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The Power of Laughter: Experimental Humor Induction Facilitates Verbal Creativity

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Abstract

Past experimental research concerning the role of humor as a facilitating factor on creativity has yielded contradictory results. Contributing to the empirical precision of the humor-creativity link, an experimental replication-extension study was conducted. Based on pioneering experiments by Isen, Daubmann, and Nowicki (1987) short video films were used to induce different affective states (humor, positive, negative, neutral) in 165 participants. Afterwards, the effect on creativity was investigated. To extend Isen et al.'s (1987) findings, positive affect with and without humor was observed by using the same types of stimuli. A verbal creativity test was used, and several indicators of creativity – fluency, appropriateness, flexibility, and originality – were assessed. Contrary to the Dual Pathway to Creativity Model, assuming that both positive and negative affect foster creativity, only the induction of positive affect *with* humor showed a facilitating effect on creativity, but neither positive affect *without* humor nor negative affect. Additionally, gender differences in the reaction to the videos were found. Further research should clarify whether hedonic tone and activation of affect interact into the humor-creativity-link and specify the role of gender differences.

Keywords: humor, creativity, affect induction

Introduction

Investigating the power of humor is exactly on the pulse of the present time. More and more leaders focus on the positive side of human existence, promote employees' strengths and make them feel good instead of pointing out their deficiencies, recognizing that happy people are better workers. The rapid enlargement of knowledge about positive psychology is due to the multitude of research groups who run experiments in fields and laboratories to investigate the benefits of positive emotions through humor on human abilities. Four pioneering humor experiments were conducted by Isen, Daubman and Nowicki (1987), although the word *humor* never appeared in their article (O'Quin & Derks, 1997). The researchers have been able to show the facilitating effect of positive emotions induced by a comedy film on creative problem solving. After the comedy film they observed higher creativity levels in the subjects compared to a neutral film condition. At that time, Isen and colleagues had already recognized the great importance of research on creativity. Globalization, worldwide networking and rapid technological change result in increased competition and therefore in a greater need for creative, innovative employees (Shalley & Gilson, 2004). Indeed, the promotion of creativity in an organization is seen as a key driver of its competitive advantage (Cho & Pucik, 2005). Moreover, humor has important implications for organizations: a recent meta-analysis reported significantly positive associations between humor and employees' health, job performance and job satisfaction, as well as a negative association with stress, burnout and withdrawal (Mesmer-Magnus, Glew, & Viswesvaran, 2012).

These recent findings about benefits of both humor and creativity underline the importance of Isen et al.'s (1987) research activities. Thus, the purpose of this

master's thesis is a replication of Isen et al.'s (1987) findings, with the extension to answer some unanswered questions arising from their research.

In their first study, Isen and colleagues compared the creative performance of subjects in a comedy film condition with those in a neutral film condition. In their second study they considered subjects in a comedy film condition (humorous positive affect) and subjects who received a candy bar (non-humorous positive affect). Same as Isen et al. (1987), we conducted an experiment with the induction of humorous and non-humorous positive affect, but with using the same type of stimuli (i.e. short video films) in each condition to answer the following question:

(1) Can the effects of humor be explained simply by positive affect? In other words, is humor a manipulation of positive affect, or does humor make a unique contribution (O'Quin & Derks, 1997)?

As described below, Isen et al. (1987) used Duncker's (1945) candle task and the Remote Associates Tests (RAT, Mednick, M. T., Mednick, S. A., & Mednick, E. V., 1964). Both were not the best choice to capture creativity as validly as possible. Duncker's (1945) candle task has the disadvantage of only one right solution, which could be known by the subjects. The RAT is criticized for measuring sensitivity to language rather than creative potential (Worthen & Clark, 1971). Further, Isen et al. (1987) captured just one indicator of creativity, the number of mentioned ideas respectively the number of individuals who gave the right answer. As described in one of the following sections, indicators for creativity could be assessed that were more adequate. These facts lead to the question:

(2) Are the results of Isen et al. (1987) reproducible with another, more adequate creativity test with several indicators of creativity?

To answer the two questions, it is important to illustrate the theoretical background of the central issues of this master's thesis.

Firstly, an overview about humor at the workplace, its definitions and operationalizations will be given, followed by definitions and operationalizations of creativity at the workplace. Empirical evidence on facilitating factors on creativity will be reported. Moreover, two underlying theories will be presented: Fredrickson's *Broaden-and-Built-Theory of Positive Emotions* (1998, 2001) and the *Dual Pathway to Creativity Model* by De Dreu, Baas, and Nijstad (2008).

In a next step, the two constructs humor and creativity were combined, in a theoretical as well as an empirical manner. The main focus of the background information is on empirical findings with an experimental part resembling Isen et al.'s (1987) experiments, the basis for the present replication. Also, their experiments will be described in more detail.

The combination of the experimental evidence and underlying theories with the unanswered questions mentioned above finally resulted in three research hypotheses.

Theoretical Background

Workplace Humor

Workplace humor can be defined as “any amusing activity or communication within the organization that would result in positive emotions and reactions in the individual, work group, and the organization” (Al Obthani, Omar, & Bakri, 2013, p. 73). However, this definition is only one of many ways to define the multidimensional phenomenon of humor in the workplace. For a deeper understanding of the construct *humor* it is necessary to consider the discourse of the construct in scientific literature. Firstly, it is important to note that the terms *sense of humor* and *humor* are often used synonymously (Mesmer-Magnus et al. 2012). However, they are not the same. In accordance with Mesmer-Magnus et al. (2012), *sense of humor* can be understood as “a personality trait that enables a person to recognize and use successful humor as a coping mechanism and/or for social/affiliative communications/interactions” (p. 158). Against that, *humor* has a wider meaning, in which cognitive, emotional, behavioral, psychophysiological, and social aspects are involved (Martin, 2000). Martin (2001) mentions that “*humor* can be used to refer to a stimulus (e.g. a comedy film), a mental process (e.g. perception or creation of amusing incongruities), or a response (e.g. laughter, exhilaration)” (p. 505).

Despite of this diversity, most researchers agree: employees can benefit greatly from workplace humor. Several studies have shown associations between humor and personal as well as work-related outcomes: humor is positively associated with effective stress coping (Abel, 2002; Henman, 2001; Martin, Kuiper, Olinger, & Dance, 1993), physical health (Martin, 2001; Morreal, 1991) and negatively associated with burnout (Talbot & Lumden, 2000). Furthermore, workplace humor is

related to higher job satisfaction (Cann, Watson, Bridgewater, 2014) and higher job engagement (Guenter, Schreurs, Van Emmerik, Gijbbers, & Van Iterson, 2013). Work teams can benefit as well: humor reduces social distance between group members (Graham, 1995; Holmes, 2006) and fosters their team performance (Lehmann-Willenbrock & Allen, 2014; Romero & Pescosolido, 2008). A frequent use of humor by leaders correlates with a higher leader performance (Avolio, Howell, & Sosik, 1999; Priest & Swain, 2002). Therefore Romero and Cruthirds have considered workplace humor as “a multifunctional management tool that can be used to achieve many objectives” (2006, S. 58).

Besides these positive effects of workplace humor, some researchers have noticed a dark side of humor as well. Martin et al. (2003) offer a conceptualization of humor by proposing four different humor styles – two of them positive and two negative – that reflect individual differences in uses of humor. The positive, adaptive styles use humor in order to enhance the self (self-enhancing) and the use of humor to enhance one’s relationships with others (affiliative). The negative, maladaptive styles were composed of the use of humor to enhance the self at the expense of others (aggressive), and the use of humor to enhance relationships at the expense of the self (self-defeating). While positive humor styles were associated with psychological health, well-being (Kazarian & Martin, 2004; Martin et al., 2003), self esteem, subjective happiness (Liu, 2012), occupational self-efficacy, optimism (Scheel, Gerdenitsch & Korunka, submitted), self-regulatory strategies (Leist & Müller, 2013), team cooperation, coworker satisfaction and organizational commitment (Romero & Arendt, 2011), negative humor styles were related to job stress, reduced job satisfaction and employee burnout syndrome (Avtgis & Taber, 2006).

To assess these humor styles, Martin et al. (2003) developed their *Humor Style Questionnaire (HSQ)* with a 2 x 2 - conceptualization. But beside the *HSQ*, there are many more measurement scales for humor, reflecting different ways to divide humor in different dimensions: for example, in his *Sense of Humor Questionnaire (SHQ)* Svebak (1974) distinguishes between (1) sensitivity to humor (2) attitudes to humor (3) expression of humor. In their *Multidimensional Sense of Humor Scale (MSHS)* Thorson & Powell (1993) assume that humor has four dimensions: (1) to be humorous, (2) to recognize humor, (3) to appreciate humor, (4) to use humor as a coping mechanism. The recently published *Humor Climate Questionnaire (HCQ)* by Cann et al. (2014) measures four dimensions of a humorous climate at work: (1) positive humor, (2) negative humor, (3) outgroup humor and (4) supervisor support. Depending on a different research focus and differences in the underlying humor definition, humor scales differ in their quantifications of the construct of humor.

In sum, research literature about workplace humor is particularly diverse: there are various ways to define humor, to operationalize it, to assess it and the all-important conclusion: there are various connections to organizational outcomes.

Workplace Creativity

Similar to workplace humor, researchers have employed a diversity of definitions and measurement methods of workplace creativity (Batey, 2012). However, one definition seems to be more commonly accepted as the others: Amabile (1988) defines workplace creativity as “the production of novel and useful ideas by an individual or small group of individuals working together” (p. 126). Shalley and Gilson (2004) mention the importance of distinguishing workplace creativity from innovation. Amabile et al. (1996) comments on that as follows: “All innovation begins with creative ideas. (...) We define innovation as the successful implementation of

creative ideas within an organization” (p. 1154-55). In their understanding, ideas can be new products, processes, procedures, services, or policies (Amabile, 1988). While creativity refers to ideas produced at the individual level, innovation refers to the implementation of these ideas at the organizational level (Amabile, 1996).

A recent work by Runco and Jaeger (2012) discussed the *standard definition* of creativity, which comprised the same message as Amabile’s (1988) definition, but with different wording. Instead of *novel* and *useful* the standard definition of creativity includes *originality* and *appropriateness* (or labeled as *effectiveness*) (Runco & Jaeger, 2012). Whereas originality refers to productivity (Runco & Acar, 2012), appropriateness refers to the problem solving value of an idea (Runco, Illies, & Eisenmann, 2005) and whether the idea is useful or fit (Runco & Jaeger, 2012). Originality alone is not a sufficient indicator of creativity, because highly original things are often uncreative (Runco et al., 2005), like the word salad of a psychotic (Runco & Jaeger, 2012). Only by fulfilling the second criterion – to be appropriate – an idea receives its value (Runco & Jaeger, 2012). Runco and Jaeger (2012) found that this *standard definition* was presented to the scientific community for the first time by Stein (1953) and Barron (1955).

Almost at the same time, Guilford (1950) presented his pioneering psychometric approach of creativity, which replaced the paradigm of historiometric studies of creative genius, which had been the dominating approach until this point in time (Simonton, 1997). In his work, Guilford (1950) supposed a number of potential measurement variables for creativity, for example *fluency* (i.e. number of produced ideas per unit of time), *ideational novelty* (i.e. the frequency of uncommon, acceptable responses), and *flexibility* (i.e. the ease to set change). Six years later, he published his famous theory *Structure of Intellect* (1956) in which he proclaimed

convergent and divergent thinking (or as he said divergent *production*) as factors of intelligence and tied divergent thinking to creative potential (Runco & Acar, 2012). In convergent thinking, one conclusion or answer is regarded as unique, whereas in divergent thinking there is not one unique conclusion, but rather a case of searching or going off in various directions (Guilford, 1956). In creativity studies divergent thinking tests were used frequently, because they are reliable and reasonably valid (Fernández-Abascal, & Díaz, 2013; Runco & Acar, 2012). Research indicates that divergent thinking is not synonymous with creativity, but leads to originality and is therefore an indicator of creativity (Runco & Acar, 2012). Nijstad, De Dreu, Rietzschel, and Baas (2010) proposed different aspects, which can be measured with divergent thinking tests, nearly the same as mentioned by Guilford (1950): *fluency* (total number of responses), *flexibility* (number of different categories of responses), *originality* (the statistical infrequency of a response) and *elaboration* (amount of detail).

One widely used approach to evaluate creativity is the rating of creative products by multiple judges along the interesting aspects of creativity (e.g. Shalley, Zhou, & Oldham, 2004). Such a product-oriented approach reduces the complexity of the assessment and simultaneously reflects today's economic situation: globalization, global networking and rapid technological change result in increased competition between organizations and pressure them to bring more innovations to the market in shorter intervals. Hence, it is not surprising that research found workplace creativity as an important indicator of organizational performance (e.g., Shalley, Gilson, & Blum, 2000) and as a competitive advantage (Amabile, 1988; Cho & Pucik, 2005). Due to these findings, more and more managers realize that they should encourage

their employees to be creative (Shalley & Gilson, 2004). But which factors facilitate workplace creativity?

According to a review by Shalley et al. (2004), employee creativity is a function of personal and environmental characteristics. They found that proximal job characteristics were more strongly associated with workplace creativity than distal organizational characteristics. In line with this, several studies investigate the effects of the relationships of supervisors and coworkers on creativity. Supportive, non-controlling supervisory behavior was found to be related to employees' intrinsic motivation and their creative performance (Amabile, Schatzel, Moneta, & Kramer, 2004; Shalley & Gilson, 2004, Zhou, 1998). Moreover, positive, significant relations between creativity and coworker support and informational feedback were found (Zhou & George, 2001).

The Key Role of Emotions

A key issue in the research of facilitating factors on creative performance is the role of the employees' mood at work (Dul & Ceylan, 2011; George & Zhou, 2002). It stands to reason that relationships at work increase the probability of positive as well as negative events and the experience of happiness or anger, which can have a decisive influence on the employees' mood. Several studies have already investigated the relationship between mood and creativity. Thereby, the terms mood, emotion, or affect were almost used synonymously, whereas *affect* was rather seen as a higher level category (Fredrickson, 2001), which contains a continuum from diffuse moods to intense emotions (Ashfort & Humphrey, 1995).

Much of the work in this area is focused on positive affect (Shalley et al., 2004) and has shown that positive affect can facilitate creativity (Amabile, Barsade, Mueller, & Staw, 2005; Davis, 2009; Estrada, Isen & Young, 1994; Fernández-

Abascal, & Díaz, 2013; Filipowicz, 2006; Topolinski & Deutsch, 2012; Vosburg, 1998). However, some researchers found that not positive affect, but negative affect can foster creativity (George & Zhou, 2002; Vosburg & Kaufmann, 1997). To understand these results, which may seem contradictory, theorists provided different explanatory theories.

One influential theory was published by Fredrickson (1998, 2001, 2004). In her *Broaden-and-Build Theory of Positive Emotions* she proposed that positive emotions broaden peoples' momentary thought-action repertoires and build their enduring personal resources, ranging from physical and intellectual resources to social and psychological resources. Besides better personal functioning through positive emotions at the moment she also proclaims a longer lasting function: "By building people's personal resources, positive emotions transform people for the better, giving them better lives in the future" (Fredrickson, 2001, p. 224). According to Fredrickson (1998) positive emotions enable the individual to pursue novel, creative, and often unscripted paths of thought and action. Therefore, her theory is valuable for explaining the facilitating impact of positive affect on creativity (e.g., Hughes, 2009).

Another influential theory was postulated by De Dreu et al. (2008). Contrary to Fredrickson (1998, 2001, 2004), who almost neglected negative emotions, their *Dual-Pathway to Creativity Model* noted a facilitating effect on creativity for positive as well as for negative affect. The model described creativity as a function of cognitive flexibility and cognitive persistence, depending on the hedonic tone and the activation of the previously experienced emotion. While cognitive flexibility was defined by the ease with which people can switch to a different approach or perspective, cognitive persistence was referring to the degree of sustained and

focused task-directed cognitive effort (Nijstad, De Dreu, Rietzschel, & Baas, 2010). De Dreu et al. (2008) suggested that activating positive affect allows individuals to be inclusive in their thinking and to explore uncommon perspectives, which stimulates the path of cognitive flexibility. Against that, activating negative affect inform the individual that his or her current situation is problematic, threatening, or troublesome, calls for a more constrained, analytical approach (De Dreu et al., 2008) and stimulates the persistence pathway. Both, the flexibility and the persistence pathway result in an increase of originality and fluency in creativity tasks (Nijstad et al., 2010). In sum, the *Dual-Pathway to Creativity Model* presents an extensive picture of the complex interrelations with accounting for both effects through hedonic tone and activation.

It seems likely that affect, regardless of its hedonic tone, plays a key role in the link between humor and creativity. Indeed, some researchers have already suspected the mediating role of affect insofar that the impact of humor on creativity is mediated by – positive or negative – affect (Hughes, 2009; Martin, 2010). Bearing that in mind, the next chapter is dedicated to the relationship between humor and creativity.

The Humor-Creativity Link

Theoretical considerations. Reviewing literature concerning humor and creativity, it becomes apparent that the two constructs share some common properties: both have a multifaceted nature and they share aspects like originality and surprise (O'Quin & Derks, 1997), incongruity and novelty (Martin, 2010). Furthermore, both involve risk-taking and the production of unexpected and unusual responses (Humke & Schaefer, 1996). O'Quin and Derks (1997) have concluded

that humor and creativity show a high similarity because they require similar mental processes. They have also mentioned:

Theoretically, humor should have two related effects on thinking that would facilitate creativity. The cheerful mood associated with humor (...) should reduce tension and anxiety. In a state of relaxation, individuals would show less fixation and rigidity in their responses to situations.

Beyond the reduced rigidity there should also be a wider range of options that could be considered. The cognitive network could be expanded thanks to priming by the incongruous. (O'Quin & Derks, 1997, p. 240)

However, the merely theoretical investigation of the humor-creativity link results in a discussion like the one about the chicken and the egg: what came first? Is humor just a form of creativity? Can humor act as a predictor of the creative ability of an individual? Or, otherwise, is humor a producer of creativity? In their review, O'Quin and Derks (1997) presented both theoretical and empirical evidence for each of these questions and came to the following conclusion: "They seem to be two interdisciplinary areas that overlap most clearly in the area of humor production" (p.247).

Due to the fact that this master's thesis functions as a replication of Isen et al.'s (1987) experiments, the next step will follow their understanding of humor as the independent, and creativity as the dependent variable. In order to get a better idea of the background of Isen et al.'s (1987) experiment, the next chapter focuses on evidence from studies which investigate the relationship between humor and creativity in experimental settings.

Experimental evidence. Researchers, who want to induce affect under laboratory conditions, can choose from a pool of procedures: interactions, hypnosis, repeating phrases, facial muscle movements, imagery, music and slides (Gross & Levenson, 1995). One procedure has emerged to be the one with the most properties, namely the usage of films, because films are readily standardized, involve no deception and have a dynamic rather than a static nature. Furthermore, films show a high degree of ecological validity, because the stimuli are external to the individual (Gross & Levenson, 1995; Rottenberg, Ray, & Gross, 2007).

The first experiment with an affect induction by using humorous film material to investigate its effect on creativity was conducted by Ziv in 1983. In his study 52 10th graders were shown humorous film clips. Afterwards they were asked to (1) write captions for cartoons and to (2) complete two subtests of the Torrance Tests of Creative Thinking (TTCT, Torrance, 1974). By comparing them with 26 students of a control group, Ziv (1983) observed that the affect induction by the humorous film clips significantly increases the funniness of the written cartoons and the creativity scores in the TTCT.

Two years later, Isen, Johnson, Mertz, and Robinson (1985) published an article concerning two experiments with the unusualness of word association as dependent variable. In their second experiment 190 students were randomly assigned to one of four conditions, two positive and two control conditions. In the first positive condition the subjects were shown a humorous film clip, in the second they received a candy bar. The neutral conditions comprised a neutral video and a condition with no affect manipulation. In their calculations, Isen et al. (1985) combined the two positive as well as the two control conditions. Results showed that subjects in the positive affect

condition produced significantly more unusual associations to neutral words than those in the neutral affect condition.

Again two years later Isen, Daubmann, and Nowicki (1987) conducted four similar experiments. Due to the fact that they form the basis of the present replication-extension study, they are being described in more detail.

During Isen et al.'s (1987) first and second experiment, creative problem solving functioned as dependent variable, operationalized by Duncker's (1945) candle task. In that task, subjects received a box of matches, a box of thumbtacks and a candle and had to fix the candle on a corkboard in such a way that it will burn without dripping wax onto the table or the floor.

Prior to this task, in the first experiment 65 students were randomly assigned to one of four conditions: a humorous film condition, a neutral film condition, a condition without manipulation and a condition with a facilitative display, therefore the box and the tacks were listed separately as items on the table. Afterwards, a manipulation check should verify the affect manipulation through the rating of the pleasantness of unfamiliar words. Results of the manipulation check suggested more positive ratings by subjects in the humorous video condition than by subjects of the neutral video condition, thus, Isen et al. (1987) regarded the affect manipulation as successful. Results of the candle task showed a higher success rate with the subjects who were in the humorous film condition, rather than in the neutral film condition.

In their second experiment, Isen et al. (1987) added three more conditions: a negative film condition to assess the impact of negative affect, a condition in which subjects were given a candy bar examining the impact of positive affect without humor and an exercise condition to observe the effect of pure arousal without affect induction. Furthermore, the facilitating display condition was omitted. Again, 126

students were randomly assigned to the conditions. For a manipulation check they completed a 7-point Likert scale representing positive and negative affective dimensions. Results indicated more positive affect in the positive film condition and more negative affect in the negative film condition, but no differences between the no film conditions (candy bar, exercise, no manipulation). This suggests that the candy bar was not successful in inducing pleasant affect unlike the humorous video. Results of the candle task indicated more subjects solving the problem after the humorous video than after the neutral video. Neither in the negative video condition, nor in the exercise condition facilitating effects on creativity could be observed. Contrary to Isen et al.'s (1987) expectations, even subjects of the candy bar condition did not show better results than those of the no manipulation condition.

The third and fourth experiment contained 21 items in different difficulties of the Remote Associates Test (RAT, M. T. Mednick et al., 1964) instead of Dunckers's (1945) candle task.

In the third experiment, 46 students were assigned to one of two conditions: a positive affect condition in which students received a candy bar, and a control condition without a candy bar. Contrary to experiment two, results showed an improved performance in the candy bar condition compared to the control group for the items of moderate difficulty.

In the fourth experiment the RAT performance by subjects of a humorous film condition, an exercise condition, and a no manipulation condition was compared. Results revealed significant differences between the humor condition and the condition without manipulation, as well as between the humor condition and the exercise condition insofar that the subjects of the humor condition performed significantly better.

For a closer understanding of the pioneering nature of Isen et al.'s (1987) findings, the following text passages provide an overview on later results of researchers, which referred to Isen et al. (1987).

Unlike Isen and colleagues, Kline, Greene, and Noice (1990) were interested in the effect of violent video material, not of positive or humorous video material. However, in their experiment they compared four groups: subjects watching a humorous video, a neutral video, a violent video and a group of subjects were receiving a small gift in form of double credit points for their participation in the experiment. Results of subsequent word generations tasks showed differences between the violent video group in comparison to all other groups, but no difference between the humor and the gift group. Thus, Kline et al.'s (1990) results agreed with Isen et al.'s (1985) and the results of Isen et al.'s (1987) second experiment, indicating no facilitating effect by a candy bar, but disagreed with results of Isen et al.'s (1987) third experiment, indicating a facilitating effect by a candy bar.

Other research groups only reproduced Isen et al.'s (1987) experimental design with another dependent variable instead of creativity: Oaksford, Morris, Grainger, and Williams (1996) observed reasoning abilities in subjects of different video conditions including one humorous video, whereas Fredrickson and Branigan (2005) observed breadth of attention and thought-action repertoires in different video conditions. Both could observe fundamental differences between humor induction conditions and control conditions.

Similar to Isen et al. (1987) Filipowicz (2006) compared a humor video group to a neutral video group and found a significant difference between the creativity performance of the two groups. Additionally, he was able to show a significant difference in the reactions of men and women. While men's creative performance

was significantly facilitated by the humor video, women's creative performance was equal in both conditions. With his results, Filipowicz (2006) laid the foundations for a gender specific, differentiated view on the humor-creativity link.

Hirt, Devers, and McCrea (2008) also showed videos to their subjects, a humorous, a neutral and a negative one. Results indicated a higher creative performance in the humor condition compared to the other conditions. Additionally, they found that individuals who watched the humorous video were significantly more likely to display potential for creativity in their task choice, thus, happy individuals look for tasks that provide the opportunity to be creative. Moreover, Hirt et al. (2008) have received another valuable insight: whenever subjects of the humor condition were confronted with a negative task, they were able to transform the task into something more fun and interesting.

Contradictory results concerning the humor-creativity link were found by Forgeard (2011). Conducting an experiment with a creative generation task and a creative evaluations task, she found firstly that preexisting mood – depression – acts as a moderator on the impact of different mood induction videos on creativity. Secondly, she found that not the humorous, but the *negative* emotion induction enhanced the creative generation performance of subjects without depression.

Another, more recent experiment of Fernández-Abascal and Díaz (2013) in turn confirmed Isen et al.'s (1987) findings. After the induction of happiness by a video film they observed increased creative divergent thinking, measured by the TTCT, already mentioned above.

In conclusion, the majority of the experiments represented above confirmed Isen et al.'s (1987) assumption that the perception of a humor video increases creativity.

Following the experimental evidence, I assume that the creative performance of subjects watching a humorous video in an experimental setting differs significantly from those watching a control video.

H1. Subjects of the humor condition show higher verbal creativity after the video than subjects of the neutral condition.

Above, a closer look on Isen et al.'s (1987) results was presented. The attentive reader will have noticed that the results of their second and third experiment indicate a contradiction and rise the question whether pure positive affect without humor influences creativity. I assume that the impact of positive affect on creativity, as assessed in the experiments mentioned above, partly depends on the perception of humor. That implies that non-humorous positive affect will not be as influential as humorous positive affect, but also facilitate the creative performance more than no affect induction. Therefore, I assume significantly different creative performances in subjects of a positive non-humorous video condition and in those of a neutral condition.

H2. Subjects of the positive affect condition show higher verbal creativity after the video than subjects of the neutral condition.

Finally, I also want to pay attention to the contradictory results of Forgeard (2011). Her findings support the assumption of the *Dual-Pathway to Creativity Model* (De Dreu et al., 2008) that also negative affect can increase creativity via the persistence path. Following the *Dual-Pathway to Creativity Model* (De Dreu et al., 2008) and Forgeard's (2011) findings, I assume:

H3. Subjects of the negative affect condition show higher verbal creativity after the video than subjects of the neutral condition.

Deviating from Isen et al.'s (1987) experimental design, in the present experiment all forms of affect (non-humorous positive, humorous positive, negative, neutral) should be induced by the same type of stimuli, because only under these conditions results can be compared.

Method

Participants

One hundred sixty-five undergraduate students at the University of Vienna, Austria participated in the experiment for payment of EUR 5. 121 (73.3%) persons were female and 44 (26.7%) male. The sample had a mean age of 24 years, ranging from 18 to 35 years ($SD = 4.7$). The majority were psychology students (64.8%), half of them (50.9%) reported to work during their studies. Most participants ($N = 105$) were Austrian (63.6%), 49 (29.7%) German, and 11 (6.7%) from other nations. Almost all participants (91.5%) reported German as their mother tongue. Participants were recruited by visiting seminars of work and organizational psychology, posters in university buildings, and social media.

Procedure

The experiment took place from May 12th to October 31th 2014 in laboratories of the department of work and organizational psychology at the University of Vienna. It was embedded into a larger study with a longitudinal and cross-sectional design. The following considerations focus on the procedures of the cross-sectional part of the experiment, because the longitudinal part was not required for answering the hypotheses of this master's thesis.

One week prior to the experiment, participants completed online or paper-pencil questionnaires and made an appointment for the experiment. At the beginning of the experiment, participants completed a further paper-pencil questionnaire to register their socio-demographic characteristics. A personal code system, in which participants were instructed to enter four different numbers and letters, made it possible to match the experimental data of the participants with the data from one

week ago. Only two sets of data could not be matched and were excluded from the analyses. Then the participants were randomly assigned to one of four video film conditions to induce different affective states (humorous, positive, negative, neutral). Before watching the video, participants were told to just watch, not to concentrate on details or memorize details. Furthermore, they were told they could stop their participation in the experiment at any time, if they were feeling unwell.

After a manipulation check participants completed three verbal creativity tasks (for details see below) and three logical reasoning tasks (not further discussed). The assignment to the four different video film conditions and a variation in the order of tasks (creativity first vs. logical reasoning first) resulted in a 4 x 2 design. Participants were tested individually, one testing session lasted approximately 30 minutes.

Materials and Measures

Affect induction. To induce different affective states in the participants, short video films were produced, each with a total duration of five minutes. The humorous video contained sequences of funny commercials, scenes with comedians, and amusing situations. The video to induce positive affect contained beautiful nature scenes, underlined with classical music. We selected the composition *Eine kleine Nachtmusik* by Wolfgang Amadeus Mozart, because its positive effect on mood has already been demonstrated (Mitterschiffthaler, Fu, Dalton, Andrew & Williams, 2007). The video to induce negative affect contained sequences from a documentary about the nuclear disaster of Chernobyl. The neutral control video, which should not induce any affect, contained a documentary about the spectrum of light and colors. Each video clip was shown on a laptop with headphones, in German, or in English with German subtitles.

Manipulation check. After watching the video, participants completed a questionnaire to ensure that the affect induction was successful. Participants rated the videos along the dimensions *funniness* (perceived by the subject) and *laughter* (by the subject) on a five-point Likert scale (1 = *not at all*, 5 = *completely*). Furthermore, they completed 12 items of the Positive and Negative Affect Schedule (PANAS, Watson, Clark, & Tellegen, 1988), six items to assess positive affect (active, cheerful, alert, determined, inspired, and attentive) and six items to assess negative affect (upset, hostile, ashamed, nervous, sad, and afraid). Reliabilities of the scales were $\alpha = .87$ for positive and $\alpha = .80$ for negative affect. Again, a five-point Likert scale (1 = *not at all*, 5 = *completely*) was used.

It is assumed that affect induction is effectual only for a short period of time (e.g. Frost & Green, 1982). Therefore those subjects, who completed the logical reasoning tasks first, were excluded from the data analysis, because it can not be assumed that it lasts longer than this time interval.

Creativity task. Following the manipulation check, participants completed three creative divergent thinking tasks, derived from Schoppe's Verbal Creativity Test (1975). Results were evaluated by measuring four different aspects of creativity: fluency (i.e. number of mentioned ideas), appropriateness (i.e. adequacy of ideas), flexibility (i.e. number of categories) and originality (i.e. infrequency of ideas). They were derived from the explanations about definitions of creativity in one of the previous sections.

In the first subtest, named *Four-Word Phrases* (German: Vier-Wort-Sätze) participants had to form as many phrases with the initial letters W - L - D - P as possible, within two and a half minutes. Just a fluency score was measured, depending on the number of phrases that were formed by the participants.

The second subtest, named *Unusual Types of Usage* (German: Ungewöhnliche Verwendungsarten), had a time limit of two minutes and asked the participants to mention as many unusual types of usage for a string as possible. In addition to the fluency score, which was suggested in Schoppe's (1975) test manual, appropriateness, flexibility, and originality were calculated. The score for appropriateness resulted from the total number of ideas minus the number of inadequate ideas. An example for an inadequate idea is *I can use it*. The flexibility score took the meaning of words into account. Two ideas, which were quite similar in their meanings, were assigned to the same category and were counted just as one idea. To assess the originality score, all ideas from all participants were ordered by frequency, whereby infrequent ideas got higher scores than frequent ideas. For each person the scores of their single ideas were added up to an overall originality score. Finally, the resulting value was divided by the fluency score, in order to consider the quantity of ideas for each participant.

The third subtest described an *Utopian Situation* (German: Utopische Situation): *Consider the food for a whole day is now available in just one pill*. For this task participants had four minutes to write down as many consequences of this situation as they could imagine. The evaluation of the third subtest was analogous to the previous one.

After fluency, appropriateness, flexibility, and originality were assessed for each single task separately, they were merged into overall values. At that time the minimum and maximum values of the four scales were inconsistent. Thus, for a better comparability between the creativity scales, the values of the four aspects were z-transformed. The resulting z-values functioned as dependent variables during the data analyses.

The evaluation of the creativity task was based on the assignment of single answers to categories, which were part of a whole category system. The detailed system was jointly developed by two independent judges. They evaluated the three creativity tasks with a rater agreement of 93% for the first task, 88% for the second task, and 87% for the third task.

Data analysis. For both manipulation check and hypotheses tests analysis of variance (ANOVA) and *t* tests were performed. If it was necessary to add covariate, analysis of covariance (ANCOVA) were conducted. If the assumptions of the parametric tests were violated, their nonparametric equivalents (i.e. Mann-Whitney U test, Kruskal-Wallis test) were used.

Several dummy variables were coded, depending on the video the group was watching: Humorous video (0 = *other videos*, 1 = *humorous video*), positive video (0 = *other videos*, 1 = *positive video*), negative video (0 = *other videos*, 1 = *negative video*) or neutral video (0 = *other videos*, 1 = *neutral video*).

Systematic differences between the four subgroups (humor condition, positive condition, negative condition, neutral condition) should be detected.

Control variables. In order to prevent that confounding variables falsify the results, several control variables were considered. It was particularly important to control the data by gender, because some researchers have already reported gender differences in creativity. In their review Bear and Kaufman (2008) have summarized these studies and noticed higher creativity in women and girls compared to their male counterparts in different creativity tests. Therefore a dummy variable for gender (0 = *female*, 1 = *male*) was built. Additionally, we controlled the results by age to prevent systematic age bias. Further control variables were mother

tongue (0 = other, 1 = German) and nationality. The nationalities German (0 = *other nationality*, 1 = *German*), Austrian (0 = *other nationality*, 1 = *Austrian*), and Other (0 = *Austria or Germany*, 1 = *other nationalities*) were captured. This was important because subjects had to understand and express verbal information in German language during the creativity tasks. In this process poor language skills could have negative effects on their results.

Results

Firstly, descriptive statistics, correlation coefficients and reliability coefficients are shown. While the descriptions above included statistics from all of the 165 participants, Table 1 displays only the statistics of those participants, who performed the creativity task first after watching the video ($N = 82$). Participants who performed logical reasoning task at first ($N = 83$) were excluded from the subsequent steps. Secondly, results of the manipulation check are presented. Thirdly, results of the hypothesis testing are displayed.

As shown in Table 1, the control variable sex was significantly related to appropriateness ($\beta = -.28, p < .05$) as well as flexibility ($\beta = -.27, p < .05$), indicating higher results in women. Being a different nationality than Austrian or German was negatively related to originality ($\beta = .27, p < .05$). Therefore, sex was controlled when appropriateness and flexibility functioned as dependent variables; when originality functioned as dependent variable, nationality was controlled.

Table 1

Descriptive Statistics, Correlation Coefficients, and Reliability Coefficients among Variables ($N = 82$)

	M (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Age	25.10 (5.58)																	
2 Sex	31.7%	-.03																
3 Nat. Austria	60.9%	.22	-.10															
4 Nat. Germany	34.2%	-.18	.17	-.90**														
5 Nat. other	4.9%	-.09	-.15	-.28**	-.16													
6 Language German	91.5%	-.08	.02	.20	.13	-.74**												
7 Video humorous	24.4%	.13	-.02	.16	-.11	-.13	.17											
8 Video positive	23.2%	-.15	-.06	.03	-.09	.14	-.04	-.31**										
9 Video negative	25.6%	-.07	.02	-.10	.05	.13	-.02	-.33**	-.32**									
10 Video neutral	26.8%	.08	.06	-.08	.14	-.14	-.11	-.34**	-.33**	-.36**								
11 Perceived funniness	1.93 (1.40)	.18	-.02	.19	-.15	-.11	.11	.91**	-.28*	-.39**	-.23*							
12 Own laughter	1.78 (1.17)	.18	-.07	.24*	-.20	-.10	.17	.79**	-.12	-.37**	-.29**	.84**						
13 Positive affect	3.19 (.79)	.03	.00	.14	-.22*	.17	-.18	.24*	.04	-.36**	.08	.36**	.38**	(.87)				
14 Negative affect	1.48 (.62)	-.09	-.04	-.01	.05	-.08	.12	-.18	-.18	.66**	-.30**	-.26*	-.31**	-.36**	(.80)			
15 Fluency	0.04 (.75)	-.10	-.17	.08	-.01	-.16	.14	.20	.06	-.08	-.17	.10	.09	-.03	.24*			
16 Appropriateness	0.04 (.85)	-.11	-.28*	.04	.02	-.14	.21	.24*	-.04	-.06	-.14	.15	.20	-.05	.22*	.85**		
17 Flexibility	0.04 (.83)	-.12	-.27*	.04	.03	-.15	.21	.23*	-.06	-.07	-.10	.13	.19	-.07	.21	.82**	.97**	
18 Originality	0.02 (.72)	.03	.16	.13	-.01	-.27*	.19	.09	.09	-.25*	.07	.11	.07	-.03	-.06	.22*	.23*	.30**

Note. Pearson Correlation, two-sided. Reliabilities (Cronbach's α) appear on the diagonal in parentheses. Sex: 0 = female, 1 = male.

* $p \leq .05$. ** $p \leq .01$.

Manipulation Check

First of all, a confirmatory factor analysis for selected items of the Positive and Negative Affect Schedule (PANAS, Watson et al., 1988) was performed to verify that the items load on just two factors, positive and negative affect. Table 2 shows the factor loadings after rotation. The items that load on the same factors suggest that factor 1 represents positive affect and factor 2 represents negative affect. Loadings between .57 and .84 suggest that the items are suitable for measuring positive and negative affect (e.g., Kaiser & Rice, 1974).

Table 2

Manipulation Check: Factor Analysis for Selected Items of the Positive and Negative Affect Schedule (PANAS, Watson et al., 1988)

	Factor	
	1	2
<i>Positive Affect</i>		
inspired	.84	
alert	.80	
active	.79	
attentive	.77	
determined	.74	
cheerful	.64	-.49
<i>Negative Affect</i>		
sad		.82
upset		.80
ashamed		.76
scared		.67
hostile		.65
nervous		.57

Note. $N = 165$. Extraction method: Principal component analysis. Rotation method: Varimax with Kaiser normalization. Rotation converged in 3 iterations. Loadings higher than .20 are displayed.

Subsequently, the assumptions of analysis of variance (ANOVA) were checked. Results of the Kolmogorov-Smirnov test for normality indicated that the distribution of positive affect, $D(165) = .08$, $p < .05$, and negative affect, $D(165) = .23$, $p < .001$, as well as for funniness (which is perceived by the subject), $D(165) = .35$, $p < .001$, and laughter (by the subject), $D(165) = .37$, $p < .001$, did deviate significantly from a normal distribution. Levene's test of homogeneity of variance revealed that the variances in negative affect, $F(3, 161) = 4.26$, $p < .05$, funniness, $F(2, 120) = 4.61$, $p < .05$, and laughter, $F(3, 161) = 14.47$, $p < .001$, were significantly different in the four video film conditions. Only the variances of positive affect, $F(3, 161) = 2.08$, ns , were statistically equivalent in the four subgroups. In conclusion, the assumptions for the ANOVA were violated; therefore, nonparametric tests were used to check whether the emotion induction was successful.

Four Kruskal–Wallis one-way analyses of variance by ranks were conducted. Results were as expected: there were statistically significant differences in positive ($H = 31.88$, $p < 0.001$) and negative affect ($H = 55.46$, $p < 0.001$), funniness ($H = 109.59$, $p < 0.001$), and laughter ($H = 93.29$, $p < 0.001$) between the four video film conditions.

Subsequently, Mann-Whitney U tests were performed to evaluate pairwise differences among the four groups. Table 3 presents the data. Subjects of the humor video condition reported significantly higher positive affect than those of the neutral video condition. Additionally, they reported significantly more funniness and laughter. In contrast, no statistically significant difference in the manipulation check between the positive and the neutral video condition could be found.

Table 3

Manipulation Check: Pairwise Comparisons of Video Conditions

Video Condition	Humor <i>M (SD)</i>	Positive <i>M (SD)</i>	Negative <i>M (SD)</i>	Neutral <i>M (SD)</i>	Difference	
					<i>U</i>	<i>r</i>
Manipulation Check						
Positive affect	3.57 (.73)			3.15 (.77)	561.00**	-.30
Negative affect	1.33 (.46)			1.20 (.24)	743.00	-.13
Funniness	4.00 (1.05)			1.52 (.77)	85.50***	-.80
Laughter	3.20 (.93)			1.31 (.68)	131.50***	-.77
Positive affect		3.43 (.77)		3.15 (.77)	662.00	-.18
Negative affect		1.26 (.28)		1.20 (.24)	732.50	-.12
Funniness		1.38 (.74)		1.52 (.77)	726.50	-.14
Laughter		1.53 (.82)		1.31 (.68)	714.50	-.16
Positive affect			2.64 (.75)	3.15 (.77)	559.00**	-.32
Negative affect			2.10 (.76)	1.20 (.24)	171.00***	-.71
Funniness			1.00 (.00)	1.52 (.77)	525.00***	-.50
Laughter			1.07 (.26)	1.31 (.68)	769.50	-.19

Note. Humor Condition $N = 41$; Positive Condition $N = 40$; Negative Condition $N = 42$; Neutral Condition $N = 42$.

** $p \leq .01$. *** $p \leq .001$.

However, there were significant differences between the negative and neutral video condition. Subjects of the negative video condition reported significantly more negative affect and less positive affect and laughter than those in the neutral video condition.

Thus, the emotion induction of the humor video and the negative video appears to have been very successful, but not the emotion induction by the positive video.

Creative Performance

Results of the Kolmogorov-Smirnov test for normality indicated normal distribution for fluency, $D(165) = .05$, *ns*, appropriateness, $D(165) = .07$, *ns*, flexibility, $D(165) = .04$, *ns*, and originality, $D(165) = .04$, *ns*. Also the variances of fluency, $F(3, 160) = 1.42$, *ns*, appropriateness, $F(3, 160) = 1.41$, *ns*, flexibility, $F(3, 160) = .70$, *ns*, and originality, $F(3, 160) = .35$, *ns*, were statistically equivalent in the four subgroups. Thus, the assumptions for analysis of variance were fulfilled.

Based on these results, a one-way ANOVA and three ANCOVA were conducted. Table 4 presents the results. At first, a one-way ANOVA was conducted with group assignment as a between-subjects variable and fluency as the dependent variable. Results have not indicated a significant overall effect of the group assignment on fluency. Planned contrasts (not displayed in Table 4) showed that the variances in fluency of the humor and the neutral conditions were significantly different, $t(78) = 2.01$, $p > .05$ (1-tailed), $r = .22$, whereas no statistically important differences were found for the positive and the negative compared to the neutral video.

To determine a statistically significant difference between the four video conditions in appropriateness, an ANCOVA was performed with sex as covariate. Again, as displayed in Table 4, no significant overall effect was found. However, for appropriateness planned contrasts revealed that the results of the subjects of the

humor video condition differed significantly, $p = .043$, 95% CI [.02, .74], from those of the neutral video condition.

Table 4

Hypotheses Testing: ANOVA/ANCOVA of Creativity Indicators by Video Condition

Source	<i>df</i>	SS	MS	<i>F</i>	<i>p</i>	η_p^2
<i>Fluency</i>						
Video Condition	3	2.71	.90	1.65	.19	
Error	78	42.79	.55			
Total	81	45.50				
<i>Appropriateness</i>						
Video Condition ^a	3	3.25	1.08	1.66	.18	.06
Error	77	50.12	.65			
Total	81	57.88				
<i>Flexibility</i>						
Video Condition ^a	3	2.87	.96	1.52	.22	.06
Error	77	48.40	.63			
Total	81	55.45				
<i>Originality</i>						
Video Condition ^b	3	2.04	.68	1.43	.24	.05
Error	77	36.61	.48			
Total	81	41.72				

Note. ^a controlling for sex. ^b controlling for nationality.

An ANCOVA with flexibility as dependent variable and sex as covariate delivered similar results. As shown in table 4, no overall effect of the video condition in

flexibility could be found and only marginally significant different variances in flexibility in the humor condition $p = .072$, 95% CI [.02, .72] compared to the neutral condition.

At last, an ANCOCA was conducted to assess the effect of the videos on originality, with nationality as covariate. Again, no statistically significant overall effect of the videos on originality could be found (Table 4). Although planned contrasts did not show any significant differences between two single video conditions.

In order to recheck and specify the results of the planned contrasts, independent-samples t tests were conducted subsequently. Table 5 presents the results. As assumed in Hypothesis 1, subjects of the humor video condition reached higher levels in fluency, appropriateness and flexibility than subjects of the neutral video condition. All three effects were medium-sized. Similar to the results of the ANCOVA, no statistical important difference in originality between the humor and the neutral condition could be found.

Additionally, no significant differences between the positive and neutral condition and between the negative and the neutral video along the indicators fluency, appropriateness, flexibility and originality were found (Table 5).

To sum up, while ANOVA and ANCOVA detected significant differences in the variances of the humor and the neutral condition, no differences between other groups were found. As predicted in Hypothesis 1, t tests revealed higher levels in fluency, appropriateness and flexibility in the humor video condition compared to the neutral video condition, but no differences between other subgroups. In conclusion, the data supported Hypothesis 1, whereas Hypotheses 2 and 3 could not be confirmed.

Table 5

Hypotheses Testing: Mean Differences of Creativity Indicators from Pairwise Comparisons of Video Conditions

Video Condition	Creativity Indicator	Humor <i>M (SD)</i>	Positive <i>M (SD)</i>	Negative <i>M (SD)</i>	Neutral <i>M (SD)</i>	Difference	
						<i>t(40)^a</i>	<i>r</i>
Fluency	Fluency	.30 (.77)			-.17 (.56)	- 2.30*	.34
	Appropriateness	.39 (.79)			-.15 (.71)	- 2.40*	.32
	Flexibility	.38 (.77)			-.10 (.71)	- 2.10*	.35
	Originality	.14 (.65)			.10 (.73)	-.19	.03
Fluency	Fluency		.12 (.72)		-.17 (.56)	- 1.45	.23
	Appropriateness		-.02 (.92)		-.15 (.71)	-.54	.09
	Flexibility		-.04 (.91)		-.10 (.71)	-.23	.04
	Originality		.13 (.65)		.10 (.73)	-.17	.03
Fluency	Fluency			-.06 (.88)	-.17 (.56)	-.47	.07
	Appropriateness			-.04 (.91)	-.15 (.71)	-.44	.07
	Flexibility			-.06 (.89)	-.10 (.71)	-.17	.03
	Originality			-.28 (.78)	.10 (.73)	1.63	.25

Note. ^a *t*(39) for Positive vs. Neutral; *t*(41) for Negative vs. Neutral.

* $p \leq 0.05$.

Post-hoc Analysis: Gender Differences

According to the results of Filipowicz (2006), gender differences in the reactions to the video films were tested subsequently. Regardless of the assigned video condition, women showed a higher performance in appropriateness and flexibility (Table 1).

In order to assess the gender differences among the video conditions, again, independent-samples *t* tests were conducted. Table 6 presents the results. No differences between the creative performance of women and men in the humor video condition were found. In contrast, men's and women's performance differed significantly as a result of the affect induction by the positive video. While women performed significantly better in the creativity aspects appropriateness, flexibility and marginally significantly in fluency, men performed significantly better in the creativity indicator originality. The negative affect induction resulted in a significantly better performance by women than by men. Better results in fluency, appropriateness and flexibility in women were found. No statistically significant gender differences in the neutral condition were found.

Table 6

Post-hoc Analysis: Gender Differences in Creativity Indicators among Video Conditions

Video Condition	Women's Performance				Men's Performance				Difference	
	Humor	Positive	Negative	Neutral	Humor	Positive	Negative	Neutral		
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>t(20)^a</i>	<i>r</i>
Creativity Indicator										
Fluency	.19 (.88)				.57 (.37)				- 1.02	.22
Appropriateness	.38 (.92)				.42 (.43)				- .12	.03
Flexibility	.39 (.90)				.35 (.40)				.10	.02
Originality	.05 (.70)				.33 (.55)				- .86	.19
Fluency		.30 (.65)				-.39 (.71)			2.01 ^b	.42
Appropriateness		.32 (.66)				-.96 (.94)			3.36**	.61
Flexibility		.31 (.57)				-1.03 (.99)			3.69**	.64
Originality		-.07 (.54)				.70 (.64)			-2.60*	.51
Fluency			.27 (.86)				-.73 (.45)		2.87**	.53
Appropriateness			.31 (.80)				-.75 (.73)		2.93**	.54
Flexibility			.26 (.85)				-.68 (.64)		2.57*	.49
Originality			-.22 (.78)				-.40 (.83)		.49	.11
Fluency				-.26 (.64)				-.02 (.36)	-.98	.20
Appropriateness				-.21 (.77)				-.06 (.64)	-.48	.10
Flexibility				-.18 (.75)				.04 (.65)	-.67	.14
Originality				-.01 (.77)				.27 (.68)	-.83	.17

Note. ^a *t*(17) for positive condition; *t*(19) for negative condition; *t*(20) for neutral condition. ^b *p* = .061.

* *p* ≤ 0.05. ** *p* ≤ 0.01.

In order to verify whether the gender differences in the creative performance resulted from different reactions to the video manipulation, further Mann-Whitney *U* tests of the manipulation check variables (positive affect, negative affect, funniness, and laughter) were conducted. As shown in Table 7, results indicated no significant gender differences in the variables of the manipulation check.

Table 7

Post-hoc Analysis: Gender Differences in Manipulation Check Variables among Video Conditions

Video Condition	Women's Ratings				Men's Ratings				Difference	
	Humor	Positive	Negative	Neutral	Humor	Positive	Negative	Neutral		
Manipulation Check	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>U</i>	<i>r</i>
Positive affect	3.71 (.69)				3.20 (.72)				104.00	.27
Negative affect	1.38 (.52)				1.20 (.22)				149.50	.07
Funniness	4.10 (1.00)				3.37 (1.20)				135.50	.14
Laughter	3.30 (.88)				2.91 (1.04)				133.00	.15
Positive affect		3.41 (.77)				3.46 (.82)			143.00	.03
Negative affect		1.25 (.27)				1.28 (.32)			146.00	.02
Funniness		1.37 (.77)				1.40 (.70)			141.00	.06
Laughter		1.60 (.86)				1.30 (.68)			120.50	.17
Positive affect			2.57 (.79)				2.86 (.59)		125.00	.16
Negative affect			2.09 (.82)				2.12 (.58)		149.00	.05
Funniness			1.00 (.00)				1.00 (.00)		160.00	.00
Laughter			1.03 (.18)				1.20 (.42)		133.00	.27
Positive affect				3.21 (.63)				3.02 (.104)	170.00	.08
Negative affect				1.19 (.22)				1.20 (.31)	170.00	.08
Funniness				1.66 (.81)				1.23 (.60)	124.50	.29
Laughter				1.38 (.78)				1.15 (.38)	173.50	.09

Note. Humor Condition $N = 41$; Positive Condition $N = 40$; Negative Condition $N = 42$; Neutral Condition $N = 42$.

Discussion

Based on a replication and extension of Isen et al.'s (1987) experiments, the present study investigated the relationship between humor perception and creativity. After watching a humorous, a positive, a negative, or a neutral video, subjects completed a manipulation check questionnaire and performed three verbal creativity tasks. The data of the manipulation check indicated that the emotion induction significantly changed subjects' affect in the humor condition and in the negative condition. However, for the positive video condition, no significant affect differences were found. Contrary to Mitterschiffthaler et al.'s (2007) findings, the used stimulus – the composition *Eine kleine Nachtmusik* by W. A. Mozart combined with appealing nature scenes – was likely not powerful enough to significantly change subjects' mood. Possibly, a positive stimulus without humor is less suitable for the measurable inducement of positive affect. Hence, it was not surprising that no facilitating effect of non-humorous positive affect on creativity was found. Against that, subjects in the humor video condition showed significantly higher levels of fluency, appropriateness and flexibility compared to subjects who watched the neutral video. This is in line with the *Broaden-and-Built-Theory of Positive Emotions* by Fredrickson (1998, 2001), who proclaimed that positive emotions broaden thought-action repertoires and therefore enhance the creative performance. It is also in line with the flexibility pathway of the *Dual-Pathway to Creativity Model* by De Dreu et al. (2008), which is the achieving of creativity through enhanced cognitive flexibility, set-breaking and cognitive restructuring. The authors argued that the flexibility pathway manifests itself in the use of many ideas and broad, inclusive cognitive categories. This is in line with the present findings of higher levels in fluency and flexibility after viewing the humor video. No support was found for the persistence pathway of the *Dual-*

Pathway to Creativity Model (De Dreu et al., 2008). The induction of negative affect through the video stimulus with scenes of the Chernobyl disaster showed no significant impact on subjects' creative performance. Even though the manipulation check indicated a significant effect of the negative video on subjects' mood, no facilitating influence of negative affect induction on creativity could be observed in the present study. Indeed, for negative affect, there is much more empirical evidence supporting the present findings (Amabile, Barsade, Mueller, & Staw, 2005; Davis, 2009; Estrada, Isen & Young, 1994; Fernández-Abascal, & Díaz, 2013; Filipowicz, 2006; Hirt et al., 2008; Isen et al., 1987; Topolinski & Deutsch, 2012; Vosburg, 1998) than evidence with contrary findings (Forgerad, 2011; George & Zhou, 2002; Kaufmann & Vosburg, 1997). When defining the persistence pathway, De Dreu and colleagues argued that higher creativity can be achieved through enhanced perseverance, which can be explained by the informing function of negative affect, when the individual's situation is threatening or troublesome. According to them, perseverance can manifest itself in a higher number of ideas with a relatively low number of cognitive categories, prolonged effort, and relatively long time-on-task (De Dreu et al., 2008). The present situation, in which subjects completed the creativity tasks, was not problematic or threatening. Further, subjects did not have the chance to use perseverance by remaining at one task, instead, they were supposed to produce a high number of ideas in short time intervals. In conclusion, the experimental setting was probably unsuitable to observe higher creativity levels through the persistence pathway.

In their research, De Dreu et al. (2008) were able to show that hedonic tone (positive or negative valence of the induced emotion) is not the sole factor that significantly affects the implications on creativity; they also revealed that physical

arousal (activation of the induced emotion) plays a crucial role. With regard to this, it is also likely that the content of the negative video was not enough trigger for the subjects to use the negative activating mood-persistence-creativity pathway. The same can also apply for the non-humorous positive video, when it failed to activate the flexibility pathway in the subjects.

Through the post-hoc analysis of gender differences, some gender effects were detected. Regardless to the video condition, women showed a higher performance in appropriateness and flexibility. These findings reflect the tendency found by a recent meta-analysis by Bear and Kaufman (2008) that women tend to be more creative than men. Contrary to the present results, the results of the meta-analysis indicated no gender differences in verbal creativity tests in most of the past studies (e.g., Amabile, 1983), even though gender differences in brain hemispheres used during verbal creativity tests were found (Tarasova, Volf, & Razumnikova, 2010). Thus, this study expands the overall conclusion of the meta analysis to verbal creativity.

Results of the manipulation check indicated no gender specific reactions to the videos. However, after the manipulation check, women's performance was significantly higher than men's performance for most of the creativity indicators in the positive and the negative group. Filipowicz (2006) found gender differences in the creative performance after affect induction, too. In contrast to the present results, he found a better creative performance in men after the humorous video and explained it through a higher reported activation of men compared to women. Our results were contradictory to Filipowicz (2006), while they were consistent with the meta-analysis (Bear & Kaufman, 2008), which indicated more overall creativity in women.

To sum up, the results of the present experimental study support Isen et al.'s (1987) findings. Like Isen et al. (1987), an effect of humorous positive affect

induction on creativity could be shown. Our variation in methods to operationalize and assess creativity expands their findings on verbal creativity and specifies them on the creativity indicators fluency, appropriateness and flexibility. To take the unsuccessful manipulation check for the non-humorous positive affect induction into account, no clear statements can be made about its impact. However, negative affect was not found to be related to higher creativity, against the assumption of the *Dual-Pathway to Creativity Model* (De Dreu et al., 2008).

Strengths and Limitations

As probably all studies, also this study has strengths and limitations. Both occur when light is shed on the experimental design of the present study. Debate about the pros and cons of laboratory experiments has a long tradition. Whereas some scholars have argued in favor of laboratory experiments with controlled manipulations of conditions and carefully documented populations, others argued in favor of field experiments where conditions are more “realistic”, and therefore imply greater relevance to policy (Falk & Hackman, 2009). The basis of this replication was a laboratory experiment and we adopt and expand the given concept. We understand our research to take place at the interface between fundamental and applied research, whereas a randomized laboratory experiment ideally enables us to isolate the effect of interest and exclude possible disturbance variables. The emotion induction by video clips made it possible to produce natural occurring affect, which could be measured in the subjects. High objectivity is been given through the evaluation of the creativity task by several raters. Another great benefit of the present design is the possibility to put a causal construction. Due to the fact that affect induction, manipulation check and creativity tasks took place in a controlled

chronological order, it was possible to investigate whether a causal link exists between humor as the independent and creativity as the dependent variable.

However, there is room for improvement. In the discussion of results of laboratory experiments, it is necessary to evaluate the representative value of the experiment. The affect induction was not part of a daily, work-related situation under colleagues, and it neither occurred within a leader-employee relationship. Likewise, the tasks of the verbal creativity tests were not taken from a realistic challenge in the work environment of an employee. Thus, caution should be taken by the direct transferral of the results to the workplace.

Additionally, the sample was not particularly representative, because most participants were young, highly educated females. Therefore, generalization of the results is limited, perhaps to young professionals and knowledge workers.

A key challenge during the interpretation of the results was the suitability of the video clips to induce desirable feelings. Thus, it would have been a good option to pretest stimulus videos before the main experiment on the dimensions (1) hedonic tone and (2) activation.

Finally, a short look on creativity, the dependent variable in the present study, should be taken. First, it must be noted that the results only apply to verbal creativity and cannot be generalized onto other forms of creativity. A disadvantage of the usage of the Verbal Creativity Test (Schoppe, 1975) is its dependence on language. Thus, it is possible that the tests measure both creative and language skills. Generally, the measurability of creativity is doubted, by both lay persons and scientist. One central problem in the development and usage of creativity tests is the lack of conceptual clarity (Crockenberg, 1972), the foundation for developing valid instruments. As mentioned above, there are many definitions of creativity, and even

thought most psychologists agree with the *standard definition*, there is still no clarity in public's opinion, whether creativity is measurable.

Plucker and Runco (1998) examined current issues, advances and future directions in the assessment of creativity and came to the conclusion: "The death of creativity measurement has been greatly exaggerated. (...) If researchers continue to broaden their conceptions of creativity and assessment, psychometric approaches to creativity will not only rise from their rumored sickbed but will also begin to thrive" (p. 36–38).

According to them, this study makes a small contribution to the flourishing of the research on creativity.

Theoretical and Practical Implications

Several implications for future research can be made. This study was the first trying to investigate differences in the induction of humorous and non-humorous positive affect with the same type of stimuli. Future studies should expand the insights by pretesting stimulus videos to investigate, whether the induction of non-humorous positive affect is possible and if a succeeded induction impacts the creative performance. Further, it could be worthwhile to investigate, whether positive and negative *humor* differs in its impact on the creative performance. As mentioned above, past research indicated fundamental differences in the effect of positive and negative humor styles. Future research could clarify if this differentiation is necessary in experiments with humor induction.

Furthermore, it is important to clarify the role of time pressure in the negative-affect-creativity-link. Some researchers already investigated time pressure in connection to creativity (e.g., Amabile, Hadley, & Kramer, 2002), but did not focus on

the impact of negative emotions. Up until now, there is no consensus about the effect of negative affect on creativity, so that more research is urgently needed.

Another area which is almost neglected, is the research on gender specific reactions of humor induction. The contradictory results of Filipowicz (2006) and of this master's thesis provide the basis to grapple this research issue.

Further investigations should also clarify, whether hedonic tone and activation interact into the humor-creativity-link.

The results of the present master's thesis may be interesting for practitioners as well. We agree with Romero and Cruthirds (2006) when they describe positive humor at the workplace as a multifunctional management tool. The use of positive humor can be especially important when designing work environments to foster verbal creativity in employees. It can be recommended for managers and leaders, to create a humorous atmosphere during meetings, brain storming or idea finding processes, where divergent thinking is needed. Further, leaders can increase work situations which allow employees to interact in a humorous way. However, as mentioned above, humor at the workplace has a dark side as well. The use of negative humor (e.g., through a high level of aggressive or self-defeating humor) by the leader may have crucial, negative consequences on employee creativity. Therefore, leaders and managers should be aware of their individual use of humor and carefully think about the consequences of their – supposedly funny – jokes.

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Appendix

Abstract (German)

Bisherige experimentelle Forschungsarbeiten, die sich mit der Rolle von Humor als Einflussfaktor auf Kreativität befassten, brachten widersprüchliche Ergebnisse. Um zur empirischen Präzisierung der Verbindung von Humor und Kreativität beizutragen, wurde eine erweiternde Replikationsstudie in Form eines Experimentes entworfen. Als Basis diente eine wegweisende Reihe von Experimenten von Isen, Daubmann und Nowicki (1987). 165 Probanden wurden kurze Video-Sequenzen gezeigt, um verschiedene affektive Zustände auszulösen (Humor, positiv, negativ, neutral), anschließend wurde der Effekt auf ihre Kreativität gemessen. Um die Ergebnisse von Isen et al. (1987) zu erweitern, wurde positiver Affekt mit und ohne Humor unter Benutzung der gleichen Reizformen erfasst. Es wurde ein verbaler Kreativitätstest verwendet und mehrere Indikatoren von Kreativität erfasst: Quantität, Zweckmäßigkeit, Flexibilität und Originalität. Entgegen der Annahme des Dual Pathway to Creativity Models, dass sowohl positiver als auch negativer Affekt Kreativität fördert, wirkte nur die Induktion von positivem Affekt *mit* Humor unterstützend auf die kreative Leistung der Probanden, nicht aber positiver Affekt *ohne* Humor oder negativer Affekt. Zusätzlich wurden Geschlechterunterschiede in den Reaktionen auf die Videos gefunden. Zukünftige Forschungsarbeiten sollten untersuchen, inwieweit die Valenz und die Aktivierung der Emotionen interagieren und welche Rolle Geschlechtsunterschiede in der Verbindung von Humor und Kreativität spielen.

Schlüsselwörter: Humor, Kreativität, Affektinduktion

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