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Brief report

Does "feeling down" mean seeing down? Depressive symptoms and vertical selective attention ☆

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Abstract

Prior research reveals that the encoding of affective stimuli is biased in a metaphorically consistent manner (e.g., good = up; bad = down). For example, negative words are evaluated faster if they are presented in a low versus high vertical position. The present studies extended this view by investigating whether such biases also correlate with individual differences in emotional experience. Specifically, in two studies, we examined whether vertical metaphor would be useful in understanding negative affect as manifested in neuroticism and depressive symptoms. We found support for this premise. That is, the higher the neuroticism (Studies 1 and 2) or depressive symptoms (Study 2) of participants, the faster they were to respond to or detect lower (versus higher) spatial attention targets. These results suggest that negative affect in general, and depressive symptoms in particular, appear to bias selective attention in a direction that favors lower regions of physical space.

Keywords: Depression; Neuroticism; Affect; Metaphor; Attention

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1. Introduction

> "It's been awhile since I could hold my head up high."—From the song "It's Been Awhile" by *Staind.*

Metaphors often link affect to perceptual representation (Kövecses, 2000). Objects or emotions that are positive are considered to be light in color or high in vertical position as compared to objects or emotions that are negative. Specific to vertical position, people experiencing positive affect are said to be feeling "up" or "high" whereas people experiencing negative affect are said to be feeling "down" or "low." Indeed, one of the definitions for depression states that it is "a depressed or sunken place or part; an area lower than the surrounding surface" (Random House, 1996, p. 535). Common metaphors appear to consistently pair negative affect with a low vertical position.

1.1. Metaphor and representation

Why are metaphors for affect and sensory experiences (e.g., vertical position) so frequently used? Lakoff and Johnson (1999) suggest that abstract thoughts like affect are only possible because of our capacity for physical metaphor. Physical metaphors (e.g., up = good) allow us to communicate with other individuals who have similar physical experiences and perceptual organs. Without such a reference to physical experiences, Lakoff and Johnson (1999) claim, it would be difficult to convey abstract thoughts to others. In this sense, metaphors shape experience and allow experience to be communicated to others. Interestingly, such a physical representation process is largely unconscious, in this sense acting like a "hidden helping hand" facilitating representation (Lakoff & Johnson, 1999). Although the idea of metaphoric representation is somewhat controversial (Murphy, 1997), other psycholinguists do agree that metaphors are helpful in understanding abstract concepts like "affect" (Gibbs, 1994; Glucksberg, 2001; Kövecses, 2000).

In recent investigations, we have provided empirical support for the idea that the representation of affect seems to automatically depend on metaphor. In an initial investigation, we found that a manipulation of word brightness (black font versus white font) affected speed to evaluate negative and positive words (Meier, Robinson, & Clore, 2004). Specifically, we found that negative words were evaluated faster and more accurately when presented in a black (versus white) font, whereas positive words were evaluated faster and more accurately when presented in a white (versus black) font.

In a second investigation, we (Meier & Robinson, 2004) found that affect and vertical position also appeared to be linked in a subtle, but pervasive, manner. In Study 1, we found that positive words were evaluated faster when presented in a higher vertical position, whereas negative words were evaluated faster when presented in a lower vertical position. In Study 2, we extended these results by showing that the mere act of making a positive evaluation shifted selective attention upwards in visual space. By contrast, the mere act of making a negative evaluation shifted selective attention downwards in visual space. Study 2 from this paper suggests, in particular, that affect exerts a causal influence on vertical selective attention, such that positive affect shifts attention upwards, whereas negative affect shifts it downwards. The results, in total, support the idea that affective representation borrows from metaphors related to the verticality of affect (i.e., up = good; down = bad).

1.2. The present studies

In the present studies, we extend our research on word affect and physical metaphor to an analysis of individual differences in negative emotions. We were particularly interested in the question of whether depressive symptoms in particular, and negative affect in general, might be associated with a downwards bias in selective spatial attention. Although our prior studies (Meier & Robinson, 2004; Meier et al., 2004) are consistent with the idea that affect biases perception, our prior studies are also limited in the sense that they concerned only word affect and therefore might have little to say about longer-term affective states. Although popular culture often reinforces the connection between depressed feelings and biases in vertical selective attention (e.g., as suggested by the *Staind* song verse "It's been a while since I could hold my head up high"), there is very little research showing that more dispositional forms of affect, for example as pertaining to neuroticism, might also be associated with metaphor-consistent perceptions (e.g., seeing down). An investigation of such an association could advance our understanding of individual differences in affective experience in addition to the attentional and cognitive correlates of personality traits, which have been largely neglected within the field of personality (e.g., Robinson, Vargas, & Crawford, 2003).

1.3. Neuroticism and depressive symptoms

In Study 1, we examined whether dispositional negative affect might be associated with a downwards bias in selective attention. Although we did not measure depressed symptoms in both studies, we believed that neuroticism might be a reasonable analog of depressive symptoms because they often covary highly. Neuroticism, however, represents a broader construct as it tends to be associated with all forms of dispositional negative affect (Clark, Watson, & Mineka, 1994). People high in neuroticism, or negative affectivity (Watson & Clark, 1984), tend to report high levels of distress, anger, and depression. Another difference between neuroticism and depression is that neuroticism is more trait-like in nature than depression. Despite these differences between neuroticism and depression, the two constructs are empirically highly related (Clark et al., 1994). In Study 1 of the present investigation, we measured neuroticism. In Study 2, we sought to extend this analysis of negative affect by also examining depressive symptoms.

2. Study 1

In Study 1, we used a sequential categorization paradigm. In this paradigm, alternative trials forced individuals to attend to the center of the screen, thus insuring that performance reflected covert aspects of attention, which typically precede eye movements (Pashler, 1998). Immediately following such centering procedures, we presented visual targets on the top or bottom of a computer screen. We hypothesized that participants high in neuroticism would be faster to detect probes occurring in lower (versus higher) areas of visual space, whereas the opposite would be true among participants low in neuroticism.

2.1. Method

2.1.1. Participants

Participants were 24 undergraduate volunteers (8 males and 16 females).

2.1.2. Procedure

Participants wore headphones with a boom microphone. Participants categorized 10 words (5 flower words and 5 insect words) presented on the center of a computer screen one at a time. Participants were told that experimenters were interested in their ability to categorize while performing an intervening task. They were told that when a word appeared, their task was to determine as quickly and as accurately as possible if the word is a flower (say "flower") or insect (say "insect"). This task served to center visual attention prior to the spatial probe task. Immediately following this categorization (no preset delay), the letter "*q*" or "*p*" was randomly presented on the top or bottom of the computer screen. The letter appeared .5 in. from the top or bottom casing of a 17 in. monitor. Participants were instructed to quickly and accurately press the "*p*" key on the keyboard if the letter "*p*" was presented and to press the "*q*" key on the keyboard if the letter "*q*" was presented. If participants were inaccurate, the word "INCORRECT" appeared in red font for 1.5 s. Accurate trials were separated by a 500 ms blank screen. Participants categorized each of the 10 flower/insect words (and corresponding letter, *p*/*q*) 16 times for a total of 160 trials. Spatial probes occurred approximately 80 times on the bottom of the screen and 80 times on the top of the screen.

Following the task, participants completed Goldberg's (1999) neuroticism scale, which has shown good evidence for reliability and validity. For example, it correlates strongly ($r = .82$) with other well-known measures of neuroticism (e.g., the NEO; Costa & McCrae, 1992). An average neuroticism score was computed ($\alpha = .85$) after reverse scoring the negatively keyed items.

2.2. Results

The means and standard deviations for all variables are shown in Table 1. Inaccurate spatial probe trials were dropped from the analysis (3.6% of trials). Spatial probe latencies were log-transformed to normalize their distribution (Ratcliff, 1993). Because reaction time distributions typically contain outliers, we replaced trials that were 2.5 *SD*s below or above the grand latency mean (with the 2.5 *SD* value; 1.05% of latencies). We believed that neuroticism would correlate with vertical selective attention (i.e., a vertical bias favoring higher versus lower areas of the computer screen), but not with "speed" per se. In an initial analysis, we averaged across all (lower and higher) trials in the attention task and found no correlation with neuroticism, $r(24) = .180, p = .399$.

Table 1
Means and standard deviations for the variables assessed in Studies 1 and 2

Study	Variable	Statistic	
		M	*SD*
1 ($N = 24$)	Neuroticism	3.02	.66
	Up speed–down speed	−1.81 ms	33.72 ms
2 ($N = 28$)	Neuroticism	2.60	.79
	Beck depression inventory	6.92	5.48
	Up speed–down speed	19.68 ms	55.73 ms

To measure vertical selective attention, defined as a bias in favor of one region of space in comparison to another, we computed a differential measure of performance by subtracting the average *q*/*p* discrimination speed pertaining to lower spatial targets from the average *q*/*p* discrimination speed pertaining to higher spatial targets. Positive scores reflect the fact that participants were faster to lower spatial probes, whereas negative scores reflect the fact that participants were faster to higher spatial probes. We then screened for univariate outliers for both neuroticism and vertical selective attention scores using the criteria of Tabachnick and Fidell (2001; *z* scores in excess of 3.29 *SD*s). We did not identify any univariate outliers.

We sought to ascertain whether neuroticism might predict vertical selective attention scores. To investigate this possibility, we performed a regression analysis with neuroticism predicting vertical selective attention scores. The two variables were significantly related, $\beta(24) = .405$, $p = .050$. A scatterplot of this relationship is shown in the top panel of Fig. 1 (which uses millisecond rather than log-transformed difference scores to facilitate comprehension). As the figure indicates, the higher a person's level of neuroticism, the faster one was to detect spatial probes occurring within lower (versus higher) areas of visual space.

An astute reviewer noted, with reference to the top panel of Fig. 1, that one individual appeared to display a larger bias favoring higher regions of space relative to the other participants in the study. Although the individual in question was not an outlier, as reported above, it would seem somewhat useful to insure that the specific individual did not differentially contribute to the bivariate correlation relative to the other individuals in the study. To examine this question, we rank-ordered individuals with respect to their vertical attention scores (lowest = 1, second lowest = 2, etc.) and then correlated such rankings with neuroticism. Again, neuroticism predicted vertical attention scores, $\beta(24) = .411$, $p = .046$. In sum, the latter correlation reveals that the initial correlation reported in Study 1 did not capitalize on the abnormally high or low vertical attention scores of any of the individuals in the study.

2.3. Discussion

Study 1 revealed a significant relationship between neuroticism and vertical selective attention. Participants prone to experiencing negative affect were faster to attend to lower (versus higher) regions of visual space in comparison to participants less prone to

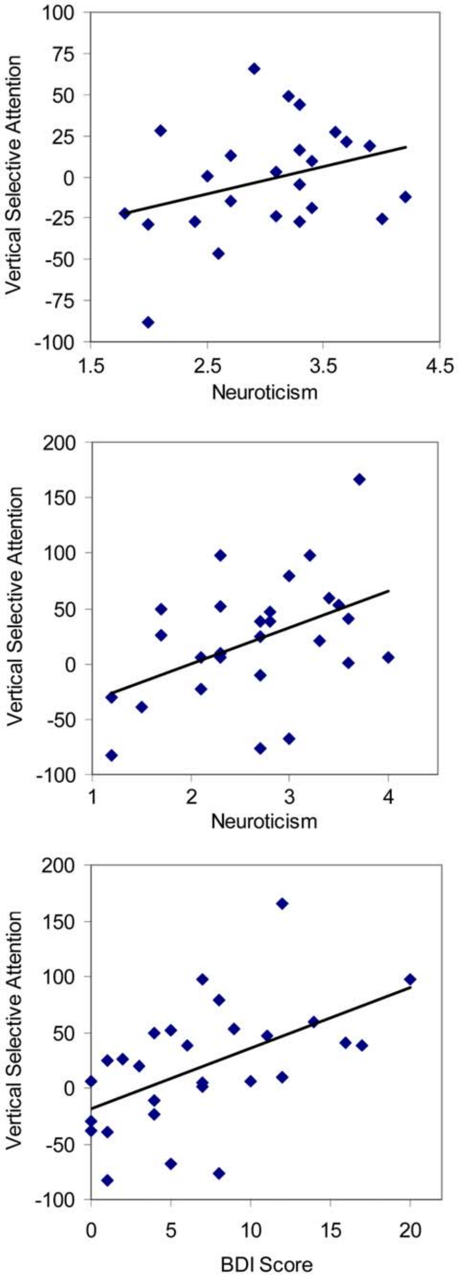

Fig. 1. Vertical selective attention scores (i.e., up speed–down speed) as a function of neuroticism in Study 1 (top panel), neuroticism in Study 2 (middle panel), and depressive symptoms in Study 2 (bottom panel).

negative affect. The results suggest that vertical selective attention may be useful in understanding individual differences in negative emotional experiences. We suspected that depressive symptoms, in comparison to neuroticism, may be even more strongly associated with a downward spatial bias because existing metaphors for depression so often reference vertical position (e.g., "down" or "low"). In Study 2, we examined vertical spatial attention as a function of both neuroticism and depressive symptoms.

3. Study 2

The data from Study 2 were gathered during a large data collection session. Some of the data from Study 2 contributed to an investigation on evaluative priming (Meier & Robinson, 2004). However, in that prior study, we did not examine individual differences, which are entirely novel to this report.

Because our interest in this prior study was in the priming effects of evaluations on vertical attention, the initial centering task in Study 2 involved evaluating words as positive or negative. Immediately following this evaluation, a spatial discrimination probe (the letter "*q*" or "*p*") appeared higher or lower on the screen. We hypothesized that participants high in neuroticism or depressive symptoms would be faster to detect probes in the lower (versus higher) spatial position, whereas the reverse would be true for participants low in neuroticism or depressive symptoms. We also hypothesized these effects might be somewhat particular to the experience of depressive symptoms (relative to levels of neuroticism).

3.1. Method

3.1.1. Participants

Participants were 28 undergraduate volunteers (10 males, 17 females, and 1 non-report).

3.1.2. Procedure

The details for Study 2 were identical to Study 1 with two exceptions. One, participants evaluated 100 positive (say "positive") and negative (say "negative") words instead of flower and insect words. Two, participants completed 100 total trials as opposed to 160 total trials.

Participants completed the neuroticism scale from Study 1 ($\alpha = .83$; Goldberg, 1999) and the 21-item Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979). The BDI is a commonly used and well-accepted measure of syndrome depression that has demonstrated good psychometric properties (Beck, Steer, & Garbin, 1988). A BDI score was computed by summing participants' responses to the 21 items ($\alpha = .85$).

3.2. Results

Inaccurate spatial probe trials were dropped from the analysis (4.8% of trials). Spatial probe latencies were then log-transformed to normalize their distribution

(Ratcliff, 1993). We next replaced trials that were 2.5 *SD*s below or above the grand latency mean (with the 2.5 *SD* value; 2.04% of latencies). Neither neuroticism [$r(28) = .038$, $p = .846$] nor depressive symptoms [$r(28) = .074$, $p = .708$] was related to average spatial probe speed. We therefore created a differential score of vertical selective attention by subtracting performance on low target trials from performance on high target trials. As in Study 1, we screened for univariate outliers for neuroticism, depressive symptoms, and vertical selective attention scores. We did not identify any univariate outliers.

We next performed two regression analyses with neuroticism and depressive symptoms predicting this selective attention score. As exhibited in the middle panel of Fig. 1, neuroticism was a significant predictor of vertical selective attention, $\beta(28) = .447$, $p = .017$. As in Study 1, the higher the neuroticism score of the participant, the faster the speed to detect lower (versus higher) spatial targets. As shown in the bottom panel of Fig. 1, a similar, yet stronger relation characterized depressive symptoms and vertical selective attention, $\beta(28) = .564$, $p = .002$.

As in Study 1, we then rank ordered the vertical selective attention scores to reduce the influence of any one vertical attention score. We then performed two regression analyses with neuroticism and depressive symptoms predicting this new (rank-ordered) measure of vertical selective attention. Neuroticism, $\beta(28) = .419$, $p = .026$, and depressive symptoms, $\beta(28) = .539$, $p = .003$, were both significant predictors of this rank-ordered measure of vertical selective attention.

The correlation between neuroticism and BDI scores was large, $r(28) = .656$, $p < .001$. Nevertheless, given that these two measures are distinct in a few ways (e.g., depression is a more state-like form of negative affect with more easily identifiable vertical metaphors), we sought to determine whether we could differentiate the effects of the two individual difference measures. We simultaneously entered neuroticism and BDI scores into a multiple regression analysis predicting vertical selective attention. This analysis suggested that depressive symptoms were more consequential for performance. Specifically, with both variables in the model, depressive symptoms remained a significant predictor of vertical selective attention, $\beta(28) = .475$, $p = .038$, whereas neuroticism did not, $\beta(28) = .136$, $p = .537$.

4. General discussion

One intriguing aspect of affect is its frequent association with metaphor. Such associations suggest that we might learn more about affective experience by focusing on perception. In a prior study (Meier & Robinson, 2004), we found that negative evaluations of stimuli biased selective attention in a downwards direction, consistent with metaphorical associations between negative evaluations and vertical position (e.g., Heaven is up and Hell is down). In the present study, we examined whether vertical metaphor might also provide an understanding of individual differences in the experience of negative emotions. As hypothesized, two studies revealed that selective attention was biased downwards among individuals high in neuroticism or depressive symptoms.

4.1. Implications for individual differences in selective attention

It is well-known that both trait and clinically anxious individuals selectively attend to threatening information in their environment (MacLeod & Rutherford, 1998; Mathews & MacLeod, 1994). This effect has occurred with a variety of populations and measures. Depressive symptoms, on the other hand, have not typically been associated with selective attention with regard to valenced information (Mathews & MacLeod, 1994). Results from prior studies have encouraged the view that depression relates more to elaborative, rather than attentional processes, whereas anxiety relates more to attentional, rather than elaborative, processes. The current results suggest that another form of selective attention might be correlated with depressive symptoms. Specifically, a tendency to direct covert attention downwards within visual space was a correlate of negative affect in general and depressive symptoms in particular. Although the present findings obviously deserve more systematic study before definite conclusions can be made, our findings suggest a possible role for selective vertical attention in the experience of negative emotional states.

4.2. Implications for individuals differences in affect

The current studies extend prior work on affective encoding and metaphor (e.g., Meier & Robinson, 2004) by revealing that trait and state sources of affect are also amenable to a metaphor-based analysis. Our findings are also consistent with recent theoretical attempts to explore body (Teasdale, 1993) and attention-related (Segal, Williams, & Teasdale, 2000) treatments for depression. The contention here is that physical experiences that are incompatible with depression (e.g., attending up) may actually decrease its intensity. In addition to having implications for treatment, our findings suggest that a systematic assessment of vertical attention may function as an implicit measure of individual differences in negative affect.

Although we have revealed a relation between vertical selective attention and depressive symptoms, our studies do not allow us to determine the causal direction or origin of such a relationship. However, some speculation along these lines seems useful. Considering the origin of the affect/attention relation, we view it likely that cognitive development is an appropriate starting point. For example, Tolaas (1991) contends that infants are basically helpless lumps of flesh. Most of an infant's time is spent lying on his/her back while looking up at a caregiver. This low vertical position necessarily means that rewarding stimuli—such as love, food, and social attention—overwhelmingly originate from higher vertical positions. In other words, a good portion of an infant's positive reinforcement arrives from above. As cognitive development matures, humans use this earlier sensorimotor scaffolding in developing abstract thought, as long recognized by developmental psychologists (e.g., Piaget & Inhelder, 1969). It should be no surprise, from such developmental perspectives, that adults use vertical position to express and represent affect (Meier & Robinson, 2004). Such considerations suggest that the association between affect and vertical position may develop early within one's sensory experiences, potentially providing a basis for later vertical attention metaphors within the verbal domain (Tolaas, 1991).

Considering causal direction, we believe that the relation is bi-directional. This view fits with what we know about sensorimotor relations to affect within the social domain. For example, Duclos et al. (1989) found that participants reported more sadness when adopting a slumped versus an upright posture. On the other hand, Wapner, Werner, and Krus (1957) found that happy (versus sad) participants exhibited an upward bias when horizontally bisecting a luminous square. These studies along with others (e.g., Neumann, Forster, & Strack, 2003) lead us to believe that the current relation between affect and vertical attention is bi-directional, with experiences within the perceptual domain reinforcing those within the emotional domain, and visa versa. Indeed, the robust relation ($\beta = .564$) between depressive symptoms and vertical selective attention in Study 2 supports such a contention.

5. Conclusion

Regardless of the underlying explanation for the current results, the idea that neuroticism and depressive symptoms could be predicted by a simple vertical selective attention task may have interesting implications for the implicit assessment of personality and emotion. On the basis of our results, it does seem that "feeling down" means seeing down.

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