# The effects of imagery on problem-solving ability and autobiographical memory

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ABSTRACT

Williams et al. (2006) found that increased imageability of cue words during an autobiographical memory task increased specificity of autobiographical memory (ABM) and improved subsequent social problem-solving (SPS). This study explored whether imagery during SPS improved SPS skill, perceived SPS ability, and the specificity of ABMs retrieved in the process of SPS in dysphoric students. Additionally, this study hypothesised that both memory specificity and perceived SPS ability would positively correlate with SPS skill. Dysphoric and non-dysphoric students solved hypothetical social problems on a modified version of the Means-End Problem-Solving task with a verbal or an imagery focus. Participants also completed a questionnaire about ABMs retrieved during SPS and rated their perceived effectiveness of their solutions. Contrary to Williams et al. (2006), the imagery focus did not improve SPS skill or influence perceived effectiveness. Additionally, in contrast to the hypothesis, the imagery group retrieved more overgeneral memories. Finally, ABM specificity did not correlate with SPS skill. However, dysphoric participants perceived specific memories to be significantly less helpful to SPS whereas non-dysphoric participants perceived specific memories to be helpful potentially supporting work on over-general ABM and functional avoidance.

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## 1. Introduction

Depressed individuals demonstrate deficits in social problem-solving (SPS) (Goddard, Dritschel, & Burton, 1996). These deficits are especially important in depression, as being unable to adequately solve a particular social problem might perpetuate a depressive episode and render an individual more vulnerable to suicide (Williams, Barnhofer, Crane, & Beck, 2005). Nezu (2004) describes social problems as current or foreseeable situations that call for a response that is adaptive but might not be immediately apparent. These problems can be interpersonal in nature (problems that involve two or more individuals) such as an argument with a friend or intrapersonal (problems that are self-focused) such as the stress of preparing for an exam. SPS utilizes both cognitive and behavioural processes that develop and integrate solutions that either modify a situation or a person's emotional reaction to the situation thereby reducing negative as well as promoting positive consequences (D'Zurilla & Nezu, 1999).

Questions arise as to why depressed individuals show this particular deficit. Within the SPS literature, Nezu (2004) suggest that two major factors influence a person's ability to successfully solve social problems. The first factor is problem orientation, which refers to the general attitudes that individuals hold about the problems they face, and their own SPS ability as defined by their set of cognitive-affective schemas (D'Zurilla & Nezu, 1999). When examining self-perceived problem-solving in a longitudinal study, Priester and Clum (1993) reported that participants with a positive problem orientation, that is more positive views of their own problem-solving skills, were less susceptible to feelings of stress, depression, and hopelessness after encountering stressful events, than individuals who had a negative problem orientation and held more negative views of their problem-solving skill. Furthermore, problem orientation is a predictor of depression symptomatology because individuals with depression symptoms show both a more negative and less positive problem orientation (Anderson, Goddard, & Powell, 2009; Becker-Weidman, Jacobs, Reinecke, Silva, & March, 2010; Kant, D'Zurilla, & Maydeu-Olivares, 1997; McMurran & Christopher, 2009; Priester & Clum, 1993; Siu & Shek, 2010).

The second component is problem-solving skill or the ability to move through the appropriate steps to adequately solve a problem, which include: 1) defining the problem; 2) generating potential solutions; 3) deciding on a specific solution; and 4) implementing the solution (Nezu, 1987). One measure commonly used to assess SPS skill is the Means-End-Problem-Solving Task (MEPS; Platt, Spivack, & Bloom, 1975). The MEPS gives hypothetical interpersonal problem scenarios and asks participants to describe the relevant steps they would take to solve each problem. Solutions are

scored on overall effectiveness and the number of relevant steps taken to solve the problem. The evidence for depression related SPS skill deficits utilising the MEPS is robust (Goddard et al., 1996, 2001; Marx, Williams, & Claridge, 1992; Maurex et al., 2010; Watkins & Baracaia, 2002; Watkins & Moulds, 2005). Depressed individuals, as compared to matched controls, provide fewer relevant steps for generating a solution, and the solutions tend to be less effective overall.

One factor associated with SPS skill performance is the ability to retrieve memories of past experiences. In particular, remembering specific memories, i.e., memories for events that occurred at a particular time and place, is associated with enhanced SPS performance (Goddard et al., 1996). In contrast, the retrieval of general, categoric memories, i.e., memories of abstract, groups of experiences, is associated with poorer, less effective SPS solutions. Williams et al. (1996) suggest that retrieving specific memories in the SPS process is imperative as previous memories provide an elaborative database of potential steps or solutions an individual might want to use when solving a problem. Indeed Goddard et al. (1996) found that the effectiveness of SPS on the MEPS was positively associated with the retrieval of specific memories during SPS for controls and negatively associated with greater categoric retrieval in the clinically depressed participants.

If autobiographical memory (ABM) deficits are influencing SPS, then increasing specificity of ABM should improve SPS skill. One avenue of research to explore in light of this possibility is imagery. Williams, Healy, and Ellis (1999) found that easily imageable cues were more likely to elicit specific autobiographical memories than non-imageable cues when the Autobiographical Memory Test (AMT) was employed. Their finding suggests that imagery is an important mediator in recalling specific autobiographical memories (Williams et al., 1999). Furthermore, Williams et al. (2006) explored the connection between imagery, specificity of ABM, and SPS skill. They asked participants without depression to perform the AMT using both words high and low in imageability. After completing retrieval of three words either high or low in imageability, participants solved a problem on the MEPS. In correspondence with the findings of Williams et al. (1999), highly imageable words were more likely to elicit specific memories than low imageable words. Additionally, solutions to problems in the MEPS after these highly imageable words were more effective than solutions produced after retrieving memories to the low imageable words. These studies suggest that there is a connection between imagery, ABM, and SPS ability. However, Williams et al. (2006) did not look at memories *spontaneously* produced during SPS. The first aim of this study is to extend Williams et al. (2006) by examining the influence imagery has *during* the process of problem solving on SPS skill. It is hypothesized that imagery (imagining the full scenario) will increase the number of specific memories retrieved whilst problem-solving and this specificity will relate to an improvement in solution effectiveness and the number of relevant means generated. It is hypothesized that imagery will improve SPS skill across all groups, since Williams et al. (2006) found improvements in SPS in non-dysphoric participants after retrieving more specific memories to highly imageable cues. However, the impact of imagery will be greater for dysphoric participants as they will retrieve fewer specific memories and be poorer problem-solvers at baseline and therefore have more room for improvement.

Additionally, as problem orientation is an important component in SPS ability, the second aim of the study is to explore how imagery will influence problem orientation. Problem orientation will be assessed through participants' ratings of their own solution effectiveness. It is hypothesized that problem orientation will be more positive after utilizing imagery whilst completing the MEPS tasks. Specifically, participants' ratings of their solutions' effectiveness

will increase. Previous studies indicate that imagining positive outcomes increases positive affect and positive interpretation biases compared to verbal processing of the same material (Holmes, Lang, & Shah, 2009). Like the materials Holmes et al. (2009) utilize, the problems on the MEPS all end with positive outcomes, thereby encouraging the use of positive imagery.

The final aim is to explore the concept of memory helpfulness. Goddard, Dritschel, and Burton (2001) state that in assessing the relationship between memory specificity and SPS it is important to consider how relevant and helpful specific memories are in solving a particular problem. Williams et al. (1996) suggest that specific memories are inherently more helpful than general memories because they provide more detailed information. However, there is evidence that specific negative intrusive memories are also a feature of both dysphoria and depression (Moulds, Kandris, Williams, & Lang, 2008; Patel et al., 2007) and may be potentially hurtful to the SPS process. Therefore it is important to assess the helpfulness of specific memories across both dysphoric and non-dysphoric groups to explore any potential differential associations that might exist.

## 2. Method

### 2.1. Participants

Twenty-nine dysphoric (25 females, 4 males, age: $M = 22.14$, $SD = 8.16$) and 29 non-dysphoric (23 females, 6 males, age: $M = 18.88$, $SD = 0.77$) participants were included in the study. Participants in the dysphoric group scored 15 and above on the Beck's Depression Inventory-II and participants in the non-dysphoric group scored eight or below. Dozois, Dobson, and Ahnberg (1998) recommend that scores of 12 and below on the BDI-II correspond to non-depressed individuals and that scores of 13 and above correspond to dysphoria. Considering these recommendations, this study incorporated more conservative criteria for differentiating the groups. Individuals in the two groups were further randomly allocated into the imagery and verbal conditions. The Ethical Committee of the University of St Andrews approved the study.

### 2.2. Materials

#### 2.2.1. Beck Depression Inventory-II (BDI-II; Beck, Steer, Ball, & Ranieri, 1996)

The BDI-II is a commonly used self-report questionnaire that measures depressive symptoms from the past two weeks though a set of 21 statements.

#### 2.2.2. State and Trait Anxiety Index (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983)

The STAI is another self-report questionnaire that measures state and trait anxiety. The STAI-S measures state anxiety through 20 statements where participants must rate on a 4-point scale how they feel 'right now' 'at this moment' from *not at all* to *very much so.* The STAI-T measures trait anxiety through 20 statements where participants must rate on a 4-point scale how they 'generally feel' from *almost never* to *always.*

#### 2.2.3. Means End Problem Solving (MEPS; Platt & Spivack, 1975)

Each vignette begins with a problem and then gives the resolution. Participants are required to describe the steps they would take to solve the problem in order to achieve the happy ending described. A modified version of the MEPS was utilised, which incorporates more multi-dimensional problems consisting, for example, of both interpersonal *and* intrapersonal problems. The