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Finding Comfort in a Joke: Consolatory Effects of Humor Through Cognitive Distraction

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This study aimed to demonstrate that the cognitive demands involved in humor processing can attenuate negative emotions. A primary aspect of humor is that it poses cognitive demands needed for incongruency resolution. On the basis of findings that cognitive distraction prevents mood-congruent processing, the authors hypothesized that humorous stimuli attenuate negative emotions to a greater extent than do equally positive nonhumorous stimuli. To test this idea, the authors used a modified version of the picture-viewing paradigm of L. F. Van Dillen and S. L. Koole (2007). Participants viewed neutral, mildly negative, and strongly negative pictures, followed by either a humorous or an equally positive nonhumorous stimulus, and then rated their feelings. Participants reported less negative feelings in both mildly and strongly negative trials with humorous positive stimuli than with nonhumorous positive stimuli. Humor did not differentially affect emotions in the neutral trials. Stimuli that posed greater cognitive demands were more effective in regulating negative emotions than less demanding stimuli. These findings fully support Van Dillen and Koole's working memory model of distraction from negative mood and suggest that humor may attenuate negative emotions as a result of cognitive distraction.

Keywords: humor, emotion regulation, distraction, affective intensity

> A person without a sense of humor is like a wagon without springs—jolted by every pebble in the road.
>
> —Henry Ward Beecher

It is common for most people to experience humor as often able to elevate them above the grip of negative emotions. On a moody day, our friends try to cheer us up by telling funny anecdotes. After a rough day at work, we may watch a sitcom on TV to feel better. Indeed, a number of laboratory studies have shown that exposure to humor can support individuals in coping with negative feelings. These studies have typically contrasted the mood-repairing effects of a "humor treatment" (e.g., a stand-up comedy audio- or videotape) with a nonhumor treatment (e.g., a geography lecture) and no treatment. Compared with these control conditions, humor has been shown to reduce depressed feelings induced by a standard laboratory mood-induction technique (Danzer, Dale, & Klions, 1990). A study by Yovetich, Dale, and Hudak (1990) showed that humor reduced feelings of anxiety after participants were led to believe that they would receive a shock in 12 min (see Moran [1996] for a conceptual replication with state anxiety). In studies by Cann, Holt, and Calhoun (1999) and Cann, Calhoun, and Nance (2000), humor reduced negative mood after participants saw a stressful movie segment. Dienstbier (1995) observed that humor changed participants' perceptions of a task from boring to interesting.

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There are several mechanisms through which humor might benefit the recovery from negative events. First, the regulation of negative feelings might result from the positive emotions that accompany the experience of humor. There is ample empirical evidence that a general positive affect counteracts negative emotions (e.g., Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 2000). It is therefore conceivable that humor affects negative feelings in a way similar to nonhumorous positive emotions such as joy, happiness, and love. Alternatively, the mood-repairing effects of humor may be mediated by cognitive processes. Specifically, the ability to shift perspective and maintain a humorous outlook on life may enable individuals to distance themselves from negative situations (e.g., Dixon, 1980; Martin, Kuiper, Olinger, & Dance, 1993; Martin & Lefcourt, 1983). According to this perspective-taking view, humor should be most effective in reducing negative emotions when it matches the stressor, providing a way for individuals to reappraise the situation from a new and less threatening point of view (Lefcourt et al., 1995). In this article, we highlight an additional cognitive mechanism through which humor may exert unique beneficial effects on emotion regulation, namely cognitive distraction.

Distraction From Negative Affect

Recently, an interesting line of research emerged that studies the relation between cognitive distraction and the experience of negative feelings (e.g., Silvert et al., 2007; Van Dillen & Koole, 2007). The studies by Van Dillen and Koole (2007) were used as a framework for our study and are therefore particularly relevant. Their work takes as its point of departure that mood-congruent thoughts are an integral part of the experience of negative emotions. There is strong empirical support for the idea that negative stimuli evoke affect-congruent cognitions, even after the stimulus

is no longer present (e.g., Bradley, Cuthbert, & Lang, 1996). These negative thoughts often serve to maintain or even intensify the emotions that were experienced on exposure to the stimulus (Bradley et al., 1996; Siegle, Steinhauer, Thase, Stenger, & Carter, 2002). It thus follows that the prevention of negative thoughts through cognitive distraction could reduce people's emotional experience of a negative event. Van Dillen and Koole established this effect in three experiments. They presented participants with a series of neutral and negative pictures. After viewing each picture, participants performed a cognitively distracting task (i.e., a math problem), a less demanding task (i.e., a less demanding math problem), or no task and then reported their feelings. Participants reported less negative feelings after viewing negative pictures followed by a high cognitively demanding task compared with a low cognitively demanding task.

Several lines of research have indicated that humor comprehension requires attentional resources (e.g., Schmidt, 2002; Strick, Van Baaren, Holland, & Van Knippenberg, 2009). The primary aspect of humor that distinguishes it from nonhumorous positive emotions is that it includes an incongruity that must be resolved to get the joke (Goel & Dolan, 2001; Mobbs, Greicius, Abdel-Azim, Menon, & Reiss, 2003; Raskin, 1985; Suls, 1972). A typical joke contains a set up that causes perceivers to make a prediction about the likely outcome. The punch line violates these expectations, and perceivers look for a cognitive rule that makes the punch line follow from the set up. When this cognitive rule is found, the incongruity is resolved and the joke is perceived as funny. Neuroscientific evidence has supported this cognitive aspect of humor by showing that before activation of the brain's reward system (i.e., the affective response resulting from the perceived funniness of the joke), humor first activates brain areas that are associated with incongruity resolution (Goel & Dolan, 2001; Mobbs et al., 2003).

On the basis of these findings—that humor distracts attentional resources and that distraction plays an important role in the regulation of negative emotions—we hypothesized that humor may down-regulate negative emotions through cognitive distraction. In contrast to the perspective-taking account, this distraction account predicts a mood-repairing effect based on the cognitive effort involved in humor comprehension. Moreover, this view entails that humor facilitates emotion regulation, particularly when its content is unrelated to the stressor.

Present Research

To distinguish between the possible benefits of humor and other positive emotions, we tested the emotion-regulating effects of humor against a positive affect manipulation that was not humorous. This distinction between humor and other positive emotions has rarely been addressed in past studies on humor (Martin, 2007). We used a modified version of the paradigm developed by Van Dillen and Koole (2007, Experiment 1). Participants were presented with a series of neutral and negative pictures. After viewing each picture, they were either presented with a humorous stimulus or an equally positive nonhumorous stimulus and then reported their current feelings. To test a mechanism of distraction rather than perspective taking, the humorous and positive stimuli were all unrelated to the negative pictures to facilitate distraction from negative feelings. Henceforth, we refer to the nonhumorous positive condition as the *positive treatment* and to the humorous positive condition as the *humor treatment.*

It is important that the effect of distraction pertains specifically to the recovery from negative emotions. We therefore included a neutral control condition in which no negative affect was induced. We expected no differences in the emotion-enhancing effects of the two treatments in this neutral condition. Finally, we examined whether affective intensity and treatment would interact. Given that strongly negative stimuli use more cognitive resources than mildly negative stimuli (Schimmack, 2005), emotional changes after strongly negative pictures should be more attenuated by distraction than emotional changes after mildly negative pictures (Van Dillen & Koole, 2007). Because people may be aware of the beneficial effects of humor on their mental well-being, we provided a cover story to disguise the hypothesis under investigation.

Method

Pilot Studies of Positive and Humorous Stimuli

To generalize across different humor inductions, the treatment stimuli encompassed both pictures and sentences, covering a wide range of topics. Of the total of 42 treatment stimuli, 30 were pictures (15 different positive pictures and 15 different humorous cartoons) and 12 were sentences. The positive pictures were taken from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2001), and the cartoons were taken from various Internet sites. Because the cartoons contained captions, we also added captions to the positive pictures that merely described their content (e.g., "The young father holds his newborn baby in his arms"). The 12 sentences consisted of 6 positive sentences (e.g., "When two people are in love, they can live as cheaply as one") and 6 different semantic jokes (e.g., "Two can live as cheaply as one, but it costs twice as much"). The sentence structure and number of words per sentence were held constant across sentence types.

We conducted two separate pilot studies to verify that the treatment stimuli fitted our manipulation goals. These goals entailed that the humorous stimuli should evoke equally positive feelings as the positive stimuli, yet should be more humorous and more cognitively demanding to process. The first pilot study tested the emotional impact and humorousness of the stimuli. Fifty-three participants paced through all the pictures and sentences one at a time and indicated what feelings the stimuli evoked on a 7-point scale ranging from 1 (*very negative*) to 7 (*very positive*). They also indicated to what extent they found the stimuli humorous on a 7-point scale ranging from 1 (*not at all humorous*) to 7 (*very humorous*). Indeed, the humorous and positive stimuli evoked equally positive feelings (Ms = 4.76 and 4.80, respectively), $t < 1$, *ns,* but differed on humorousness (Ms = 5.21 and 2.14, respectively), $t(52) = 16.08$, $p < .01$.

The second pilot study measured the cognitive demands of the stimuli in two ways. First, we measured the processing time of the stimuli. Fifty-five participants processed all stimuli one by one at their own pace and were asked to continue with the next stimulus as soon as they felt they had understood it. Moreover, all participants engaged in a secondary task while processing the stimuli. Before each stimulus appeared on the computer screen, an eight-digit number was presented that they had to memorize during the

processing of the stimulus. Following the processing of the stimulus, a number again appeared on screen, and participants judged whether it was the same number that they had memorized during the processing of the stimulus. Both processing time and performance on the secondary task are valid measures of cognitive demands (Just & Carpenter, 1992; Van Dillen & Koole, in press). Indeed, the processing time of the humorous stimuli was, on average, longer than that of the positive stimuli (*M*s = 4,144 ms and 3,078 ms, respectively), $t(54) = 9.90$, $p < .01$. Moreover, the percentage of incorrect answers to the secondary task was higher, on average, when processing humorous stimuli than positive stimuli (*M*s = 26% and 14%, respectively), $t(54) = 8.86$, $p < .01$. The two indices of demandingness correlated significantly, $r(42) = .38$, $p < .01$. More important, the difference in task performance remained reliable after entering the difference in processing time between the positive and humorous stimuli as a covariate to the analysis.

Participants and Design

Ninety students took part in the experiment and received 3 euros ($3.98) in return (average age = 21.56 years; 15 men and 75 women. We found no gender effects across all analyses.) The experimental design was 2 (treatment: positive or humor; within participants) × 3 (picture negativity: neutral, mildly negative, or strongly negative; within participants). The main dependent variable was participants' self-reported feelings.

Procedure

The entire experiment was run on a personal computer. Participants first received an instruction that represented the cover story:

> This research examines the extent to which emotional experiences affect your perception of colors. Next you will be presented with a number of pictures, and you will be asked to answer some questions. Your task is to look at the pictures, and answer the questions.

The picture-viewing task that followed consisted of 42 trials. During the task, participants were presented with either neutral or negative pictures taken from the IAPS database. We selected three sets of pictures: neutral, mildly negative, and strongly negative. The 14 pictures representing the neutral set had normative IAPS ratings between 4.00 and 5.00 on a scale ranging from 1 (*most unpleasant*) to 9 (*most pleasant*). The 14 mildly negative pictures had IAPS ratings between 2.20 and 2.50. The 14 strongly negative pictures had IAPS ratings lower than 2.20. Negative pictures included scenes of physical assaults, car crashes, and drug addicts. Neutral pictures included scenes of traffic, geometric shapes, and neutral faces.

During each trial, a negative or neutral picture appeared on screen for 4 s. During half of the trials, participants saw a positive stimulus after viewing the picture. During the other half of the trials, participants saw a humorous stimulus after viewing the picture. In between the negative picture and the treatment, the screen turned blank for 1 s. During each trial, participants looked at one of the treatment stimuli for 8 s. Next, participants rated how unpleasant they felt at that moment on a 9-point scale ranging from 1 (*not at all*) to 9 (*very much*). Finally, to lend credibility to the cover story, participants rated on a 9-point scale how much they liked the color of a 3.94-in. × 3.94-in. (10 cm × 10 cm) square. Across the 42 trials, these squares were presented in seven shades of blue, red, and gray.[1] In between trials, participants were asked to relax for 4 s. Before the 42 experimental trials, participants first received two practice trials to become familiar with the task.

In the final part of the experiment, participants were asked to report their idea of the purpose of the experiment, the outcomes of the experiment, and any other comments. All participants reported that the experiment tested the influence of emotions on color perception. These responses indicated that our cover story had been successful.

Results

Humor and Emotion Regulation

To analyze the effects of treatment on emotions, we conducted a 2 (treatment) × 3 (picture negativity) analysis of variance (ANOVA) of participants' feeling ratings.[2] This analysis yielded a main effect of picture negativity, $F(2, 88) = 55.72$, $p < .01$, $\eta^2 = .56$. The relevant means are displayed in Table 1. As expected, contrast analyses revealed a linear effect of picture negativity, $F(1, 89) = 112.47$, $p < .01$, $\eta^2 = .56$. Participants reported most negative feelings after strongly negative pictures ($M = 3.49$), less negative feelings after mildly negative pictures ($M = 3.30$), and least negative feelings after neutral pictures ($M = 2.47$).

The ANOVA further yielded the predicted interaction between treatment and picture negativity, $F(2, 88) = 15.75$, $p < .01$, $\eta^2 = .28$. We proceeded by analyzing the effect of treatment separately for each picture negativity condition. Analysis of the neutral pictures yielded no effect of treatment, $t(89) = 1.08$, $p = .28$. In the negative trials, the analyses produced an effect of treatment for both the strongly negative and the mildly negative trials, *t*s(89) = 5.83 and 3.06, *p*s < .01, respectively. These effects indicate that across both strongly and mildly negative trials, participants reported less negative feelings in negative trials with humor than in negative trials with positive stimuli.

We also considered whether negative feelings after strongly negative pictures were more attenuated by humor than negative feelings after mildly negative pictures. A 2 (treatment: positive or humor) × 2 (picture negativity: mildly or strongly negative) ANOVA yielded a significant two-way interaction, $F(1, 89) = 9.87$, $p < .01$, $\eta^2 = .10$. In negative trials with the positive treatment, participants reported significantly less intense negative feelings following mildly negative pictures ($M = 3.44$) than following strongly negative pictures ($M = 3.82$), $t(89) = 3.06$, $p < .01$. There was, however, no effect of picture negativity on negative feelings in trials with humor, $t(89) = 0.24$, *ns* (*M*s = 3.15 and 3.17 for mildly vs. strongly negative pictures respectively). Thus, strongly negative pictures only elicited more negative feelings than mildly negative pictures in trials with the positive treatment. In

[1] The color ratings were not significantly affected by the experimental manipulations.

[2] We found no differences between the effects of pictures plus sentences versus sentences only on participants' feeling ratings, indicating that the effects of humor can be generalized across these two types of stimuli. We therefore collapsed the data of both stimulus types.

Table 1
Mean Negative Feeling as a Function of Picture Negativity and Treatment

	Picture negativity		
Treatment	Neutral	Mild	Strong
Positive	2.43_a (1.29)	3.44_b (1.18)	3.82_c (1.21)
Humor	2.50_a (1.31)	3.15_d (1.57)	3.17_d (1.45)

Note. Standard deviations appear in parentheses. Ratings ranged from 1 (*not at all*) to 9 (*very much*). Means that do not share subscripts differ within rows and columns at $p < .05$.

trials with humor, strongly and weakly negative pictures induced equally negative feelings.

Relation Between Cognitive Demands and Emotion Regulation

For each of the three picture negativity conditions separately, we calculated the participants' average negative feeling ratings for each particular treatment stimulus (i.e., the 21 positive and the 21 humorous stimuli). To study the effect of cognitive demandingness of the treatment stimuli on the subsequent ratings of negative feelings, we used two indices of demandingness derived from the second pilot study, namely processing time of the stimuli (Index 1) and percentage incorrect answers to the secondary task (Index 2). In the negative trials, Index 1 correlated inversely with the negative feeling ratings, rs(42) = −.39 and −.36, ps = .01, for the strongly and mildly negative trials, respectively. Index 1 did not correlate with negative feelings in the neutral trials, $r(42) = -.04$, $p = .80$. This pattern of correlations was also observed for Index 2, $r(42) = -.41$, $p < .01$; $r(42) = -.39$, $p = .01$; and $r(42) = .14$, $p = .37$, for the strongly negative, mildly negative, and neutral trials, respectively. These correlational data suggest that stimuli that pose greater cognitive demands were more effective in regulating negative emotions than less demanding stimuli.

Discussion

Previous research has identified several emotional and cognitive mechanisms by which humor may regulate negative emotions. In this study, we propose that one of the ways in which humor facilitates the recovery from negative events is by cognitive distraction. Our findings converge with a distraction account in various respects. First, highly demanding stimuli were more effective in down-regulating negative feelings than were less demanding stimuli. A second indication was the difference observed between the mildly and the strongly negative conditions. Whereas in positive trials, participants experienced more negative feelings after viewing strongly negative pictures than after viewing mildly negative pictures, the strongly and mildly negative pictures induced equally negative feelings in the humorous trials. This finding fits well with a cognitive distraction account, given that strongly negative stimuli use more cognitive resources than mildly negative stimuli (Schimmack, 2005).

Our data fully support the working memory model of distraction from negative mood (Van Dillen & Koole, 2007). This model proposes that negative moods are maintained by mood-congruent thoughts and therefore rely on the availability of limited cognitive resources. Until now, the empirical support for the model was primarily based on the distracting effects of math problems. This experiment broadens the scope of the model by generalizing these effects to humor. Furthermore, because humor represents a commonly used distracter in daily life, these data underscore the applied value of the theoretical model. Finally, we replicated Van Dillen and Koole's (2007) findings under the disguise of a successful cover story. It could thus be shown that the emotion-regulating effect of cognitive distractions operates free from demand characteristics.

The recent interest in the application of humor in health care and stress management signifies a need to investigate the longer term effects of humor on well-being. Generalization of our results to longer term effects is unwarranted because the experiment focused on moment-to-moment emotional changes. Although our study demonstrates that humor attenuates negative feelings, participants still reported less negative feelings in response to neutral pictures. This is because distraction leaves the source of negative feelings intact. In the end, the distraction of humor does not solve problems. Distraction appears useful when a stressor is relatively low on personal relevance and imposed on a person for a limited duration, such as in this experiment. As a stressor becomes more intense and enduring, such as when an individual experiences a strongly negative life event, a perspective-taking strategy may become more effective. The longer term impact of the distraction and perspective-taking strategies on emotions requires further examination in future research. One possible avenue would be to compare the impact of stressor-related and stressor-unrelated humor on negative emotions in the shorter and longer term.

Within the boundaries of short-term effects, however, our results were clear on the benefits of humor for emotion regulation. The more humor captured attentional resources, the better it served to regulate negative emotions. Hence, people can attenuate the impact of momentary adversities on their moment-to-moment emotions by exposing themselves to humor.

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