideation during assessment might be regarded as a possible cut-off line to identify high-risk individuals for suicide. Therefore, this useful method of assessing suicidal ideation can help clinicians identify those people who are most at risk for suicide. They can be targeted then for intensive therapy and care designed to lower the risk. There are studies and reviews concluding that psychological interventions can significantly prevent the risk of suicide (Hepp, Wittmann, Schnyder, & Michel, 2004; Brown, Have, Henriques, Xie, Hollander, & Beck, 2005; Mann, Apter, Bertolote *et al*., 2005). That is, once the assessment reveals that the depressed patients experience suicidal thoughts, the same therapeutic actions should be taken into account as applied for the treatment of suicide-attempters.

In this study, women are approximately 3.5 year older than men on average. This may be seen as a matter of concern suggesting that it would make a difference as males under this age seem to be more susceptible to get into risky behaviour such as suicide. The age range was 18-45 yrs, not including people under 18 (children and adolescents). However, the age differences in both groups are comparable (women are older than men in both ideator and non-ideator groups) bearing in mind no gender differences were found. With this in mind, still one can argue that it might be regarded

as a limitation and should be addressed in future studies. Furthermore, the limited number of participants in each group ($N= 20$) might also be the source of argument and future studies may have to take this potential limitation into account.

It should be emphasized that in association with the suicide cycle and its clinical implications suggested earlier in this article, caution should be observed when extrapolating since the cross-sectional structure of the design applied in the present research has its own limitations.

Finally, although the present report aimed to extend our knowledge of the association between cognitive aspects of depression and suicide-ideation in a different clinical setting, further investigations are required to clarify the probable cause or effect roles of each and to draw a more detailed picture of the complexity.

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