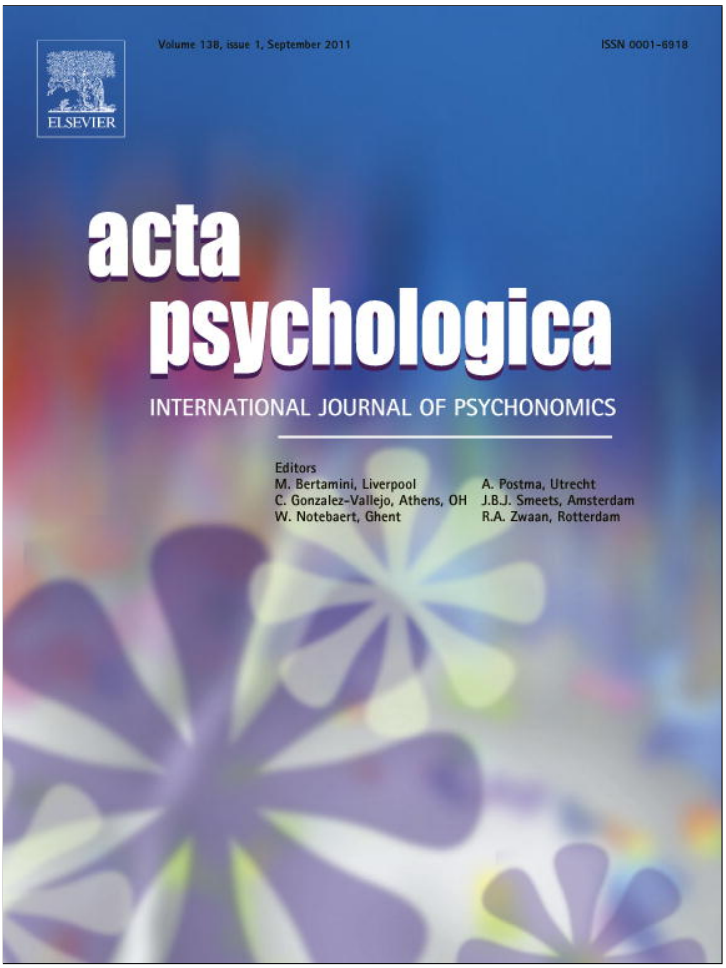

Acta Psychologica 138 (2011) 39–44

Contents lists available at ScienceDirect

Acta Psychologica

journal homepage: www.elsevier.com/ locate/actpsy

Cognitive consequences of motivational orientation: Perceived similarity between objects

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ARTICLE INFO

Article history:
Received 2 April 2011
Received in revised form 4 May 2011
Accepted 5 May 2011
Available online 1 June 2011

PsycINFO codes:
2300
3000

Keywords:
Approach/avoidance
Motivation
Similarity
Global
Local
Processing style

ABSTRACT

Recent findings suggest that the unconscious activation of the motivational orientations of approach and avoidance is accompanied by the adoption of a more global and a more local processing style, respectively. A global processing style, in turn, is assumed to instigate a focus on similarities whereas a local processing style is assumed to instigate a focus on differences. Integrating these two ideas, the present research examines the hypothesis that participants under approach perceive objects as more similar to each other than participants under avoidance. To test this assumption, we induced the two motivational orientations and elicited judgments of similarities (Experiments 1 and 2) and differences (Experiment 2) for pairs of pictures. Results confirmed the hypothesis. We propose that the relative attunement to similarities/differences under approach/avoidance is functional because it allows for a flexible conceptualization of the environment/an ability to discern slight deviations from what is expected.

1. Introduction

> "*Listening not to me but to reason, it is wise to agree that all is one*."—Heraclitus, Fragments: The Collected Wisdom of Heraclitus, Fragment 50

One promising avenue for studying how motivation can lead to action is to identify mechanisms that tune our cognition and perception to best serve our motivational states. One assumption that has been confirmed is that, specific need states or goals can enhance accessibility of and attention to need- and goal-related objects (Aarts, Dijksterhuis, & de Vries, 2001; Bruner, 1957; Förster, Liberman, & Higgins, 2005). Another assumption that has been corroborated is that general motivational states of the organism attune it to seek out opportunities or to avoid dangers (Carver & Scheier, 1990; Elliot & Trash, 2002; Higgins, 1997). Here, we argue for the existence of a heretofore untested attunement: that a motivational orientation of approach leads to perceiving more similarities between objects in the environment, whereas a motivational orientation of avoidance leads to perceiving more differences between objects in the environment. We further suggest that the increased sensitivity to similarities is beneficial under benign conditions (in which an approach orientation is called for) because it allows for a more flexible conceptualization of the environment. An increased sensitivity to differences, in contrast, is beneficial when the situation is hostile (and an avoidance orientation is invoked) because it allows one to better discern deviations from what is expected, deviations that often signal a source of danger.

Up to now, neuropsychological, social-cognitive, and personality research has mainly conceptualized motivational orientations of approach and avoidance as readiness to decrease and to increase the physical distance between oneself and a target object, respectively. When under an approach orientation, people are faster to minimize the physical distance from positive objects (e.g. a cake) by moving toward them, or by moving the objects towards themselves. When under an avoidance orientation, people are faster to maximize the physical distance from negative objects (e.g., a snake) by moving away from them, or by moving the objects away from themselves (Chen & Bargh, 1999; Seibt, Neumann, Nussinson, & Strack, 2008).

In addition, Förster, Friedman, Özelsel, and Denzler (2006) found that the activation of these orientations is also accompanied by the activation of two distinct processing styles or manners of attending to

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0001-6918/$ – see front matter
doi:10.1016/j.actpsy.2011.05.003

information. When under approach, one's perceptual attention is more global, attending to the entire gestalt of the object. In contrast, when under avoidance, one's perceptual focus is more local, attending to details and components of the object. To test this assumption, the authors unobtrusively induced participants into an approach or an avoidance orientation and presented them with a series of hierarchical letters — large (global) letters made up of small (local) letters (e.g., an H made of Fs) (Navon, 1977). The participants' task was to quickly decide whether a target letter was presented on the screen. Participants in the control and approach conditions responded faster when the target matched the global letter, whereas participants under avoidance responded faster when the target matched the local letters. This finding supports the notion that an approach orientation broadens the focus of perceptual attention and results in a relative focus on global perceptual features, whereas an avoidance orientation narrows the focus of perceptual attention and results in a relative focus on local perceptual features. In line with this finding, Förster and Higgins (2005) have shown that there is a bidirectional link between a promotion regulatory focus (associated with an approach orientation, Higgins, 1997) and a more global processing focus, as well as between a prevention regulatory focus (associated with an avoidance orientation) and a more local processing style.

A global versus local processing style, in turn, influences various cognitive processes. Thus, for example, global (as opposed to local) processing was shown to foster halo effects (Förster, Özelsel, & Epstude, 2010) and assimilation (Förster, Liberman, & Kuschel, 2008) in person perception, to improve face recognition, to worsen word recognition (Förster, 2010), and to encourage creative thinking, while dampening analytic thinking (Förster, Epstude, & Özelsel, 2009). The assumption that underlies the current research is that a global processing style leads people to focus on, and search for, similarities, whereas a local processing style leads to a focus on dissimilarities (Förster, 2009). Förster suggests that a global processing style fosters a focus on what two targets have in common in their relational structure (i.e., how properties of the standard and the target are interrelated). According to structure mapping approaches, such a focus underlies the processing of similarity (Gentner & Markman, 1997; Medin, Goldstone, & Gentner, 1993). In contrast, the breaking of targets into their constituent parts, as in local processing, is associated with a focus on ways to separate targets from each other. Indeed, when Förster (2009) primed participants with either a global or a local processing style and then asked them to find similarities and dissimilarities between objects (two TV shows; dolphins and sharks, etc.), participants primed with a global processing style were found to generate more similarities and less differences than those primed with a local processing style. Furthermore, Förster (Experiments 8a and 8b) also found that whereas a promotion regulatory focus (associated with approach) is positively correlated with the amount of similarities reported between two target objects and negatively correlated with the amount of dissimilarities reported between them, a prevention regulatory focus (associated with avoidance) is positively correlated with the amount of dissimilarities reported between the two objects and negatively correlated with the amount of similarities.

In conclusion, if indeed (a) approach and avoidance motivational orientations are associated with global and local processing styles, respectively, and (b) a global processing style is associated with a tendency to focus on similarities and a local processing style is associated with a tendency to focus on dissimilarities, it follows that an approach orientation renders people more likely to perceive similarities between objects as compared to an avoidance orientation. This hypothesis is at the focus of the present article.

2. Experiment 1

Experiment 1 examines the hypothesis that when presented with pairs of pictures, participants under an approach orientation perceive the two pictures as more similar to each other than participants under an avoidance orientation. Motivational orientation was unobtrusively manipulated by inducing participants to assume either an arm flexion or an arm extension position. The arm flexion position involved lightly pressing the palm upward against the bottom of the table, keeping the elbow bent at a right angle, thus activating the arm flexor muscle. This activation is associated with an approach motor action of moving objects toward oneself, and has been shown to induce an approach motivational orientation. The arm extension position involved lightly pressing the palm downward against the top of the table, keeping the elbow straight, thus activating the arm extension muscle. This activation is associated with an avoidance motor action of moving objects away from oneself, and it induces an avoidance orientation (see Cacioppo, Priester, & Berntson, 1993; Förster & Strack, 1997, 1998; Neumann & Strack, 2000; Nussinson, Seibt, Häfner, & Strack, 2010; Nussinson, Häfner, Seibt, Strack, & Trope, in press; Priester, Cacioppo, & Petty, 1996; and see Seibt et al. 2008).

2.1. Method

2.1.1. Subjects

Forty-one students of a German university participated in the experiment. They were offered a chocolate bar for their participation. One participant who failed to follow the instructions and two participants who did not believe the cover story were excluded from the analysis.

2.1.2. Design

The design was a 2 (Arm position: arm flexion vs. arm extension) × 2 (A-priori relatedness of the pictures in a pair: related vs. unrelated) × 2 (Scale: increasing in perceived similarity from 1—not at all similar to 11—very similar vs. decreasing in perceived similarity from 1—very similar to 11—not at all similar) × 2 (Order: order 1 vs. order 2) design with arm position, scale, and order as between-participants factors and a-priori relatedness of the pictures in a pair as a within-participants factor.

2.1.3. Materials and apparatus

The experimental task was administered on PC screens. The size of the pictures ranged from 7.5 cm width × 5.5 cm height to 13.5 cm width × 11.5 cm height, and the size of the pictures in a pair was kept similar. Thirty-six pairs of pictures, 31 colorful and 5 in black and white, depicting landscapes, objects, people and animals were used in this experiment. Based on the results of a pretest the pictures were paired so that 18 pairs consisted of moderately related pictures and 18 pairs consisted of unrelated pictures. Four pairs (two related pairs and two unrelated pairs) served for practice. The rest of the pairs were divided into two lists (list A and list B), each consisting of eight related and eight unrelated pairs.

A paper-and-pencil questionnaire was constructed to control for affective and non-affective differences between the conditions. Participants were asked to rate on 9-point Likert scales their motivation, their liking of the task, the difficulty of the task, their concentration while performing it, their success in keeping the tension in their arm throughout the task, the ease with which they differentiated the pairs of pictures in terms of their similarity, the naturalness of the task, the strain in keeping the tension in the arm, and how they currently felt. A final question was an open-ended probe for suspicion regarding the cover story.

2.1.4. Procedure

Participants were recruited for a study on “the processing of pictures” and were run individually. They were seated in a chair approximately 46.6 cm tall at a table approximately 71.6 cm tall. A cover story was used to eliminate self-perception effects on performance. Building on the cover story used by Friedman and Förster (2000), participants were told that “In the following study we examine connections between intuitive processing of information and different kinds of activation of the hemispheres… In order to activate the hemispheres we will use a new method: the contraction of

muscles in your arm. Recent studies show that the activation of the arm muscles affects the activation of the hemispheres." Participants were further explained that they would perform a series of simple tasks tapping intuitive information processing.

Then, participants were shown with the appropriate arm position (according to their assigned condition) and were introduced with "the information-processing task". They were told that they would be presented with pairs of pictures and that their task was to quickly decide how similar the two pictures were on a scale from 1 to 11. While performing this task participants assumed the designated arm position with their dominant arm. They typed in their ratings with their other hand. It was emphasized that there were no correct answers and that we were interested in the participants' first, immediate impression of the degree of similarity of the two pictures. Half the participants in each arm position made their ratings on an increasing scale (in which "1" stood for *not at all similar* and "11" for *very similar*) and half on a decreasing scale (in which "1" stood for *very similar* and "11" for *not at all similar*). This variation was introduced in order to ascertain that, if found, the effect does not merely reflect a general tendency of participants under approach to provide higher ratings.

In each trial, the two pictures were presented side by side in the upper part of the screen. Two seconds later they were accompanied by a similarity scale. When the participant typed in his/her rating, the pictures and the scale disappeared, and 1000 ms later the next pair of pictures was presented. The first four trials were practice trials. The order of the following 32 pairs of pictures was manipulated orthogonally to arm position and scale: half the participants were presented with list A followed by list B, whereas the others were presented with list B followed by list A. The pictures within each list were presented in a fixed pseudorandom order. A short break was introduced between the two lists during which participants relaxed their arm and then reassumed the position before continuing with their ratings. On trials in which participants did not respond within 4 s from the presentation of the scale, a text was presented on the screen asking them to respond faster. After completing the similarity rating task, participants filled out the paper-and-pencil questionnaire, were debriefed, and received a chocolate bar for their participation.

2.2. Results and discussion

Data from participants that responded on the decreasing scale were reversed so that for all participants the higher the rating — the higher the perceived similarity. Studies of similarity in various domains suggest that an initial rapid similarity processing is followed by a slower, more detailed process (Markman & Gentner, 2005). We assumed that quick, spontaneous judgments were more likely than slow, deliberate ones, to be influenced by the subtle motor cues of approach and avoidance. Therefore, a total of 0.3% of the ratings provided more than 4000 ms from the presentation of the scale (which is when the text asking participants to respond faster was presented) was omitted from the analysis.

Mean similarity ratings were analyzed by a 2 (Arm position) × 2 (Scale) × 2 (Relatedness) × 2 (Order) ANOVA with relatedness as a within-participants factor. There was no effect for order and it was, therefore, discarded from all further analyses. A 2 (Arm position) × 2 (Scale) × 2 (Relatedness) ANOVA revealed a main effect of relatedness, $F(1, 34) = 654.75$, $p < .0001$, $\eta^2_p = .95$, with a-priori related pairs rated as more similar than a-priori unrelated pairs ($M_{related} = 6.48$, $M_{unrelated} = 2.44$), and a main effect of arm position, $F(1, 34) = 14.26$, $p < .001$, $\eta^2_p = .30$, with participants who made their judgments in an arm flexion position rating the pictures as more similar than participants who made their ratings in an arm extension position ($M_{flexion} = 4.95$, $M_{extension} = 3.91$). No other effects emerged. The fact that no interaction was found between arm position and scale ($F < 1$), suggests that the effect of arm position does not merely reflect a general tendency of participants in arm flexion to provide higher ratings. The arm position affected both the ratings of the a-priori related pairs, $F(1, 34) = 13.52$, $p < .001$, $\eta^2_p = .28$, as well as the ratings of the a-priori unrelated pairs, $F(1, 34) = 7.96$, $p < .01$, $\eta^2_p = .19$. Participants' responses to the questionnaire revealed no affective or non-affective differences between the two arm position conditions.

Thus, as predicted by the notion that approach instigates the use of a more global processing style, Experiment 1 shows for the first time that people under approach perceive stimuli in their environment as more similar to each other than people under avoidance. However, both scales used in Experiment 1 asked about the similarity of the pictures. A more stringent test of our hypothesis would include a scale which asks about the differences between the two pictures. This is why we designed Experiment 2.

3. Experiment 2

Findings suggest that a promotion regulatory focus (associated with approach) instigates a more "risky" decision-making bias whereas a prevention regulatory focus (associated with avoidance) fosters a more "conservative" decision-making bias: When working on a decision making task that requires them to decide whether they did or did not detect a signal, those in a promotion focus are more inclined to say "yes" than to say "no", whereas those in a prevention focus are more inclined to say "no" than to say "yes" (Crowe & Higgins, 1997; Friedman & Förster, 2001). Since approach and avoidance are associated with promotion and prevention, respectively (Higgins, 1997), it might be that approach is also associated with an affirmative response bias and avoidance with a dissenting response bias. If that is the case then the question arises as to whether the effect observed in Experiment 1 can be attributed to the tendency of individuals under approach to affirm the hypothesis that the pictures are similar, and to the tendency of individuals under avoidance to reject the hypothesis that the pictures are similar.

Experiment 2 was designed to rule out this possibility. Half the participants under each motivational orientation were asked to judge how similar the two pictures were, whereas the rest were asked to judge how different the two pictures were. The question of interest was whether participants under approach would perceive more similarity than those under avoidance, when asked how different the two pictures were. If the results of Experiment 1 reflect a response bias associated with the orientations, then when asked how different the two pictures are participants under approach are expected to rate the pictures as more different. If, however, the results of Experiment 1 reflect an effect of the orientations on cognitive style, then participants under approach are expected to rate the pictures in a pair as more similar to each other regardless of the question asked.

3.1. Method

3.1.1. Subjects

Sixty students from a German university, not majoring in psychology, participated in a battery containing several unrelated experiments for 6€ payment. Three participants were excluded from the analyses because their native language was not German, and two other participants were excluded because they failed to follow instructions, leaving a sample of 55.

3.1.2. Design

The design was a 2 (Arm position: arm flexion vs. arm extension) × 2 (A-priori relatedness of the pictures in a pair: related vs. unrelated) × 2 (Task: rating similarity vs. rating difference) × 2 (Order: order 1 vs. order 2) design with arm position, task, and order as between-participants factors and a-priori relatedness of the pictures in a pair as a within-participants factor.

3.1.3. Materials and apparatus

The experimental task was similar to that of Experiment 1, except that half the participants were asked to indicate how similar the two

pictures are on a scale from 1—*not at all similar* to 11—*very similar* (as in Experiment 1), whereas the rest of the participants were asked to indicate how different the two pictures are on a scale from 1—*not at all different* to 11—*very different*.

Furthermore, participants were asked to rate on 9-point Likert scales their liking of the task, their success in keeping the tension in their arm throughout the task, the ease with which they differentiated the pairs of pictures in terms of their similarity, and the strain in keeping the tension in the arm. Mood was assessed by asking participants to indicate their mood on a line of 12 cm labeled "very bad" on one end and "very good" on the other. A final question was an open-ended probe for suspicion regarding the cover story.

3.1.4. Procedure

Participants were run in groups of up to three. Upon arrival, participants were seated in a chair approximately 46.6 cm tall at a table approximately 71.6 cm tall. Participants went through the same procedure as in Experiment 1, except that half of the participants were asked to rate the difference of the two pairs and that the questionnaire was presented on the screen. After completing the questionnaire, participants were debriefed and paid.

3.2. Results and discussion

No participant expressed suspicion regarding the actual purpose of the arm manipulation. Data from participants that responded on the difference scale were reversed so that for all participants the higher the rating the higher the perceived similarity. A total of 1% of the ratings which were provided more than 4000 ms from the presentation of the scale, (which is when the text asking participants to respond faster was presented) was omitted from the analysis.

Mean similarity ratings were analyzed by a 2 (Arm position) × 2 (Task) × 2 (Relatedness) × 2 (Order) ANOVA with relatedness as a within-participants factor. There was no effect for order or for its interactions with any of the other variables and it was therefore discarded from all further analyses. A 2 (Arm position) × 2 (Task) × 2 (Relatedness) ANOVA revealed a main effect of relatedness, $F(1,51) = 350$, $p < .001$, $\eta^2_p = .87$, with a-priori related pairs rated as more similar than a-priori unrelated pairs ($M_{related} = 5.11$, $M_{unrelated} = 3.84$), and a main effect of arm position, $F(1,51) = 4.17$, $p < .05$, $\eta^2_p = .07$, with participants who made their judgments in an arm flexion position rating the pictures as more similar than participants who made their ratings in an arm extension position ($M_{flexion} = 4.67$, $M_{extension} = 4.12$). No other effects emerged. The fact that no interaction was found between arm position and task, $F = 1.07$, *ns*, suggests that the effect of arm position is not due to response bias. As in Experiment 1, arm position affected the ratings of the a-priori related pairs, $F(1,51) = 4.15$, $p < .05$, $\eta^2_p = .08$, and (although marginally) the ratings of the a-priori unrelated pairs, $F(1,51) = 3.72$, $p < .06$, $\eta^2_p = .07$. Participants' answers to the questionnaire revealed no affective or non-affective differences between the two arm position conditions.

To conclude, the data from Experiment 2 suggest that the process underlying the effect of arm position on perceived similarity (or difference) reflects different cognitive styles rather than different biases.

4. General discussion

This article examines the hypothesis that when under approach, people perceive objects in their environment as more similar to each other than when under avoidance. In line with this hypothesis, participants in two experiments rated pictures in pairs as more similar to each other while flexing their dominant arm (assumed to activate an approach motivational orientation) than while extending it (assumed to activate an avoidance orientation).

Consistent with our findings are findings by Nussinson et al. (2010) showing that people under approach perceive greater psychological similarity between unknown others and the self than people under avoidance (Experiments 1 and 2). Nussinson et al. further showed that when under approach, people's behavior assimilated toward the typical behavior of a primed exemplar (e.g., Einstein, Lothar Matthäus) or a stereotype (professors, soccer players) whereas under avoidance their behavior was contrasted away from the typical behavior of the prime (Experiment 3). The authors assumed that an approach orientation led to perceiving greater similarity between the self and the prime, and thus to categorizing them in the same category, resulting in behavioral assimilation. In contrast, an avoidance orientation was assumed to lead to perceiving the self and the prime as different and to categorizing them into different categories, resulting in behavioral contrast (see Schubert & Häfner, 2003).

Whereas Nussinson et al.'s (2010) findings were specific to the effect of the orientations on the similarity of self to others, the present findings attest to the more general role played by motivational orientations on the perception of similarity between objects in general. Furthermore, Nussinson et al. explained their effect in terms of effect priming, assuming that, much like other actions, approach and avoidance behaviors render the actor more sensitive to perceptual cues associated with their effects (i.e., closeness to the self and distance from the self, respectively). The current findings suggest that the effect of the orientations on perceived similarity extends beyond effect priming.

4.1. Related findings

Our findings may be related both to the literature on conditioning and to the study of more specific goals. Various findings suggest that people have more generalized, abstract, and flexible notions of resources (approach-instigating stimuli) as opposed to more specific, feature-dependent notions of dangers (avoidance-instigating stimuli). For example, findings show that although each satisfies a different need state, different rewards (e.g., money, food) are psychologically substitutable. Thus, hungry people are less willing to donate money, and participants with a stronger induced desire for money consume more food (Briers, Pandelaere, Dewitte, & Warlop, 2006). Furthermore, Hoefling et al. (2009) showed that the (approach related) goal to eat renders the category of food more inclusive, making food-deprived people ready to approach otherwise unpalatable, negatively valenced food. Both of these effects may be conceptualized as a broadening of motivation-related categories, and they may well be driven by the same focus on similarities that we demonstrate above. Avoidance states, by contrast, lead to a narrowing of attentional focus (Derryberry & Tucker, 1994) and result in a more feature dependent conception of dangers. Indeed, research into the preparedness of fear conditioning shows that not only are we prepared to react to a certain well-confined set of stimuli with a fear response, but also that the UCS has to match the conditioned stimulus on the relevant attribute: fear of snakes, for example, can be easily conditioned with an electric shock as a UCS, but much less so with loud noise (Cook, Hodes, & Lang, 1986). Research on taste aversion also demonstrates the critical role played by the belongingness of the CS–UCS pair as defined by their specific attributes (Garcia & Koelling, 1966). These findings fit well with a focus on specificities and on differences under avoidance and a focus on generalizations and similarities under approach.

4.2. Implications and functionality

The results of the two experiments reported in this article suggest that perceived similarity among stimuli is moderated by one's motivational orientation. In both experiments the effect was observed not only for pairs of pictures that were somewhat similar (related) but also for pairs of pictures that seem to bear no a-priori similarity (unrelated). The finding that participants under approach perceived unrelated pictures as more similar than participants under avoidance strongly suggests that they conceptualized both pictures on a more

abstract level, while ignoring differences on a concrete level. Although our studies did not involve a direct measure of the effect of the orientations on processing style (thus precluding any mediational analysis) we think this finding supports the notion that the effect of motivational orientations on perceived similarity is mediated by the activation of a global processing style under approach and a local processing style under avoidance (Förster et al., 2006; and see also Derryberry & Tucker, 1994 and Tucker & Williamson, 1984).

Our results are important because recent findings provide evidence that the degree of similarity between aspects of one's environment, as well as between aspects of the environment and background knowledge, is calculated continuously in an automatic, unintentional, and often unconscious manner (Markman & Gentner, 2005). Furthermore, it is assumed that this initial assessment of similarity guides the allocation of attentional resources (Markman, 2001), and provides a reliable guide for further processing. In some cases the detection of initial similarity results in an early sense of "something interesting's happening" and therefore leads to the allocation of more processing resources to a more elaborate processing of the stimulus. In other cases (such as in habituation) the detection of similarity (between consecutive stimuli) results in the allocation of less processing resources to the later stimulus. If one's motivational orientation affects the perceived similarity of stimuli in one's environment, then we would expect it to moderate these effects as well.

According to this analysis, individuals under approach should be more likely to experience the metacognitive feeling of "something interesting's happening" in response to relatively unconnected stimuli, and should hence be more likely to elaborate on them. Such a tendency may sometimes privilege people under approach in the use of analogies (see also Friedman & Förster, 2000, Experiment 5) and metaphors, in discerning general truths and common building blocks of the world, and in coming up with creative ideas that bridge seemingly unrelated domains (Gentner & Gentner, 1983; Markman & Gentner, 2005). If, for example, people under approach are more likely to perceive similarity and relatedness between background knowledge and seemingly unrelated aspects of the environment (e.g., a problem at hand and objects that could potentially serve as means for its solution, or a missing object and an available one that could substitute it) they would stand a better chance of dealing with benign environments. In this regard our findings go hand in hand with those of Friedman and Förster's (2000) showing that approach orientation bolsters creative insight. People under avoidance, by contrast, may profit from a better ability to discern between similar objects or ideas, and to show in which way they differ. Furthermore, our analysis suggests that the greater sensitivity to differences of people under avoidance makes them better qualified to locate aspects of the environment that deviate from background knowledge (e.g., schemas) and more generally to trace stimuli that are *not* "in line". They should hence be more sensitive to irregularities (e.g., that apple that looks just a bit different from the way an apple should look like, or from the way the apples that surround it look like). At the same time they should be slower to habituate, and should keep relatively alert in the face of a seemingly unchanging environment.

Our findings may imply that approach sensitizes the perceiver to obscured solutions and to the potential hidden in exploring seemingly irrelevant alternatives whereas avoidance sensitizes the perceiver to deviation from common order, which is often a predictor of danger.

4.3. Future research

Given that many effects in this domain are bi-directional (Strack & Deutsch, 2004), it would be interesting to examine whether individuals trained to find similarities and structural alignments between different objects would also exhibit a greater approach motivational orientation as a result. Such training might help individuals overcome a chronic avoidance orientation, such as one induced by persistent stress.

Acknowledgments

We thank Simone Dohle, Matthias Michalik, Thomas Stemmler, Robert Kordts and Urs Wenzel for serving as experimenters. We also thank Jens Förster for invaluable advice and discussions regarding the contents of this article.

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