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Prospective and positive mental imagery deficits in dysphoria

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ABSTRACT

We know less about positive imagery than we do about negative mental imagery in depression. This study examined the relationship between depressed mood and the subjective experience of emotion in imagined events; specifically, prospective imagery, and imagery in response to emotionally ambiguous stimuli. One hundred and twenty-six undergraduates completed measures of depression, imagery vividness for future events, and a homograph interpretation task in which they generated images and subsequently rated image pleasantness and vividness. As predicted, compared to low dysphoria, high dysphoria was associated with poorer ability to vividly imagine positive (but not negative) future events. These findings were augmented by the observation that high dysphorics provided lower pleasantness ratings of images generated in response to homographs they interpreted as positive. We suggest that an imbalance in the inability to vividly imagine positive but not negative future events may curtail the ability of high dysphorics to be optimistic. High dysphoric individuals are further disadvantaged: even when they interpret ambiguity positively, the resulting images they generate are associated with less positive affect. Therapeutic strategies that address both such positive-specific imagery biases hold promise for depression treatment innovation.

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Introduction

While high levels of negative mental imagery in the form of intrusive memories have been found in depression (Carlier, Voerman, & Gersons, 2000; Kuyken & Brewin, 1994, 1999), we know little about positive mental imagery in the context of depressed mood. MacLeod and colleagues have argued that depression is associated not just with an excess of negative cognitions, but with a deficit in processing positive information (MacLeod & Byrne, 1996; MacLeod, Byrne, & Valentine, 1996; MacLeod & Cropley, 1995; MacLeod, Tata, Kentish, & Jacobsen, 1997). In particular, they have proposed that depression is associated with reduced levels of positive future-directed cognitions. In support of this proposal, compared to non-depressed controls, suicidal depressed patients have more abstract (i.e., less image-based) representations of the future (Williams et al., 1996). The inability to be specific about the future is key to Williams' model of suicidality (Williams, 2001). Yet suicidal individuals can experience (negative) prospective vivid intrusive imagery of committing suicide (Holmes, Crane, Fennell, & Williams, 2007).

One way in which we think about the future is to imagine; that is, to mentally simulate future events (Markman, Gavanski, Sherman, & McMullen, 1993). Examining the association between imagery and psychopathology, Stöber (2000)

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asked healthy volunteers to imagine positive (e.g., “you will make good lasting friendships”) or negative (e.g., “you will fall badly behind in your work”) future-oriented scenarios. Participants then rated the qualities of their images, such as vividness. As predicted, depressed mood (but not anxiety) was correlated with reduced imageability of positive, but not negative, future events. By comparison, in another non-clinical sample, [Bywaters, Andrade, and Turpin \(2004\)](#) found that depressed mood was associated with increased imagery vividness in picture recall, for both negatively and positively valenced stimuli. Methodological differences may account for these discrepant findings. Specifically, it is possible that the recall of vivid imagery from pictures (e.g., [Bywaters et al., 2004](#)) differs from the generation and recall of novel vivid future-oriented imagery in response to short verbal scenarios. The relationship between positive imagery and depression therefore remains unclear, and [Stöber’s](#) results require replication and methodological extension. We sought to do this, and predicted that high levels of dysphoria would be associated with a poorer ability to vividly imagine positive (but not negative) future events. In addition, in a methodological extension of [Stöber \(2000\)](#) we included a measure of the tendency to use mental imagery in everyday life, in order to exclude the possibility that any differences detected could be accounted for by practise effects in using imagery.

Given that our broad interest was in the subjective experience of emotion in imagined events, in addition to examining emotional prospective imagery, we also investigated imagery generated in response to interpretations of ambiguous stimuli. Why consider imagery for emotionally biased interpretations in dysphoria? We are constantly confronted with ambiguity in daily life. Depression has long been proposed to be associated with negative biases in interpretation; that is, the tendency to resolve ambiguity in a negative rather than a benign manner ([Beck, 1976](#)). This idea remains a cornerstone of cognitive therapy for depression. However, despite suggestive results (e.g. [Nunn, Mathews, & Trower, 1997](#); [Rude, Wenzlaff, Gibbs, Vane, & Whitney, 2002](#)), conclusive evidence for interpretation bias in depression is rare (see [Bisson & Sears, 2007](#)). A notable exception is [Lawson, Macleod, and Hammond’s \(2002\)](#) study that used an eye blink response to ambiguous words. Further, [Mogg, Bradbury, and Bradley \(2006\)](#) found a negative interpretation bias in depressed patients on a homophone task, but not on a text comprehension task.

Such results encourage the further examination of emotionally biased interpretations and depressed mood. When confronted with ambiguity, one way to resolve the interpretation is to imagine the outcome. Studies of depressive interpretation bias have rarely examined imagery. However, in line with [Hirsch, Clark, and Mathews’ combined cognitive bias hypothesis \(2006\)](#), the search for an interpretive bias can be combined with an investigation of the presence of biases for negative or less positive imagery. One tool with which to do this is provided by the methodology of [Hertel, Mathews, Peterson, and Kintner \(2003\)](#). These investigators presented homographs such as “blow” (which could be interpreted as blow as in breath, or blow as in punch) and instructed participants to imagine and describe the outcome. In the current study, we assessed the binary interpretation of the homographs (categorised by independent raters as either positive or negative) and predicted that more negative interpretations would be associated with high dysphoria. However, given that our study was driven by an interest in the subjective experience of emotion in imagined events, we were particularly interested in the subjective ratings of emotionality of the images participants generated in response to their interpretations. In line with the deficits posited in positive processing in depression discussed above, we predicted that dysphoria would be associated with reduced subjective ratings of the pleasantness of images, even if the homographs had been interpreted by the participant as positive. That is, dysphoria may not simply be associated with a greater likelihood of interpreting homographs as more negative, but may be correlated with lower ratings of *pleasantness* of images generated in response to positively interpreted homographs.

The current study was conducted over the internet. Evidence for the utility of web-based surveys to examine mental imagery generation is provided by [Libby, Shaeffer, Eibach, and Slemmer \(2007\)](#). In a web-based study, these investigators successfully manipulated participants’ visual perspective of an imagined future event and observed changes in subsequent behaviour. In summary, we sought to replicate [Stöber’s \(2000\)](#) findings that high levels of dysphoria would be associated with a poorer ability to vividly imagine positive future events, and that this pattern would be independent of the general tendency to use mental imagery. Second, we predicted that high levels of dysphoria would be associated with less pleasant ratings of mental images formed in response to ambiguous homographs that had been positively resolved.

Method

Participants

The study was conducted in Oxford. The 126 participants were 49 males and 77 females recruited at the University of Oxford, with a mean age of 22.6 years ($SD = 3.2$). Participants were recruited via e-mail within the university with a link to the web-based survey. An incentive was offered to complete the survey—entering a cash prize draw of approximately \$100. On the basis of BDI-II scores, a subgroup of participants were categorised as high ($BDI-II \geq 14$; $N = 33$) or low ($BDI-II \leq 6$; $N = 45$) dysphoric.

Measures and procedure

The Bristol Online Surveys (BOS, 2007) software was used to create the web-based survey. Participants gave their informed consent on-line, and then completed all questionnaires in the following order:

Beck Depression Inventory-second edition (BDI-II; Beck, Steer, & Brown, 1996).

The BDI-II is a self-report measure with strong internal consistency of .93 with college students and .92 with psychiatric outpatients (Beck et al., 1996).

Spontaneous Use of Imagery Scale (SUIS; Reisberg, Pearson, & Kosslyn, 2003)

The SUIS measures the tendency to use imagery in everyday life. This questionnaire consists of 12 items, for example: “When I think about a series of errands I must do, I visualize the stores I will visit”. Each item is rated on a 5-point scale, ranging from 5 “If a description is always completely appropriate” to 1 “if it is never appropriate”.

Prospective Imagery Task (PIT; based on Stöber, 2000)

Participants were asked to form a mental image of 10 negative future scenarios and 10 positive future scenarios. The scenarios comprised the subjective probability items used by MacLeod et al. (1996) and included events such as “You will have a serious disagreement with your friend” or “You will do well on your course”. Each image was rated for vividness on a continuous 5-point Likert scale anchored at each point from (1) *no image at all*; (2) *vague and dim*; (3) *unclear but recognisable*; (4) *moderately vivid*; and (5) *very vivid*.

Homograph Interpretation Task (HIT; Hertel et al., 2003)

The homograph interpretation task was used to index interpretation bias. Participants were asked to form a mental image of 16 negative/positive homographs such as “break” (as in broken/rest) or “sentence” (as in prison/phrase). Participants received the following instructions: “Please quickly form a mental image of each of the following words. The mental image should include yourself. Please describe the first image that comes to mind in one sentence”. Responses were typed into a box. An example was given of the cue word “beach” and accompanied by the response “I am walking along a beach in summer.” In addition, participants were asked to make judgements about the images produced. Similar to Hertel et al. (2003), participants rated how vivid their image was (“How vivid is your image?”) on a Likert scale from 1 (*not at all vivid*) to 7 (*extremely vivid*). They subsequently rated on a Likert scale how pleasant they found their image (“How pleasant is your image?”) from 1 (*extremely unpleasant/negative*) to 9 (*extremely pleasant/positive*).

Two judges (psychology students) who were blind to participant characteristics (i.e., dysphoric status) evaluated a random sample of eight participants’ descriptions of homographs. Following a similar classification system to that used by Hertel et al. (2003), they classified the usage of the homographs as positive, negative or ambiguous “based on the context provided by the sentence (e.g., respectively for the homograph battery: I read about the assault and battery/I bought a new battery for my car/I saw the battery)” (p. 779). Average agreement between the two raters was 93%. Any disagreement between the raters was clarified and agreed upon by both raters. Rater 1 then categorised the remaining descriptions. Mean pleasantness and vividness scores were calculated for the two valenced interpretation categories; i.e., for descriptions independently categorised as (1) positive interpretations or (2) negative interpretations. This yielded four scores for each participant, namely: pleasantness positive; pleasantness negative; vividness positive; vividness negative.

Results

Means and standard deviations for self-report measures are presented in Table 1. The high and low dysphoric groups did not differ in age, $t(76) = 1.00, p = .32$, or gender, $\chi^2(1, N = 78) = 1.85, p = .17$. Independent samples *t*-tests indicated that compared to the low dysphoric group, the high dysphoric group reported more vivid negative prospective imagery, $t(76) = 2.42, p = .03, d = .49$, and less vivid positive prospective memory, $t(76) = 2.78, p = .007, d = .48$, on the PIT. The groups did not differ in the use of imagery as indexed by the SUIS, $t(76) = 1.23, p = .22$, establishing that any differences were not merely a function of between-group differences in a pre-existing tendency to spontaneously use mental imagery.

Correlations were conducted across the total sample and for high and low dysphoric groups separately in order to examine the interrelationship of mood and the vividness of types of prospective memory (i.e., positive, negative) elicited by the PIT. Across the total sample, there was a positive association between the vividness of positive and negative prospective imagery ($r[124] = .32, p < .001$). BDI-II was positively correlated with vividness of negative prospective imagery ($r[124] = .20, p = .02$), and inversely correlated with vividness of positive prospective imagery ($r[124] = -.31, p < .001$). We repeated these correlations for the high and low dysphoric groups separately. For the low dysphoric group, there was a positive association between the vividness of positive and negative prospective imagery ($r[43] = .42, p = .004$). By comparison, within the high dysphoric subsample, there was no such association between negative and positive prospective imagery ($r[31] = .16, p = .37$). In addition, for the low dysphoric group, there was no association between BDI-II scores and the vividness of negative ($r[43] = .18, p = .23$) or positive ($r[43] = -.13, p = .40$) prospective imagery. For high dysphoric participants, there was no association between BDI-II and the vividness of negative imagery; however,

Table 1

Means and standard deviations for self-report measures for both high and low dysphoric groups

	High dysphoric (N = 33)		Low dysphoric (N = 45)	
	M	SD	M	SD
BDI- II	20.52	7.61	3.24	2.06
SUIS	3.32	.67	3.13	.69
PIT				
Positive imagery vividness ratings	3.05	.52	3.49	.80
Negative imagery vividness ratings	3.29	.56	2.92	.79
HIT rater categorizations				
Number of positive interpretations	10.39	2.01	10.53	1.82
Number of negative interpretations	4.69	1.91	4.60	1.59
HIT subjective imagery pleasantness ratings				
Positive interpretations	5.44	.87	5.95	.84
Negative interpretations	3.13	1.42	3.33	1.01
HIT subjective imagery vividness ratings				
Positive interpretations	5.16	.68	5.25	1.13
Negative interpretations	4.87	.98	4.73	1.36

Note: BDI-II = Beck Depression Inventory-II; SUIS = Spontaneous Use of Imagery Scale; PIT = Prospective Imagery Task—positive and negative subscales; HIT = Homograph Interpretation Task.

interestingly, there was a significant inverse relationship between BDI-II and the vividness of positive imagery ($r[31] = -.42, p = .02$).

We also compared high and low dysphoric participants' generation of imagery on the homograph interpretation task; first, for independent categorisation of interpretation (i.e., those classified by the two independent raters as being either positive or negative), and second, for average vividness and pleasantness of the images of positively and negatively interpreted homographs (i.e., participants' own subjective ratings for each of the two types of interpretation). High and low dysphorics did not differ in terms of the number of descriptions that were independently categorised as positive, $t(76) = .32, p = .75$, or negative, $t(76) = .24, p = .81$, interpretations. Similarly, there was no difference between these groups in the vividness ratings of the images generated in response to negatively interpreted, $t(76) = .50, p = .62$, or positively interpreted, $t(76) = .45, p = .68$, homographs, nor in their pleasantness ratings of images generated in response to negatively interpreted homographs, $t(76) = .67, p = .51$. However, high dysphorics rated their images of *positively* interpreted homographs as significantly less pleasant than the low dysphorics, $t(76) = 2.65, p = .01, d = .73$. Thus, while high dysphoric participants were as capable of generating vivid images of positive material as low dysphorics, these images did not have the same subjective affective impact as they did for their low dysphoric counterparts.

To further explore the relationship between mood and performance on the homograph task, we carried out additional correlations between BDI-II and the vividness and pleasantness ratings of the positively and negatively interpreted homographs. Across the total sample, the only significant association was an inverse relationship between BDI-II and the pleasantness of positively interpreted homographs ($r[124] = -.26, p = .003$).

Discussion

Our goal was to extend the previous finding of an association between depression and reduced imagery for future positive events. This association was examined in three ways using the Prospective Imagery Task. First, in accord with Stöber (2000), across our total sample, higher depression scores (BDI-II) were associated with reduced vividness of positive prospective imagery and the generation of more vivid negative prospective imagery. Furthermore, our use of a larger sample than in Stöber's original study permitted us to conduct these correlations within high and low dysphoric groups separately, and we observed a significant inverse relationship between BDI-II and the vividness of positive imagery. Second, a comparison of these two groups demonstrated that high dysphoric participants reported more vivid negative prospective imagery and less vivid positive prospective imagery than their low dysphoric counterparts. That is, compared to the low dysphorics, the high dysphorics were not compromised in their capacity to generate images of the future per se—indeed, their future negative imagery was more vivid, consistent with the observation of vivid imagery of suicidal planning in depression (Holmes, Crane et al., 2007). However, the high dysphorics were selectively compromised in their ability to generate positive prospective imagery. Third, within groups, the high and low dysphorics showed differential associations

for imagery valence on the Prospective Imagery Task. For low dysphoric individuals there was a positive association between the vividness of positive and negative prospective imagery, suggesting that this group was equally adept at generating vivid images of positive and negative future events. However, for high dysphorics, there was no equivalent association between the vividness of positive and negative prospective imagery. That is, despite being able to generate vivid images of negative future events, their imagery of positive future events was not equivalently vivid.

These findings suggest that high dysphorics have an imbalance in their perceived vividness of the imagined future according to emotional valence. Why would such an imbalance be important? The capacity to simulate the future in imagination is adaptive for evaluating future outcomes, judging their likelihood, and deciding on a plan of action (Markman et al., 1993; Schacter, Addis, & Buckner, 2007). Using imagery can increase the perceived probability that an imagined event will occur (Sherman, Cialdini, Schwartzman, & Reynolds, 1985) and increase the likelihood of action (Libby et al., 2007; ; Pham & Taylor, 1999). The more vivid the image, the more such effects are favoured (Gonsalves et al., 2004; Johnson, 2006); hence, more vivid prospective emotional images would be evaluated as being more likely to occur. Thus, high dysphoric individuals appear deficient in their capacity to imagine (or can only hazily “see”) positive future events in their mind’s eye, yet their images of negative outcomes are “crystal clear”. Such an imbalance would very likely compromise dysphoric individuals’ ability to be optimistic (Sharot, Riccardi, Raio, & Phelps, 2007). We propose a number of consequences of this positive-specific future imagery deficit. Specifically, high dysphorics may be less likely to think that future positive events will occur, may consider images of positive events in the future as less believable, and therefore be less likely to promote action in response to positive images, relative to their (more vivid) negative future images. Future research should examine these possibilities.

Our data suggests a prospective imagery imbalance for high but not low dysphoric participants, supporting the possibility that a positive-specific imagery deficit may be an important maintaining factor in depression. Indeed, the proposal of positive-specific deficits in depression has been advanced previously (e.g., Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004; MacLeod & Moore, 2000) and resonates with Williams’ claim that suicidal depressed patients lack positive imagery of the future (Williams, 2001). Our findings forward this line of argument by providing additional support for the notion that a positive-specific future imagery deficit characterises dysphoric individuals, and thus build on existing evidence of deficits in the subjective experience of emotion in imagined future events.

The prospective imagery findings were augmented by the other key result that high dysphoric participants rated the images that they generated in response to positively interpreted homographs as significantly less pleasant than did low dysphorics. Meanwhile, there was no equivalent effect for negatively interpreted homographs. That is, even when high dysphoric individuals made positive interpretations of ambiguous stimuli, they did not experience their resulting (positive) imagery as being as pleasant as did low dysphorics. Further, across the total sample, higher depression scores were associated with reduced pleasantness ratings for the positively interpreted homographs.

While our prediction that high dysphoric participants’ homograph interpretations would be categorised by raters as being more negative, this was not the case; rather, only the ratings of subjective pleasantness of images differed. A limitation of this study is that we used the homographs developed by Hertel et al. (2003) that were originally employed to index general negative threat interpretations. While we found some predicted results on this measure, more recently, Hertel and El-Messidi (2006) developed homographs that more precisely target self-relevant depression-related concerns. The latter homographs may more readily distinguish high and low dysphoric populations, and future studies should test this possibility. Future studies should also draw on the literature on imagery in the form of intrusive memories in depression (e.g., Williams & Moulds, 2007a, 2007b) and explore a range of features of imagery that are emerging as important in attenuating emotional impact (e.g., vantage perspective; Holmes, Coughtrey, & Connor, 2007).

Experimental psychopathology has long focused on deficits in autobiographical recall of the past (e.g., overgeneral memory phenomena) rather than on deficits for imagining the future. Schacter et al. (2007) highlighted the overlap in neural circuitry involved in autobiographical memory with that used for prospective imagining. D’Argembeau, Raffard, and Van der Linden (2008) recently demonstrated that patients with psychosis are characterised by a deficit for imagining the future. Sharot et al. (2007) emphasised the importance of imagining a positive future in developing an optimism bias. Our study provides a methodological alternative for the assessment of imagery biases. Rather than indirectly assessing imagery via rating verbal responses to word cues and for overgenerality (cf. the Autobiographical Memory Task used by D’Argembeau et al. (2008); see Williams et al. (2007), inspired by Stöber (2000) and Hertel et al. (2003), we directly invited the generation of imagery and used subjective ratings (vividness, pleasantness) of imagery itself.

Taken together, the current results suggest that high dysphoric individuals may be characterised by a lack of a positive mental imagery bias: both for future imagery and for imagery generated in response to positive resolutions of ambiguity. We propose that future interventions could benefit from targeting these deficits; for example, by using systematic procedures to encourage the generation of more vivid, prospective positive imagery. We found that even when dysphoric individuals successfully overcame negative interpretation biases and interpreted ambiguous information positively, these images were rated as less pleasant. Such findings suggest the utility of incorporating procedures that aim to boost the affect associated with imagery. Cognitive bias modification paradigms that promote mental imagery hold promise for adaptation to these specifications (e.g. Holmes, Lang, & Shah, in press; Holmes, Mathews, Dalgleish, & Mackintosh, 2006).

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