The psychology of creativity : moods, minds, and motives

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What enables scientists to make notable contributions, and engineers to creatively solve technical problems? What hinders designers to fashion new clothing, and hampers an author to write novel prose? When are people creative, and why? What hinders creativity, and when? Partly because creativity helps human progress, survival, and adaptation, these questions are as old as the human sciences. Accordingly, creativity has been studied in the psychological sciences for decades and now has its own place within most of the traditional sub-areas in psychology, including social, organizational, personality, cognitive, clinical, and child psychology.

Within these different sub-areas, mood stands out as one of the most widely studied predictors of creativity, which is defined as the production of ideas, insights, products, or problem solutions that are original and appropriate. The popularity of mood as a predictor of creativity is partly due to the fact that mood often serves as an intermediary state between a host of situational and personality predictors, on the one hand, and creative performance, on the other. Thus, once we understand how mood relates to creativity we may infer from the ways in which leadership influences employee mood how leadership relates to employee creativity, and from the ways in which group conflict influences individual moods we may infer how conflict relates to group creativity. Its importance also lies in the fact that moods can be influenced more directly to stimulate creativity. For example, convinced that a calm and relaxed state stimulates creativity, organizations spend large amounts of money on relaxation rooms to stimulate employees' creative thinking. Unfortunately and despite its popularity, the empirical evidence for the mood-creativity relationship is puzzling with many inconsistent findings. As such, the work on the mood-creativity relationship leaves unanswered which moods do, and which do not, promote creative insight and original thinking?

My goal in the present dissertation was to examine which mood states help or hinder creativity and to understand why this is the case. In order to do so, I invoked the Dual Pathway to Creativity model (DPCM) that identifies two pathways to creativity (De Dreu et al., 2008). According to DPCM, creativity can be achieved through enhanced cognitive flexibility (the use of broad and inclusive cognitive categories, global as opposed to local processing of information, and flat associative hierarchies) or enhanced cognitive persistence (the focused and systematic exploration of a few possible solutions and perspectives in great depth and prolonged and motivated effort). DPCM further proposes that the flexibility and/or persistence-pathway is activated by states or traits that are activating rather than deactivating. However, some activating states and traits may affect creativity

primarily through their influence on cognitive flexibility, while other activating states and traits affect creativity primarily through their influence on cognitive persistence. Because initial evidence suggested this also applies to moods and motivational orientations, the focus of the present dissertation, DPCM offers a good framework to understand which moods and motives help or hinder creativity and to understand why this is the case.

Main Findings

In Chapter 2, I reported on a meta-analysis of the effects of specific mood states (happy, relaxed, sad, fearful, and angry) on creativity. The first goal was to examine whether the inconsistencies in past work on the mood-creativity relationship could be explained in terms of DPCM. Moreover, it was argued that specific mood states can be differentiated in terms of hedonic tone (positive vs. negative), level of activation (activating vs. deactivating), and motivational orientation (approach vs. avoidance) and these are mood dimensions that have been meaningfully related to flexibility, persistence, and to creative performance in general. Therefore, another goal of the meta-analysis was to understand whether the mood-creativity relation is better understood in terms of hedonic tone, level of activation, motivational orientation, or combinations of these three dimensions.

Findings showed that the mood-creativity link is better understood as a function of a mood state's associated level of activation and motivational orientation than simply in terms of hedonic tone. Consistent with DPCM, it was found that deactivating mood states (e.g., relaxed state, sadness) are not related to creativity. In comparison to mood-neutral states, a relaxed state, a deactivating positive mood state associated with an avoidance orientation, was not related to creativity (k [number of studies] = 3, r = .01), as was the case for sadness, a deactivating negative mood state associated with an approach orientation (k = 21, r = .02). Consistent with DPCM, it was also found that activating mood states that are associated with an approach orientation (e.g., happiness, anger) were associated with increased levels of creativity. In comparison to mood-neutral states, happiness was associated with greater levels of creativity (k = 53, r = .17) and anger produced more creativity than relaxed moods and comparable levels of creativity to happiness. However, because only two studies that were included in the meta-analysis involved anger, clearly more research was needed to explore the role of anger in the creativity process. This void was filled in Chapter 3.

Finally, and inconsistent with the idea that activating moods would enhance creativity, findings showed that fear, an activating negative mood state associated with an avoidance orientation, was negatively related to creativity (k = 20, r = -.12). However, three cautionary notes must be raised here. First, follow-up analyses showed that only measures of cognitive flexibility were negatively related to fear (k = 13, r = -.20), but not other indicators of creativity, such as fluency or originality. Second, the findings on fear were based on correlational studies, prohibiting conclusions about causality. Third, although consistent with the finding that avoidance orientations are not or negatively related to creativity, experimentally induced activating and avoidance-related mood states, such as fear and anxiety, have been found to promote creative performance. In short, a true understanding of the interplay between motivational orientation, specific mood states, and creative performance needed more work. Achieving this was the goal of Chapter 4.

Chapter 3 examined whether and why anger promotes creativity. Because anger mobilizes energy, arouses, and activates, it was predicted that anger potentially leads to more creativity than sadness, a deactivating mood state, and mood-neutral control states. Across four experiments in which moods were manipulated through self-generated imagery (Study 3.1–3.4), anger indeed enhanced creativity more than sadness and mood-neutral control states, but only initially – in the first blocks of time – and not in later phases of the creativity task. Furthermore, anger associated with a less structured approach to idea generation as compared to sadness – we found less semantic clustering and more self-induced yet unstructured switching between cognitive categories among angry individuals than among their sad counterparts (Study 3.1 and Study 3.2). Such unstructured thinking is relatively taxing, and indeed, these findings suggest that the relatively steep decline in creative productivity among angry individuals is due to resource depletion – angry people burn a lot of energy early on, which makes them relatively creative but also renders them fatigued faster than sad or mood-neutral people. Such fatigue shows up in substantially reduced creative performance at later stages. Accordingly, we found in Study 3.4 that following the taxing creativity task, angry participants reported being more depleted than sad individuals. Moreover, the relatively steep decline in creative performance among angry individuals was mediated by feelings of depletion. In short, the "wilder and more energetic" task-approach by angry, compared to sad, individuals pays off in initially higher levels of creativity, but because this approach is relatively taxing, energy resources get depleted, which results in reduced creativity especially in later phases. As such,

these findings point to an important boundary condition to the general idea that activating mood states increase creativity.

Chapter 4 examined how motivational orientations and specific mood states associate with one another, and how they promote or inhibit creative performance. As said, DPCM suggests that any state or trait that activates rather than deactivates the individual promotes creativity. Approach states are generally activating, but whether avoidance states are activating and boost creativity depends on regulatory success, the sense of success or progress towards fulfilling a goal. Approach states activate the individual because the desired end-state is not attained and frustration and annoyance signals additional effort is needed, or because the desired end-state is achieved and the concomitant joy and elation activates in and of itself. Avoidance states activate the individual as long as the undesirable end-state is not successfully avoided; but when successfully avoided, the individual experiences relief, is deactivated and disengaged. Accordingly, in four experiments the basic hypothesis was tested that in the case of regulatory failure, both approach and avoidance oriented individuals would show high levels of creative fluency, originality, and insight performance; in case of regulatory success, however, avoidance oriented individuals were expected to show lower levels of creativity than those with an approach orientation.

The results of four studies confirmed this basic prediction and showed that directly induced feelings associated with unsuccessful avoidance (i.e., fear) led to more creativity than directly induced feelings associated with successful avoidance (i.e., relief; Study 4.2). Moreover, in the case of regulatory failure (i.e., not achieving a goal), avoidance-oriented individuals produced similar levels of creativity as approach-oriented individuals. However, in the case of regulatory success (i.e., achieving a goal), avoidance-oriented individuals produced lower levels of creativity than those with an approach orientation (Study 4.1, 4.3, and 4.4). Finally, this effect was mediated by self-reported activation (Study 4.3 and 4.4). Thus, the results across all four studies show that greater originality and more creative insights emerge when the individual is activated, regardless whether the motivational orientation is towards approach or towards avoidance.

I also found new support for the idea that creativity can be achieved through enhanced cognitive flexibility and/or enhanced cognitive persistence. Study 4.2 showed that fear led to greater creative fluency than relief through cognitive persistence (i.e., within-category fluency), and not through cognitive flexibility (the number of semantic categories that was assessed). In addition, Study 4.4 showed

that approach-related states led to the use of more mental categories in a brainstorming task (i.e., flexibility) than avoidance-related states. However, and inconsistent with the idea that avoidance-related states lead to a narrow processing style focused on details (i.e., persistence; Study 4.2), this effect was further qualified by regulatory success. Thus, avoidance-oriented individuals in the regulatory failure condition showed comparable levels of flexibility as those in the approach conditions; only individuals in the successful avoidance condition appeared to be less flexible. Finally, because of this decreased flexibility, the successful avoidance condition (vs. the unsuccessful avoidance and approach conditions combined) led to lower levels of fluency and originality.

Overall Conclusion

My goal in the present dissertation was to examine which mood states help or hinder creativity and to understand why this is the case. Consistent with DPCM, the results show, first and foremost, that creativity is enhanced when the individual is cognitively aroused and activated. Happiness is associated with greater creativity than relaxed moods and mood-neutral control states (Chapter 2, De Dreu et al., 2008), anger led to more (early) creativity than sadness and mood-neutral control states (Chapter 3; De Dreu et al., 2008), and although individual differences in anxiety related negatively to cognitive flexibility (Chapter 2), experimentally induced fear and anxiety led to greater fluency and originality than relief (Study 4.2; see also De Dreu et al., 2008). Our findings on the role of motivational orientations in creativity further attest to the generalizability of the idea that some cognitive activation is needed for creativity to come about. Compared to deactivating motivational states (e.g., successful avoidance), activating motivational states (e.g., unfulfilled avoidance-related states, and approach-related states) led to greater levels of creative performance. Moreover, this effect was mediated by feelings of activation (Study 4.3 and 4.4). Supporting DPCM, it was thus found that any state that activates the individual stimulates creativity. However, I also identified an important boundary condition for this so-called "activation-effect:" although the mobilization of energy and resources shows up in relatively high levels of creativity early on, resources are also limited in their availability, and due to resource depletion, creative performance may be substantially reduced at later stages.

Second and consistent with DPCM, it appears that some activating states may have their creativity enhancing effects primarily because of increased flexibility and others primarily through increased persistence. Happiness and approach-related

states enhance creativity primarily through increased flexibility (Study 4.4; see also De Dreu et al., 2008) and findings from Chapter 3 point to the possibility that this might also be the case for anger. Fear, on the other hand, is associated with reduced cognitive flexibility (Chapter 2) and promotes creativity primarily through increased persistence (Study 4.2; see also De Dreu et al., 2008). Taken together, DPCM received new support in that creativity can be achieved through different routes - cognitive flexibility or cognitive persistence, but an important issue is what determines which route is engaged? In our earlier work, hedonic tone and level of activation were put forward as critical dimensions underlying the mood-creativity relation, with activating moods stimulating creativity through flexibility when tone is positive and through persistence when tone is negative (De Dreu et al., 2008). However and consistent with work on motivational orientation and processing modes, current findings suggest that activating mood states stimulate creativity primarily through flexibility when the motivational orientation is towards approach and primarily through persistence when the motivational orientation is towards avoidance.

In conclusion, creativity can be achieved through flexible, global, and divergent thinking and through systematic and persistent probing of a few categories and ideas. Help-books on creativity tend to focus exclusively on the flexibility pathway by highlighting the importance of "out-of-the-box," lateral, and divergent thinking, which is supposedly triggered by deactivated moods and minds. This pervasive viewpoint on how creativity is best achieved is also widespread among managers and entrepreneurs who think that creativity requires "loose," "out-of-the-box," and flexible thinking and is best achieved in a relaxed mood. The current findings indeed suggest that creativity can be achieved through flexible and divergent thinking. This, however, does not happen when one is deactivated, feels relaxed and calm – it happens when one is activated, feels happy, and is focused on desired outcomes. To boost creativity in their employees, managers are ill-advised to spend large amounts of money on relaxation rooms; they are better off making their employees happy or having them focused on desired outcomes. The same managers and entrepreneurs are also ill-advised when they assume that a systematic and thorough approach hinders creativity. In doing so, they fail to see the persistence pathway to creativity. It may take longer for creativity to come about, but given enough resources, the deliberate, persistent, and in-depth exploration of a few cognitive categories or perspectives may ultimately results in many and original ideas, products, and insights. As the famous scientist Isaac Newton said: "If I have

ever made any valuable discoveries, it has been due more to patient attention, than to any other talent." This dissertation suggests that Newton's humble introspection may reflect not only his fitting intuition about the psychology of creativity, but also that Newton resembled a scaredy-cat more than a happy camper.