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TARGET ARTICLE

GLOMO[sys]: A Systems Account of Global Versus Local Processing

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Within GLOMO[sys] (the GLObal versus LOcal processing MOdel, a systems account) we examine the functionalities of two processing systems that process information either globally or locally (looking at the forest vs. the trees). GLOMO[sys] suggests that (a) global versus local perceptual processing carries over to other tasks; (b) perceptual processing is related to conceptual processing (e.g., creative/analytic tasks; face/verbal recognition; similarity/dissimilarity generation; abstract/concrete construals, distance estimates, inclusive/exclusive categorization; assimilation/contrast in social judgments); (c) perceptual and conceptual processing is elicited by real-world variables (e.g., mood, exteroceptive and interoceptive cues of approach/avoidance, promotion/prevention focus, high/low power, distance, obstacles, novelty/familiarity, love/sex, interdependent/independent selves); (d) regulatory focus, psychological distance, and novelty are driving effects; and (e) the global system (glo-sys) processes novelty and the local system (lo-sys) processes familiarity. We discuss whether glo-sys is responsible for understanding meaning, relate the systems to physiological research, and discuss new research questions.

People can attend to the same event in different ways. When attending to an object, they can zoom out and pay attention to its entire figure, or they can zoom in on the same object and pay attention to its details. In other words, as the proverb says, they can look at the forest or the trees. In psychological terms, people can use different *processing styles*. By using a global processing style, people attend to the Gestalt of a stimulus set, whereas when using a local processing style they attend to its details (Navon, 1977; Schooler, 2002). Navon's (1977) classic test of the global *dominance hypothesis* (predicting that people, by default, look for the forest rather than the trees) probably best illustrates the distinction between global and local perceptual processing. He presented participants with large letters that were made up of small letters (see Figure 1) and showed that participants were faster to identify the global target letter than the local target letters. Although researchers challenged the global dominance hypothesis and offered various theoretical models explaining the effect (Kimchi, 1992; Kinchla & Wolfe, 1979; Lamb & Robertson, 1990; Love, Rouder, & Wisniewski, 1999), global versus local processing has generated an abundance of research investigating its moderators and effects.

In this target article we develop a systems account of the GLObal and LOcal processing MOdel, GLOMO[sys]. The model is based on five assumptions that are derived from recent and classical theorizing, as well as evidence from our own and other labs. Notably, although some of these assumptions have been made before by others, it is our aim to integrate them into a comprehensive model. GLOMO[sys] suggests the following

1. A processing shift: Global versus local perceptual processing carries over to other tasks.
2. Percept-concept-links: Perceptual processing styles are related to conceptual processing styles.
3. Triggers of processing: Perceptual and conceptual processing is elicited by a variety of real-world variables.
4. A psychological "glue": Perceptual and conceptual processing is based on a few common factors.
5. Two processing systems: The global system processes novelty and the local system processes familiar events.

Let us explain these assumptions in more detail.
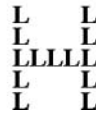
Key A= L   H = Key B

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    L        L
    L        L
    LLLLL
    L        L
    L        L
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Figure 1. Sample item from the Navon-letter-task (Navon, 1977).

Processing Shifts: Global Versus Local Perceptual Processing Carries Over to Other Tasks

Processing styles are content-free ways of perceiving the world and are represented in procedural memory (Tulving & Schacter, 1990). To illustrate, in the task developed by Navon (1977), hereafter referred to as the Navon-letter-task, participants focused on letters as gestalts or as constituting details. Within this paradigm, semantics were held constant by instructing participants to attend to the same amount of Hs made of Ls and Ls made of Hs, thereby merely changing the focus of attention on gestalts versus details.

Processing styles can carry over to other, unrelated tasks, without participants' awareness, representing cases of *procedural priming*. Schooler (2002; Schooler, Fiore, & Brandimonte, 1997) described such carryovers as "processing shifts," which can be transfer-appropriate or transfer-inappropriate. During transfer-appropriate processing shifts, residually-activated procedures are beneficial for subsequent processing, whereas transfer-inappropriate shifts result when the elicited procedures impair subsequent processing. For example, solving analytical reasoning problems may activate procedures that transiently facilitate the ability to solve similar problems (Schooler, 2002). Likewise, memory performance can be enhanced if the processes used at encoding fit the processes at retrieval (Morris, Bransford, & Franks, 1977; Roediger, 1990).

Notably, "procedural priming" is different from "semantic priming" (see Smith & Branscombe, 1987), in that the *how* rather than the *what* is primed (for a detailed discussion, see Förster & Liberman, 2007; Förster, Liberman, & Friedman, 2007). Semantic priming describes the—often automatic (Bargh, 1994)— influence of activated semantic concepts on information processing and behavior via increased accessibility (see Neely, 1977). Accessible knowledge can enhance perceptual readiness: For example, participants become faster at identifying the word *light* if they previously saw the word *lamp*. It can further have an effect on social judgments, such as when participants describe an ambiguously reckless person as more aggressive after being primed with "recklessness"

than after being primed with "adventurous" (Higgins, Rholes, & Jones, 1977).

In a classic study, Smith and Branscombe (1987) illustrated the difference between semantic and procedural priming by asking participants to judge an ambiguously aggressive person. Before judging the target, participants were primed either semantically by unscrambling sentences describing hostile behaviors (e.g., "leg her break he"; see Srull & Wyer, 1979) or procedurally by being presented with the same sentences in an unscrambled form and having to choose the matching trait (e.g., hostile). The latter represents procedural priming, because inferring traits from behavior was the same procedure people had to use when judging the vaguely aggressive target in the second phase. Results showed that the semantic priming of traits had an effect on aggressiveness ratings only for a short delay (15 s), whereas procedural priming continued to have this effect after a longer delay (15 min). The *procedure* of extracting traits from behavior seemingly made this particular inference style more accessible and facilitated its use more permanently than semantic priming (Förster & Liberman, 2007; Smith, 1989; Smith, Branscombe, & Borman, 1988). Although research on semantic priming exploded during the last two decades, procedural priming remains underexamined.

Recently, attempts to fill this void have been made by examining global versus local processing styles and their impact on several dependent variables. Most prominently, Macrae and Lewis (2002) showed that face recognition was improved following a global processing task but was impeded following a local processing task. In the experiment, participants watched a videotape of a simulated bank robbery and afterward had to recognize the robber. Before recognition, however, participants performed an allegedly unrelated modified Navon-letter-task. The task was used to procedurally prime processing styles *between* participants, by instructing them to attend to either the global features of the presented stimulus *or* the details of this figure. Results showed that face recognition was less accurate after participants focused on the local letters, whereas having focused on the global letters increased accuracy compared to an unprimed control group
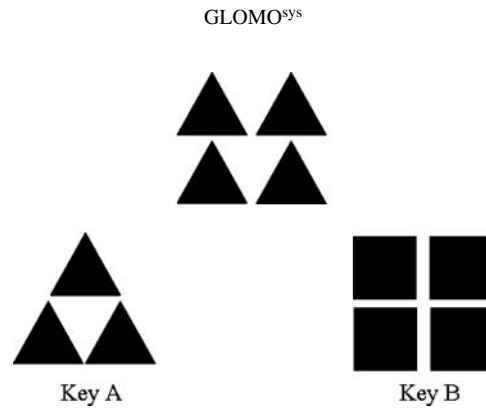
Figure 2. Sample item from the Kimchi-Palmer-figures-task (Kimchi & Palmer, 1982).

(see also Weston, Perfect, Schooler, & Dennis, 2008). The authors explain this effect by transfer-appropriate shifts, because face encoding has been shown to profit from holistic processing (see Michel, Rossion, Han, Chung, & Caldara, 2006; Tanaka & Farah, 1993; Tanaka & Sengco, 1997; Young, Hellawell, & Hay, 1987). To reiterate, the effect of such procedural priming could not be based on differences between semantics, because all participants were exposed to the same letters; only their attention was directed to either the Gestalt or the details of the very same stimulus set.

While these studies showed carry-over effects from visual perception to another visual task, recent studies investigated cross-modal processing shifts (Förster, 2010a). For example, one study had participants feel an entire stimuli set or its details with their fingers. More specifically, under the pretext of a "perception quiz," the experimenter blindfolded participants, seated them behind a desk, and asked them to feel an object on a desk in front of them for 45 s. The stimulus set consisted of four small square plastic boxes that were glued in a square to a cardboard. In the global condition, the boxes were taped closely together, representing one large object. In the local condition, the taped boxes were spaced 10 cm apart, representing four smaller objects. In the control condition, both cardboards were presented and participants had to feel them one after the other. In an allegedly unrelated next experiment, a variant of the Navon-letter-task was given (Gasper & Clore, 2002; Kimchi & Palmer; 1982; see Figure 2). More specifically, participants were presented with geometric shapes, like a triangle or a square, that were made up of smaller triangles or squares. A square made up of triangles could therefore be viewed locally as triangles, or globally as a square. Participants were then presented with two sample figures that involved the local elements (e.g., triangles) or the global element (e.g., a square) and had to decide which of two sample figures looked most like the target figure by pressing one of two designated keys. Choice of local sample figures reflects a dominant local processing style, whereas choice of global sample figures reflects global processing. This paradigm (hereafter referred

to as the Kimchi-Palmer-figures-task) aimed to improve the Navon-letter-task, which was suspected to be confounded with size and conspicuity (e.g., Kimchi, 1983; Kimchi & Palmer, 1982). Results showed enhanced global visual processing upon global haptic priming and enhanced local visual processing upon local haptic priming compared to the control group.

In another study, Dutch participants were asked to listen to an alleged Moldavian poem, which was in fact a text written in an artificial language. In the global condition, the poem was presented in a fluent reading style, whereas in the local condition the reading was very disfluent, including many breaks, emphases, and interruptions. In the control condition, the poem was a mixture of fluent and disfluent reading styles. In a subsequent Kimchi-Palmer-figures-task, as predicted, global listeners made more global choices, whereas local listeners made more local choices compared to the control group.

Similar effects on global/local visual processing were obtained with tasting four different muesli samples or smelling four different aromas. Participants' visual processing was more global after tasting or smelling four ingredients as a whole (global tasting/smelling) than when tasting or smelling them separately (local tasting/smelling). These preliminary findings attest to the range of two basic processing modes that operate across sensory modalities. Are such carry over effects restricted to sensory content, or can they also extend to conceptual processing?

Percept-Concept-Links: Perceptual Processing Styles Are Related to Conceptual Processing Styles

According to prominent views in cognitive psychology, high-level cognition derives from, and is connected to, perception (Barsalou, 1999; Finke, 1985; Gilbert, 1991; Masson, 1995). Most relevant for the current analyses is Derryberry and Tucker's (1994) suggestion (see also Friedman & Förster, 2008, 2010) that the mechanisms, which drive perceptual attention

and let you focus visually on one percept while excluding others, might be linked to mechanisms that drive conceptual attention such as the selective activation within semantic networks (see also Anderson & Spellman, 1995; Neill & Westberry, 1987; Neumann & DeSchepper, 1992; Posner, 1987). Conceptual attention refers to when a concept such as, for example, "mountain" is primed, and activation spreads either narrowly to concrete associates (e.g., "stone" and "goat") or to abstract or superordinate concepts (e.g. "nature"; see Förster, Friedman, & Liberman 2004) that give room for further activation of remote associates (e.g., "eternity"; "Kopenhagen" or "polar bear"; see Friedman & Förster, 2008; Förster, 2009).

In their classic book *Psychological Differentiation*, Witkin, Dyk, and Faterson (1962) summarized numerous studies showing correlations between perceptual and conceptual attention tasks. For example it has been found that the embedded figures test (EFT; i.e., finding simple patterns within complex visual patterns; Witkin, Oltman, Raskin, & Karp, 1971) is related to insight problem solving that involves the activation of remote associates (see Förster et al., 2004; Friedman & Förster, 2008). More recent research showed correlations among performances on the Remote Associates Test (Mednick, 1962), number of generations for alternative uses of an object (e.g., a brick), higher scores on the Creative Personality Scale (Gough, 1979), and faster global than local responses in the Navon-letter-task (Vartanian, Martindale, & Kwiatkowski, 2007).

Experimental evidence comes from studies examining the influence of global versus local perception on a diversity of dependent variables, such as creative thinking, distancing, and similarity focus. We now describe some of the experiments.

Creativity

One study (Friedman, Fishbach, Förster, & Werth, 2003) primed global versus local perception by asking participants to look at either the Gestalt of a state map (global processing) or a specific detail of the same map (local processing). In the test phase, participants were asked to generate the most unusual exemplar they could think of for a number of categories (e.g., birds, colors, fruits, etc.). Results showed that participants who looked globally at the map afterward created more atypical exemplars than participants who looked at the map's details. In conceptual replications, the authors had participants look for items on a computer screen within a small (local processing) or a larger (global processing) radius (Friedman et al., 2003) or primed them with the Navon-letter-task (Förster & Friedman, 2010). Then, participants had to find a creative title for a cartoon and generate unusual uses for a brick (Friedman & Förster, 2001). More creative solutions

(as rated by experts) followed global priming compared to local priming. Participants in the global processing condition produced, for example, creative uses such as "grind it up and use it as makeup," whereas locally primed participants generated solutions such as "build a wall" (Förster & Friedman, 2010).

To explain the results, Friedman and Förster (2008, 2010) developed their attentional tuning model, which suggests that focusing perceptual attention broadly versus narrowly can facilitate versus impede the ability to activate inaccessible conceptual representations in memory. In a global focus, more superordinate or abstract concepts (e.g.; thinking of a brick as a "rectangular object" or a "reddish substance") are activated that trigger more remote concepts (e.g., "makeup"), thereby enhancing performance in creativity tasks (see Finke, 1995; Mednick, 1962; Ward, 1995). In a narrow, local conceptual focus, on the other hand, only concrete and dominant associations are activated (e.g., "wall," when "brick" is primed) and innovation is impeded (see Marsh, Ward, & Landau, 1999). To sum up, research on creative generation supports the assumption of a link between perceptual attention and conceptual attention. Perceptually broadening attention also broadens conceptual attention and activates abstract construal and remote exemplars in memory (Martindale, 1995).

Distance

In a different research project, Liberman and Förster (2009a) examined the influence of processing styles on distance estimates. Construal level theory (CLT; Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2003) holds that people represent distant events on a more abstract or higher level of construal because concrete information is usually lacking. As a result, a mental link between distance and abstraction may be formed, so that one dimension can influence the other. For example, "going to Zabar's at 9:15 for a lox bagel" would be represented more abstractly as "breakfast" when it pertains to a more psychologically distant action. Within the framework of CLT, research already demonstrated the influence of different distance manipulations on level of construal (for recent reviews, see Liberman & Trope, 2008; Liberman et al., 2007; Trope & Liberman, 2003), thereby broadening or narrowing perceptual and conceptual attention. For example, a study by Förster et al. (2004) showed that thinking of a distant event facilitated the generation of abstract concepts and global perception in various tasks. By means of the aforementioned close link between perceptual and conceptual scope, one may predict that perceptual-processing styles should also expand or reduce distance estimates so that for example the concrete thought of "having a Zabar's lox bagel" may activate more proximal events. According to CLT, psychological distance exists on many different dimensions, as an event can

be more or less removed from oneself on a social, spatial, temporal and hypothetical level (see Liberman et al., 2007). Thus, concrete events may activate closeness on all distance dimensions compared to abstract events.

Consequently, Liberman and Förster (2009a) primed a global or local processing style using the Navon-letter-task and afterward asked participants to estimate temporal distance (e.g., estimating how many days from now they would go to a free dental cleaning), spatial distance (e.g., estimating the distance between them and a different city); social distance (e.g., estimating closeness between them and their family doctor), or hypothetical distance (e.g., estimating the probability to become one of the 5% best people in their field). In all studies, globally primed participants estimated distances to be larger (and probabilities to be lower), whereas locally primed participants estimated distances to be smaller, compared to the control group. The data support the crucial role of processing styles in estimates of psychological distance. Such results almost literally reflect the aforementioned notion of activating "remote" thoughts or associates when people are in a global as opposed to local processing mode.

Assimilation/Contrast and Dis/similarity Search

A global processing mode not only activates more remote exemplars in memory but also defines structural relations between perceptual stimuli (Love et al., 1999) that are also known to underlie higher order processing, such as analogical and metaphor processing or similarity judgments (Gentner, 1983; Gentner & Markman, 1997). When individuals search for similarities between two targets, they focus on what they have in common and on their relational structure, thereby globally processing the entire stimulus set. When, instead, people search for dissimilarities, they focus on ways to separate targets from one another, breaking them into their constituent parts, a process related to local processing. Links between local/global processing and dis/similarity search may be bidirectional so that globally processing two targets fosters a focus on similarities (e.g., two birds are included in the category of robins), whereas during local processing, dissimilarities may become more salient (e.g., a bird that lacks red feathers is excluded from the category of robins; see Schwarz & Bless, 2007).

In a recent set of nine experiments, Förster (2009) examined such bidirectional links more closely. Using the Navon-letter-task, participants were primed with global or local processing styles and were then asked to find similarities and dissimilarities between two comparable TV shows. Results showed that whereas global priming led to the generation of more similar-

ities than dissimilarities, local priming led to the opposite; in the control condition (primed globally and locally) participants generated similarities and dissimilarities to the same extent. Förster then carefully varied both dependent and independent variables to conceptually replicate the findings. For example, results were replicated when the map-task (Friedman et al., 2003)—instead of the Navon-letter-task—was used to induce processing styles. The pattern of results was also obtained when the comparison set included targets (dolphins and sharks) that differed more on the abstract level (mammal vs. fish) but were similar in details (they swim and have a dorsal fin), or if the comparison objects were rather dissimilar (a statue and methane gas) and when they were very similar (two copies of the same statue). Notably, in one study priming participants locally or globally caused spontaneous dis/similarity generation even in the absence of specific instructions to generate similarities or dissimilarities. Attesting to a bi-directional link, a different experiment showed that priming a focus on similarities induced global attention in a subsequent Navon-letter-task, whereas a focus on dissimilarities induced local attention.

Global and local processing can also influence assimilation and contrast in social judgment. Förster, Liberman, and Kuschel (2008) used a typical paradigm in which participants first compared themselves to a high or a low standard and then estimated how they would score on this dimension. To illustrate, in one study participants compared themselves to high standards (Michael Schumacher, a Formula 1 racer) or low standards (Bill Clinton) with respect to athletic skills. Before comparing themselves, participants were primed globally or locally with the Navon-letter-task. When in a global processing style, participants assimilated to the standard, thinking for example that they could do more push-ups when compared to Michael Schumacher and fewer push-ups when compared to Bill Clinton. In contrast, participants primed with a local processing style contrasted themselves from the standards: they thought they could do more push-ups on comparison with low standards and fewer push-ups on comparison with high standards. This pattern of results even holds for extreme standards (which usually give rise to contrast effects; see Förster & Liberman, 2007; Higgins, 1996) and was in one study partly mediated by the cognitive accessibility of similarities or dissimilarities (Förster et al., 2008; see Mussweiler & Strack, 2000).

To explain the effects of processing styles on assimilation and contrast, Förster et al. (2008) proposed the GLOMO (GLObal vs. LOcal processing MOdel), which introduces a process distinction in which global processing leads to inclusion and assimilation and local processing leads to exclusion and contrast. Based on Schwarz and Bless's (1992, 2007) Inclusion-Exclusion

Model, GLOMO proposes that assimilation occurs when the target (e.g., me) is included in the standard's category (e.g., athleticism, or "sportive people"); however, contrast occurs when the target is excluded from the category. Put differently, globally processing leads to inclusion (of the self in the category of an athlete or athletic people) and renders similarities accessible (e.g., I like sports like them/him); however, local processing leads to exclusion from a category and renders dissimilarities accessible (e.g., I am not like them, my muscles are weaker).

Because GLOMO, as a predecessor of GLOMO[sys], explains mechanisms of social comparison, let us briefly discuss the advantage of this approach over existing models in this domain (for a detailed discussion, see Förster et al., 2008).

The Relation of GLOMO to Other Models of Assimilation/Contrast

GLOMO, as many other models on assimilation and contrast effects, such as, for example, SAM by Mussweiler (2007); ICM by Stapel and Koomen (2001), and the REM by Markman and McMullen (2003), was derived from Schwarz and Bless's (1992, 2007) Inclusion-Exclusion Model. Of importance, GLOMO does not contradict any of these models but rather extends them because it can integrate different potential causes of assimilation and contrast effects. Although critics complained (see Schwarz & Bless, 2007) that other models can either predict *changes in representations* (see SAM) or *differential use of the same representations* (see ICM) in assimilation and contrast, GLOMO can explain why both differences *in accessibility* of input and different *use* of input affect social judgment. For example, in Förster et al.'s (2008) experiments, it did not matter whether processing styles were primed before or after participants were exposed to the comparison. Furthermore, although ICM, SAM, and REM are silent with respect to processing information that occurs outside of social comparisons, Förster et al. (2008) could demonstrate spontaneous assimilation/contrast effects due to processing styles even when participants were merely asked to evaluate a different person (an ambiguously aggressive person, see Srull & Wyer, 1979) upon semantic priming (of aggressive or nonaggressive content). To sum up, in social judgment, global/local processing affects the actual representation and the utilization of information, and operates beyond social comparisons.

GLOMO[sys] goes beyond social judgments, incorporating a variety of outcome variables such as creativity and distance, which was just summarized. In the following, we want to demonstrate another advantage of GLOMO[sys], namely, that it can incorporate a range of real-world variables that activate different processing styles.

Triggers of Processing: Perceptual and Conceptual Processing Is Elicited by a Variety of Real-World Variables

In the following, we first summarize variables that can trigger global or local processing styles and current models explaining the effects. Later, we examine the psychological commonalities among these moderators.

Mood

Numerous studies support the general contention that positive affect leads individuals to focus on the "forest" at the expense of the "trees," whereas for negative moods the reverse is true (cf. Reeves & Bergum, 1972; Tyler & Tucker, 1982; Weltman, Smith, & Edstrom, 1971). For example, Gasper and colleagues (Gasper 2004; Gasper & Clore, 2002) had their participants write about a "happy and positive" or a "sad and negative" life event. In the following Kimchi-Palmer-figures-task they found that happy moods lead to global processing, whereas sad moods lead to local processing. Not only situationally induced but also chronic moods, such as trait happiness and optimism, are associated with attention toward global as opposed to local structures, whereas trait depression and anxiety correlates negatively with global processing (Basso, Schefft, Ris, & Dember, 1996; see also Derryberry & Reed, 1998).

Taking this further, research has established that positive moods can also improve performance in conceptual tasks such as creative thought and breadth of categorization (see Baas, De Dreu, & Nijstad, 2008; Isen, 2000; Isen, Daubman, & Nowicki, 1987). In a famous study, Isen and Daubman (1984) used Rosch's (1975) categorization task to show that participants who first watched a comedy were more likely to include fringe members (such as camel) into a certain category (such as vehicles), reflecting a broader conceptual categorization, than participants who watched a movie about concentration camps.

Several models can explain these effects (for a review, see Baas et al., 2008). We selectively focus here on the ones that point to mechanisms beyond moods and that can be applied to effects on perceptual *as well* as conceptual attention. For example, Tucker and colleagues (Tucker & Williamson, 1984; see also Derryberry & Reed, 1998; Derryberry & Tucker, 1994; Luu, Tucker, & Derryberry, 1998) put forth an elaborate neuropsychological model, in which they predict that aversive arousal narrows perceptual attention and thereby reduces the range of cues that an organism can use (as suggested by Easterbrook, 1959). This change in perception is thought to be associated with a *tonic* system residing in the brain's left hemisphere. Upon exposure to threat cues, this system automatically elicits a *redundancy bias*, constricting the scope of

attention and impairing access to "remote" constructs. In contrast, motivational approach states (e.g., elation) broaden perceptual attention; such a process is supported by a *phasic* system that is lateralized in the brain's right hemisphere. In the face of attractive incentives this system automatically elicits *a habituation bias*, expanding attentional scope and enabling access to perceptually peripheral or relatively inaccessible cognitive information (Friedman & Förster, 2008).

Recently, functional process models aimed to explain why this would be the case. Most prominently, in the *cognitive* tuning-model by Schwarz and Bless (Clore et al., 2001; Gasper & Clore, 2000; Schwarz, 1990; Schwarz & Bless, 1991; Schwarz & Clore, 1996) mood states serve as information (Schwarz & Clore, 1983), apprising individuals of the nature of their current environment. Positive moods signal that the world is safe and that goals are not threatened. In safe situations, individuals become more agreeable to risk-taking and adopt a more heuristic cognitive approach (cf. Isen, 1987; Isen, Means, Patrick, & Nowicki, 1982). This in turn facilitates exploration of novel alternatives (cf. Fiedler, 1988; Fredrickson, 2001) and the activation of remote exemplars in memory (Friedman & Förster, 2008). In contrast, negative moods may inform individuals that their world is threatening and that their goals are compromised. In unsafe situations, tried and true strategies and a relatively systematic approach are used to solve the problem at hand, because experimentation and risky behavior would be too costly.

In line with such reasoning, Förster and Higgins (2005) suggested that a local processing style is adopted when people are concerned with security, because it prepares the individual for searching concrete and verified means of problem solving. However, when concerns of security are replaced by an emphasis on self-fulfillment and growth, which represent a category of abstractly defined goals (Baumann & Kuhl, 2005), a global processing style is triggered, because merely attending to the concrete surroundings would be insufficient or even detrimental to effective goal pursuit.

Approach Versus Avoidance Cues

Besides using mood and conscious affect as primary signals of safety and danger (cf. Clore, Schwarz, & Conway, 1994), people "are able to implicitly or explicitly utilize a virtually unlimited array of intero- and exteroceptive cues to interpret the nature of the situation and modify [their] thought and action patterns accordingly" (Friedman & Förster, 2000). Within their work on creativity, Friedman and Förster (2000) used motor actions of arm flexion and arm extension to induce approach and avoidance, respectively. Specifically, participants were either asked to press their palms upward against a surface, leading them to enact a motor

action typically used to pull desired objects toward the body, or asked to press their palms downward against a surface, leading them to enact a motor action usually associated with pushing undesired objects away from the body (see e.g., Cacioppo, Priester, & Berntson, 1993; Chen & Bargh, 1999; Förster, 2004; Förster & Strack, 1997, 1998; Neumann & Strack, 2000; cf. Markman & Brendl, 2005). Using perceptual tasks related to global processing, such as the aforementioned EFT (Witkin et al., 1971) and the Snowy Pictures Test (images of simple objects hidden within complex patterns of visual noise; Ekstrom, French, Harman, & Dermen, 1976), and more conceptual tasks such as creative generation (Wallach & Kogan, 1965) and creative insight (Schooler & Melcher, 1995), the authors found enhanced performance under approach arm flexion and reduced performance under avoidance arm extension (for a summary, see Friedman & Förster, 2008). Recently, Kuschel, Förster, and Denzler (2010) showed that the arm positions influenced performance on the perceptual interference paradigm (Hirshman & Mulligan, 1991), a backward-masking paradigm, reflecting access to higher order information at early perceptual stages, in that arm flexion led to better performances than arm extension.

Notably, the arm positions used in the studies typically do not elicit conscious or explicit affect (see Förster & Friedman, 2009) but can be considered *implicit affective cues* of benign or unsafe situations (Friedman & Förster, 2010; see Frijda, 1988) that are sufficient to narrow or broaden attention.

Regulatory Focus

Safety and growth concerns are part and parcel of regulatory focus theory (RFT; Higgins, 1998). Moreover, RFT claims independence between valence of (affective) end states and approach versus avoidance motivation (see Higgins, 1998; Förster, Higgins, & Idson, 1998). So, for example, a person may construe a desired, positive end-state (e.g., an A in a quiz) as a nonloss (e.g., not failing to get an A) and may use vigilant avoidance means to attain that goal (e.g., avoiding going to bed late). This happens when people are in a *prevention focus* that is grounded in safety needs. In contrast, a person focusing on the same end state may construe the event as an ideal goal or a gain (e.g., I want to get an A) and may use approach means to arrive there (e.g., calling a friend to discuss open questions). This person would be in a *promotion focus* that is grounded in growth needs.

Past studies on chronic as well as situationally induced regulatory foci were able to show a relation to global/local processing. A study by Förster and Higgins (2005) measured participants' chronic promotion versus prevention goals via the regulatory strength measure developed by Higgins, Shah, and Friedman

(1997). This computerized measure records the time (and thereby the strength of concerns; see Fazio, 1986) it takes participants to enter (on a computer keyboard) a set of three promotion goals related to growth and a set of three prevention goals related to safety. In a subsequent Navon-letter-task, promotion focus strength was positively correlated with the speed of processing global letters and negatively correlated with the speed of processing local letters, whereas the reverse was true for prevention focus strength. Of importance, the goals that participants typed were equally positive in both focus conditions. Thus, chronic safety versus growth concerns predict processing styles independent of valence.

Friedman and Förster (2001) temporarily induced regulatory focus with a subtle manipulation. All participants completed a paper-and-pencil cartoon maze in which they were asked to either lead a mouse depicted in the center of the maze to a piece of cheese (inducing a promotion focus) or help the mouse escape an owl hovering above the maze (inducing a prevention focus). Notably, these manipulations do not elicit conscious moods (see also De Lange & van Knippenberg, 2007; Fazio, Eiser, & Shook, 2004; Friedman & Förster, 2001, 2002, 2005; Sassenberg, Jonas, Shah, & Brazy, 2007; Scholer, Stroessner, & Higgins, 2008; Werth & Förster, 2007; for a similar procedure, see Langens, 2007). However, such priming had the expected effects on tasks measuring perceptual (e.g., Navon-letter-task; Förster, Friedman, Özelsel, & Denzler, 2006) and conceptual attention (e.g., creativity, category breadth and similarity search; Förster, 2009; Friedman & Förster, 2001, 2002, 2005): global processing occurred after a promotion focus was induced, whereas local processing resulted after prevention focus priming. Recently, Kuschel et al. (2010) showed that solving the cheese maze compared to the owl maze enhanced encoding of information beyond the information given, as measured by the speed of understanding of new metaphors. Notably, for these foci to have an effect, neither awareness of the goals nor explicit arousal or moods seemed to be necessary. Taken together, these findings and the aforementioned studies using arm positions suggest that both exteroceptive and interoceptive cues signaling benign versus unsafe situations can elicit global versus local processing styles (Friedman & Förster, 2008).

Colors

There are other exteroceptive cues related to approach/avoidance or benign/unsafe situations. Recent research in psychology argued that colors are also associated with approach and avoidance, in that through frequent pairing, blue is typically associated with approach, peace and tranquility, whereas red, especially in achievement situations, is associated with aversive arousal and failure (e.g., the teacher's red pen). Consistently, Elliot, Maier, Binser, Friedman and Pekrun (2009) found that participants tended to lean away from a test cover (i.e., an avoidance expression pattern) to a greater degree when it was colored red as compared to green or gray. In a different set of studies, Maier, Elliot, and Lichtenfeld (2008) exposed participants to red versus gray covers on their test booklets and then asked them to complete the Kimchi-Palmer-figures-task. Primed with red, participants showed more local processing compared to participants primed with grey. Likewise, research by Mehta and Zhu (2009) showed that blue is related to approach behavior and broadens both perceptual and conceptual attention. Notably, even though exposure to these colors did not induce moods (as measured by self-reports), they influenced processing styles, presumably because they signaled approach versus avoidance (Maier et al., 2008) or benign versus unsafe situations (Friedman & Förster, 2008).

Distance

Earlier, we mentioned recent research of perceptual attention on distance estimates. Classic research on CLT (Liberman & Trope, 2008) showed that with increasing psychological distance, events are more likely to be represented in terms of their global features that convey the perceived essence of the events (high-level construal), rather than in terms of more local or incidental details of the events (low-level construal).

For example, Liberman and Trope (1998) showed that more distant future actions are represented in more superordinate "why" terms, rather than in subordinate "how" terms. Thus, "watching TV" was represented as "being entertained" when it pertained to the distant future and as "flipping channels" when it pertained to the near future. In a different set of studies, Vallacher and Wegner's (1989) Behavior Identification Form was used, which presents diverse activities: Each was followed by two statements, one corresponding to the concrete *how* aspect and the other corresponding to the more abstract *why* aspect of the activity. For example, "locking a door" is followed by the alternative elaborations: (a) "putting a key in the lock" or (b) "securing the house." Liberman and Trope (1998) found that participants who thought about an event happening in the distant future chose the *why*, abstract solutions, more often than participants who thought about the same event happening tomorrow. These processes were found to extend to other areas as well: For example, temporal distance enhanced acceptance of atypical art objects to the category of arts reflecting greater categorical breadth (Schimmel & Förster, 2008). Similar effects also emerged with social distance (Liviatan, Trope, & Liberman, 2008), spatial distance (Fujita, Henderson, Eng, Trope, & Liberman, 2006), and hypothetical distance (Wakslak, Nussbaum, Liberman, &

Trope, 2008). Furthermore, studies consistently found that socially, spatially, and temporally distant events broaden perceptual attention in the Navon-letter-task (Liberman & Förster, 2009b), and Förster et al. (2004) showed enhanced performance in the aforementioned snowy pictures task and in the Gestalt completion task (i.e., fragmented pictures of familiar objects to be recognized; both by Ekstrom et al., 1976) as a result of temporal distance.

Förster et al. (2004) also examined the relation between distance, creativity, and abstract thinking. To illustrate, in one experiment, participants were asked to imagine their lives 1 year from now (distant future condition) or tomorrow (near future condition), or they did not get any "time travel" instructions (control condition). Afterward, they were asked to help a fictitious person "to find as many creative ways as you can regarding how she can water her plants" (concrete) or "to further improve her room" (abstract). Results showed that distant, relative to near time perspective, facilitated creative generation, but only when the creativity task demanded abstract thought. Recently, research has also found that temporal distance enhances similarity search and reduces dissimilarity search (Förster, 2009) and facilitates assimilation effects in social judgments (Förster et al., 2008).

Of importance, here again, the effects of distance are generally independent of an event's valence or moods (Liberman et al., 2007). In line with this notion, Gable and Harmon-Jones (2008) manipulated distance while holding valence of end states constant. In one experiment, all participants were exposed to positive pictures of delicious desserts. Participants' perceptual attention was more local when they expected to consume these desserts after the study, compared to participants who did not have such expectations. The authors hypothesized that the closer one is to the goal, the more people narrow down attention because they aim to "shut out irrelevant stimuli, perceptions, and cognitions as they approach and attempt to acquire the desired object" (p. 477; a goal gradient effect; Liberman & Förster, 2008). The studies are generally consistent with CLT, predicting that the closer one gets to an event, the narrower one's perceptual attention becomes.

Love Versus Lust

Romantic love is usually associated with attachment goals (Mikulincer, 1998; Mikulincer & Shaver, 2007) and wishes of "foreverness," the long-term goal of commitment and sharing a life together (Diamond, 2003, 2004); lust, however, usually exists in the "here and now" and does not necessarily involve a long-term perspective (see Sprecher & Regan, 1998). Based on CLT, one would then predict that perceptual and conceptual attention should broaden attention when people think of love and narrow it when people think of lust or

sex. In a series of experiments, Förster, Epstude, and Özelsel (2009) primed participants with love or sex via imagination paradigms and subliminal priming.[1] In the imagination studies, participants were asked to think about a situation of casual sex in which no love was involved or about a situation of love in which no sex was involved. Afterward, global versus local perceptual processing (via the Navon-letter-task), followed by creative generation versus analytical problem solving (Förster, Epstude, & Özelsel, 2009); partner evaluation on different, unrelated dimensions (such as intelligent, social, good looking, motorically skilled, etc.; Förster, Özelsel, & Epstude, 2010); and face versus verbal recognition (Förster, 2010c) were assessed. As predicted, the studies show more global perception upon love compared to sex priming, higher creative thought, lower analytic thought, worse differentiation among evaluative partner dimensions (i.e., enhanced halo), better face recognition, and lower verbal recognition. Mediation analyses revealed that perceptual attention mediated conceptual attention. Furthermore, when experts rated the temporal distance involved in the imagination studies, love led to more thoughts in the distant future than sex. Finally, distance mediated effects of love/sex on conceptual attention. Moods and emotions, however, did not mediate the effects.

Power

Social power has been related to both approach behavioral tendencies (Keltner, Gruenfeld, & Anderson, 2003) and psychological distance (Smith & Trope, 2006). In a nutshell, high power is associated with resources (e.g., Fiske, 1993; Keltner et al., 2003; Thibaut & Kelley, 1959), freedom of action (Lammers, Stoker, & Stapel, 2009) and approach, because powerful individuals (a) live in environments with more social rewards and resources (e.g., Keltner, Young, Heerey, Oemig, & Monarch, 1998; Operario & Fiske, 2001), (b) are better able to attain their goals, and (c) feel unconstrained by the consequences of their actions (see Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, 2008). Moreover, high power can be conceived of as social distance, because it often relates to independence (of other people) relative to low power (see Smith & Trope, 2006). Recently, Galinsky et al. (2008) showed that participants primed with power concepts (e.g., authority, boss, control) outperformed participants who were primed with concepts unrelated to power (e.g., automobile, bass, song) in a creative generation task

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[1]The primes were carefully pretested with respect to various dimensions. Importantly, abstractness and valence of the primes did not differ between conditions. Thus, differences in abstractness could not have been produced by features inherent in the stimuli. Rather, temporal distance triggered by love versus lust primes seemed to have driven effects.

(Rubin, Stoltzfus, & Wall, 1991). Smith and Trope showed effects of power-priming on both abstractness and perceptual breadth. Finally, Förster (2009) showed that high-power participants generated more similarities than dissimilarities, whereas the opposite was found for participants primed with low power. Thus high power seems to broaden conceptual and perceptual scope with social distance or approach motivation being candidates for processes that drive the effects.

Novelty

According to CLT, an event is psychologically distant (temporal, social, spatial, or hypothetical) whenever it is not part of one's direct experience. Recently, Förster, Liberman, and Shapira (2009) put forward the idea that the common mechanism underlying all these distances is "lack of experience" or novelty (Berlyne, 1960; Zajonc, 1968). In their experiments, novelty versus familiarity of an event was primed while holding distance constant. To give an example, in their experiments the Navon-letter-task or the Kimchi-Palmer-figures-task were framed as a "newly invented task" (novelty condition) versus a task "similar to other tasks participants had done before" (familiarity condition). In yet another experiment using a procedural priming paradigm, novelty was manipulated by either asking participants to imagine something they had never experienced (novelty condition) or something that had already happened in the past (old condition). All participants had to think of this event as happening tomorrow. Results showed that novelty framing and priming lead to relative global processing, whereas in the old conditions, the opposite was true. Using similar manipulations, novelty compared to familiarity enhanced inclusion of fringe members into certain categories (Rosch, 1975) and the preference for abstract constructs in the Behavior Identification Form (Vallacher & Wegner, 1989). Förster (2009) conceptually replicated these results with a mere exposure paradigm, in which he subliminally exposed participants to unknown letters for 0, 5, 15, and 40 times. He later presented the letters again and asked participants to write down what this symbol could mean in a different language. Note that subliminal presentation of letters prevented for any more conscious processes playing a role in this effect. Experts evaluated the abstractness of participants' solutions. Conceptually replicating findings using priming and framing, meanings of letters became more concrete with increased familiarity. In sum, the results reflect links between novelty and conceptual or perceptual breadth.

To provide a comprehensive model of novelty perception and processing, Novelty Categorization Theory (NCT; Förster, Marguc, & Gillebaart, 2010) was introduced, predicting that people are motivated to un-derstand novel events. NCT proposes that in new situations, people automatically start processing their surroundings more globally, because broader perception may help to process important contextual information and because broader categories are more inclusive. If, however, novelty is perceived as threatening, people focus on the threat to eliminate or cope with it, and local processing results. Consistently, in a series of experiments, strongly negative novelty (such as a task that was framed as potentially harming participants' self-esteem) led to local processing, whereas mildly negative novel events and positive novel events enhanced global processing (Förster, Liberman, & Shapira, 2009; Experiments 2, 4a). NCT suggests that the effects of novelty on global processing are driven by a motive to know (Kagan, 1972) or an epistemic motivation. People are generally curious and want to understand novel events and therefore open up perceptual and conceptual attention to take these events in. This general motive can be revoked by self protection motives that demand a change from global to local processing.[2]

Obstacles

A recent set of studies by Marguc, Förster, and van Kleef (2010a) examined the impact of physical and mental obstacles on processing styles. For instance, in one of their experiments, the authors asked participants to guide a cartoon figure through a maze. In the obstacle condition, the most obvious paths to the goal were unexpectedly blocked. In a subsequent variant of the Remote Associates Task (Mednick, 1962), relating to global processing (see Friedman & Förster, 2001), participants in the obstacle condition outperformed those in the control condition whose path was not blocked. This was mainly true for participants low in trait volatility (Kuhl, 1994) who usually stay engaged rather than switch between activities. Presumably, engaged participants wanted to understand the problem at hand, and to do so, they automatically started to process globally. This might have further helped them to integrate the obstacle and the goal into a common problem field (Lewin, 1935) and to eventually overcome the obstacle. Consistent with NCT, a mildly aversive situation, such as the obstacle, can lead to a global processing style. Future research is needed to show whether highly arousing obstacles, similarly to highly threatening novelty, would lead to local processing instead.

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[2] Some researchers differentiate between eudaimonic and hedonic pleasure (Deci & Ryan,. 2008; Ryan & Deci, 2001; Ryff & Singer, 1998). Although eudaimonia contains an "orientation of openness to the tension and excitement of life challenges and uncertainty" and is related to growth, expansion motives, and curiosity, hedonic pleasure contains a notion of "frequent and enduring positive affect" that is immediate (Kashdan & Steger, 2007). NCT proposes eudaimonia and curiosity as motives driving effects rather than (anticipation of) hedonic pleasure.

Culture

Finally, processing styles have been linked to differences in culture. In so-called individualistic or independent cultures, the person is a separate core unit, and society exists to promote the well-being of individuals. So-called collectivistic or interdependent cultures define the core unit as the group, and the person has to fit in with the given society and is fundamentally connected through interpersonal and group relations (see Oyserman & Lee, 2008). Although there seem to be consistent differences across cultures, where "Westerners" are more likely to promote individualistic values and are less sensitive to contextual cues than "Easterners," every person's self-concept contains aspects from both "selves" (Oyserman, Kemmelmeier, & Coon, 2002). One way to situationally draw attention to either independent or interdependent aspects of the self is to have individuals circle pronouns that symbolize independence, such as "I" and "me," versus those that symbolize interdependency, such as "we" and "us," respectively (Brewer & Gardner, 1996; Gardner, Gabriel, & Lee, 1999).

Research shows that a primed or chronic view of the self as being separate from, as compared to connected to, influences information processing (see Hannover & Kühnen, 2004). Priming, for example, the interdependent self increases global letter processing in the Navon-letter-task (Kühnen & Oyserman, 2002, Study 1) as well as solution efficiency in the EFT (Kühnen, Hannover, & Schubert, 2001, Study 1 and 4).

Beyond the independence/interdependence distinction, recent correlational evidence could also support that even religious cultures and beliefs may lead to different visual processing of content-free stimuli. In line with the observation that Dutch neo-Calvinists tend to "mind their own business," Colzato, van den Wildenberg, and Hommel (2008) found that Calvinists engage in more local processing in the Navon-letter-task compared to Atheists. Likewise, Dutch Calvinists and German Protestants have been shown to be less creative but more analytic than Dutch and German Catholics, especially when they were reminded of their religious denominations (Förster, 2010d). Although the correlational nature of the results does not permit for a causal analysis, it seems that Calvinism and Protestantism provide incentives for a local rather than global processing style, whereas for Catholics the reverse is true.

Summary

In the previous section, we showed that a variety of moderators can influence basic processing styles. Summarizing these findings, of course, does not answer the question of what common denominator may underlie all these effects. In the following section we discuss some candidates in the hope that this will help us to better understand why and when effects on processing styles occur.

A Psychological "Glue": The Effects on Perceptual and Conceptual Processing Are Based on a Few Common Factors

The aforementioned variables, such as mood, color, distance, love, power, novelty, obstacles, and culture, as well as entire regulatory concerns, are unrelated as regards to content. However, could a common psychological principle underlie their effects on processing? Admittedly, using Occam's razor in this case may involve considerable risks, because the moderators stem from different research traditions and involve social (e.g., power), emotional (e.g., love), cultural (e.g., independence), or cognitive (e.g., mental distancing) processes. Therefore, it is possible that all effects are caused by different, or a combination of, specific factors. Using parsimony as a research heuristic, however, we aim at an explanation that integrates many classic results and opens the doors for new, exciting, and original predictions. To do this, it is our goal to suggest two basic psychological systems at the end of this analysis.

Clearly, an all-encompassing umbrella explanation should be sufficiently broad, making power, love/lust or obstacles with very specific contents poor explanatory candidates. For example, it is more likely that people who are in love or powerful are in a promotion focus or in a good mood, as compared to that people in a promotion focus are in love or powerful. In the following, we discuss the concepts that could encompass most of the variables mentioned earlier. More specifically, we examine mood, valence, regulatory focus, distance, and novelty.[3]

Mood, Approach/Avoidance, Regulatory Focus as Glue

To make a long story short, it is unlikely that conscious or explicit aspects of affect drove most of the effects previously reported (see Friedman & Förster, 2010). Recall that explicit affect has been carefully measured, controlled for, and ruled out in many of the studies reported.[4] However, affect does have cognitive, experiential, and motivational components (see Frijda, 1987, 1988; Plutchik, 1980; Roseman, 1984); it has signal character (L. L. Martin & Stoner, 1996; Schwarz & Bless, 1992), is of informative value (Schwarz & Clore,

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[3]We hasten to add that this is not an evaluation of existing theories *in general*, rather we attempt to examine some important concepts with respect to their explanatory value for the aforementioned effects on processing styles.

[4]This is especially important for those variables that are related to valence and might influence affect, such as arm positions, color, regulatory focus, novelty, or power.

1983), and may have direct effects (Cacioppo, Priester, & Berntson, 1993; Strack, Martin, & Stepper, 1988) because it can be unconscious (Berridge & Winkielman, 2003) or implicit (Friedman & Förster, 2010).

Many of the moderators that encourage a global processing style seem to be related to positive valence. Could the unconscious experience or anticipation of positive versus negative states underlie the effects? Although high power, or cues of approach, both eliciting global processing, may be related to experiences of *hedonic pleasure*, such a relation would not hold for the cases of obstacles and novelty.[5] Moreover, valence or hedonic pleasure cannot explain the differences between lust and love, because participants reported experiencing these situations as equally pleasant.

One would run into similar problems if one tried to apply classic notions of approach versus avoidance as a more motivational distinction to underlie all the variables. Both sex (triggering local processing) and love (triggering global processing) involve approach motivation, whereas obstacles and novelty (both triggering global processing) have been related to avoidance in the literature (see Loewenstein, 1994). Making it more complicated, Gable and Harmon-Jones (2008) showed that as people get closer to a desired end state (approach), they process more locally.

A nonhedonic moderator (see Baas et al., 2008), independent of the approach/avoidance dimension, such as regulatory focus (RF; see Higgins, 1997) seems to make a better candidate. In a promotion focus people are *eager* to pursue their growth goals or *ideals*, whereas in a prevention focus, focusing on safety goals or *oughts*, they become *vigilant*. These strategic means used to attain *desired* end states of growth versus security can be elicited by task instructions (e.g., focusing on losses/nonlosses or gains/nongains, etc.), exteroceptive (the mouse-maze paradigm, semantic primings related to ideals or oughts, etc.) and interoceptive (arm flexion/extension, certain mood states, etc.) cues. Such cues may elicit a promotion focus if they relate to benign situations, whereas they activate a prevention focus if they relate to threatening or problematic situations (see also Friedman & Förster, 2010).

The attempt to reconceptualize variables in terms of regulatory focus looks promising. For example, seeing the color red may imply an achievement situation where one should approach desired end states more vigilantly, whereas seeing blue may signal a relaxed environment in which one can pursue one's ideals eagerly (Friedman & Förster, 2010). Likewise, high social power may allow one to eagerly pursue growth

goals, whereas low social power may enhance motivational vigilance (see Keltner et al., 2003). Similarly, but admittedly more speculative, thinking about love brings to mind ideals or abstract "maximal" goals (Brendl & Higgins, 1996), whereas security concerns and concrete "minimal" goals may more likely arise while one is reminded of (the *desired* end state of) casual sex (e.g., unwanted pregnancy or sexually transmitted diseases).

In addition, effects of psychological distance can be related to RF. An event that is perceived to be close may evoke more concrete security concerns than when it is perceived to be distant. Among others, Lewin (1935) and N. Miller (1944) theorized on so-called goal gradients (Förster et al., 1998), where not only approach but also avoidance motivation increases as one gets closer to a goal. However, whereas compared to avoidance, approach motivation is greater the farther one is away from a goal, the avoidance gradient increases more steeply with goal proximity (see Förster et al., 1998; Förster & Liberman, 2007; Liberman & Förster, 2008). From this follows that decreasing distance between the self and a goal makes prevention concerns more salient. A recent study confirms this prediction by showing that goals are construed more abstractly and imagined in the more distant future when people are in a promotion focus, whereas they are construed more concretely as oughts in the proximal future when people are in a prevention focus (Pennington & Roese, 2003). For example, in one of their studies, students thought less about ideals the closer they were to an exam, and this pattern was replicated when participants merely had to imagine the exam taking place in the near versus distant future. Moreover, when participants were asked to list promotion versus prevention goals, they expected promotion goals to be initiated and completed later in time. Thus, there seems to be a striking relation between psychological distance and RF. Proximal events trigger concerns with security and caution eliciting a prevention focus, whereas more distal events are related to ideals, and growth concerns eliciting a promotion focus.

The literature also suggests a link between a promotion focus and openness for novelty. For example, participants in a promotion focus are more willing to exchange an old task or object they received for a new one (Liberman, Idson, Camacho, & Higgins, 1999). Furthermore, people in an insecure situation, and consequently in a prevention focus, prefer tried and true strategies of problem solving over new and risky ones (Friedman & Förster, 2001). Thus, a promotion focus leads to more openness for novelty, yet, to the best of our knowledge, it is not known whether being exposed to novelty triggers a promotion focus. Of importance, Förster, Liberman, and Shapira (2009) and Förster, Marguc, and Gillebaart (2010) distinguish between benign and threatening novelty. Their research

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[5]Approaching novelty and learning from difficult situations however may well be interesting (Turner & Silvia, 2006), or may elicit eudaimonic pleasure (i.e., the pleasure to develop ones' potential and the excitement challenges and complex situations may produce, e.g., Kashdan & Steger, 2004).

could show that benign novel events trigger a global processing style, whereas threatening novelty triggers a local processing style. Thus, it is not far-fetched to predict that benign novel events trigger strategic approach, eagerness, and exploration, all related to a promotion focus, whereas new events that threaten security trigger vigilance and strategic avoidance. Similarly, obstacles are problematic interruptions to goal attainment and should typically lead to a prevention focus. However, these obstacles may be experienced as challenges motivating people to explore them when they are in a promotion focus of growth (see Higgins, 2006).

Even though many moderators fit a regulatory focus umbrella, the relation between regulatory focus and interdependence/independence with respect to processing styles is more complicated. Lee, Aaker, and Gardner (2000) manipulated or measured participants' chronic selves and found that interdependent participants place more emphasis on prevention information (local processing) than on promotion information (global processing), whereas for independent participants the opposite was true. On the other hand, we summarized results showing that *interdependent* selves outperform independent selves on tasks related to *global processing* (Kühnen et al., 2001; Kühnen & Oyserman, 2002). We are yet unable to dissolve these discrepancies; however, it seems that for independent and interdependent selves, other distinctions are relevant. For example, Higgins, May, and Mendoza-Denton (2003) found that vertical collectivism (self-sacrifice and duty) is related to prevention concerns, but horizontal collectivism (nurturance and support) is related to promotion concerns.

Yet other cultural distinctions are more clearly related to regulatory foci. For example, in his research on religious denomination and creativity, Förster (2010d) found that a chronic prevention focus mediated the negative relation between Protestantism and creativity, whereas a chronic promotion focus mediated the positive relation between Catholicism and creative thought. In sum, future research needs to determine the relations among regulatory focus, culture, and global versus local processing.

An explanation in terms of regulatory focus has yet an additional advantage. In a recent meta-analysis, Baas et al. (2008) examined which factors may underlie the effect of moods on creative thought, an effect that has been explained with a multitude of psychological models. The results suggest that it is not hedonic tone (e.g., anxious vs. happy) or level of activation (e.g., anxious vs. depressed) that determines whether emotion influences creative performance. Rather, promotion focus emotions (such as happiness or anger; see Higgins, 1997; Idson, Liberman, & Higgins, 2000) were found to enhance creativity, whereas prevention focus emotions (such as fear or anxiety) reduced it, compared to neutral control groups.

In sum, the current analysis suggests that explicit moods and a classic notion of approach/avoidance might underlie some of these effects but are not sufficient to explain all the effects. In contrast, RF seems to be a conceivable umbrella concept, encompassing many different types of variables. Moreover RF seems to underlie the classic mood → creativity link. Admittedly, in the case of obstacles, novelty, and interdependence/independence, an RF perspective is possible but not obvious. Here, more research is needed to identify the relation between these variables and RF.

Distance as Glue

CLT was designed to predict effects of temporal, spatial, social distance, and hypotheticality on high-level and abstract versus low-level and concrete construal and global/local processing (Liberman & Trope, 2008). Moreover, the studies on power and love/lust have been explicitly related to CLT. Smith and Trope (2006) argued that people in high power are physically and mentally more distanced from others, make plans for the future, and define abstract goals, whereas subordinates in low power are socially closer to others, taking care of the details and everyday hassles. Similarly, Förster, Epstude, and Özelsel (2009) argued and showed that when people think of love, they activate wishes in the distant future (foreverness), whereas people thinking about lust are more concerned with the immediate future; these thoughts mediated effects of love/sex on conceptual scope.

As mentioned earlier, distance may also relate to approach versus avoidance. Goals motivate people to approach from a distance, but avoidance motivation increases as distance decreases (see Gilovich, Kerr, & Medvec, 1993; Liberman & Trope, 1998). As people move closer to a goal, they may be more likely to perceive concrete obstacles or problems related to goal pursuit and notice specific wrinkles and weaknesses of generally desirable events.[6] Not only the studies by Pennington and Roese (2003) but also research on moods, colors, arm movements, and other procedural priming—which have been related previously to RF—may speak for a close relation between promotion focus concerns and distance and a link between prevention focus concerns and proximity. It is possible then that all these variables trigger distance versus proximity.

CLT runs into the same problems as RFT when trying to explain effects of interdependence on global perception (Kühnen & Oyserman, 2002). For socially interdependent selves who are usually closer to others,

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[6]Some of the approach/avoidance manipulations used may directly relate to distance. The aforementioned arm flexion entails pulling something distant towards myself, whereas arm extension is used to create a distance between me and something that is too close.

one would predict a more local processing style (see Liberman et al., 2007; Smith & Trope, 2006).

However, there is evidence for the relation between obstacles, novelty, and distance. In their recent research on obstacles, Marguc et al. (2010a; for a summary see Marguc, van Kleef, & Förster, in press) suggested that people who are highly engaged in goal pursuit and encounter an obstacle "step back" or distance themselves to see the big picture. This produces a global-processing style that in turn enables people to integrate the obstacle into the problem field, and eventually helps them to overcome it so that "the path to the goal becomes a unitary whole" (Lewin, 1935, p. 83). More recent research suggests an even closer relation between obstacles and distance (Marguc, Förster, & Van Kleef, 2010b). In one study, University of Amsterdam participants were asked to direct a cartoon figure through a computer maze, when an obstacle suddenly blocked the way. Participants afterward estimated the distance between Amsterdam and another Dutch city to be farther away than participants in a control condition who had not been confronted with an obstacle. These findings suggest an automatic link between obstacles and distance. Finally, novelty, or "distance from experience," has been suggested to be the common denominator of all distances (Förster, Liberman, & Shapira, 2009).[7] Thus the results of novelty also generally fit under the umbrella of psychological distance.

In sum, psychological distance seems to be an equally good candidate as RF for the effects on processing. With more or less effort, almost all moderators' effects can be explained by CLT's notion of psychological distance. Just like with RFT, the biggest problem arises if one tries to integrate research of culture on perception. As a last candidate for the glue, we now consider novelty as conceptualized by NCT.

Novelty as Glue

NCT (with novelty as the core construct), as a sister of CLT (with distance as the core construct), shares many commonalities such as the overall hypothesis that "lack of experience" increases global processing.[8] In their studies, Förster, Liberman, and Shapira (2009;

Förster, 2009) manipulated novelty by holding distance constant (e.g., participants had to imagine new or familiar events tomorrow) but found corresponding effects with respect to processing styles. The results therefore suggest that distance seems to be a sufficient but not a necessary condition for producing effects when people lack experience. This means that all the variables that could be glued together with distance can also be reconceptualized as novel or uncertain versus familiar or certain.

NCT makes specific predictions with respect to processing. Because of a general "motive to know" (Kagan, 1972), curiosity is elicited whenever people experience an information gap (James, 1890; Loewenstein, 1994). To integrate new information into existing knowledge structures (Piaget, 1952), it is useful to open perception and cognition, because superordinate categories are naturally more inclusive (Schwarz & Bless, 1992, 2007). This notion is also in line with categorization models in social cognition such as Fiske and Neuberg's (1990), which predicts that when we encounter a stranger, we first categorize her along general categories (age, gender, race, etc.), and only later attend to more specific features (e.g., that she likes wrestling). Thus people may have proceduralized a novelty → global processing routine; with increasing familiarity, however, when the global level is not sufficient any more people begin to examine the details.

Why would superordinate categories support understanding? First, knowledge representation is said to follow the subordination principle, in the sense that the meaning of local features depends on global aspects more than vice versa (Liberman et al., 2007). For instance, the general meaning of a door and a spoon that are made of either wood or plastic does not depend on the local feature (i.e., what it is made of)—doors are used for protecting property and spoons are made for carrying food, regardless of their material. Yet, the meaning of the local detail depends on the global feature: The fact that a door is made of wood (e.g., it needs to get painted) carries a different meaning than the fact that a spoon is made of wood (e.g., you cannot put it in the dishwasher). As a result, when encountering a novel event, encoding its gross features may help to understand its general stable meaning (see Förster, Liberman, & Shapira, 2009). Second, there are typically fewer features on the global than on the local level (Rosch, 1975), making it easier and more efficient to first search global categories. In sum, activating broad mental categories increases the chances of inclusion of the target into existing knowledge structures and provides basic, superordinate information about the target's meaning.

One may conclude that whenever events create information gaps, such as when they occur in the distant future, at a distant place, when we meet people we are not familiar with, and when events are hypothetical,

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[7]According to CLT anything that is not presently experienced by me, here and now is psychologically distant and leads to more global processing. Thus, the definition of novelty as lack of past experience makes it closely related to the common denominator of all psychological distances.

[8]Conceptually speaking, novelty is related to distance but it is not the same. Maybe the closest concept to novelty is (among the other distances, spatial, temporal, and social) hypotheticality. One may argue that novel objects, just like hypothetical objects, have not yet been experienced, however still, novelty cannot be reduced to hypotheticality. Objects and events can be unlikely (i.e., distant on the hypotheticality dimension) without being novel, and objects may be novel and likely (and even certain) at the same time (see for a detailed discussion, Förster, Liberman, & Shapira, 2009).

due to a general motive to know we want to understand its general meaning. Similarly, we want to understand our promotion focus ideals (which, relative to our prevention focus oughts, are less clearly defined), and we want to know how to overcome obstacles that stand in our way. Including epistemic motivation (Kagan, 1972), curiosity (Kashdan, 2004), or interest (Silvia, 2005) has at least two advantages: First, it introduces an important moderator, because state and trait epistemic motivation changes within and across people, and second, domain specificity should follow, because people are not interested in everything.

There is some recent evidence for epistemic motivation underlying the effects of novelty on processing styles. For example, a series of recent studies showed that need for cognition, as a measure of chronic epistemic motivation (Cacioppo & Petty, 1982) moderated the effects of novelty framing and priming on global processing (Förster, 2010b) as well as classic findings on the influence of temporal distance on abstract versus concrete construals (Liberman & Trope, 1998). For example, the effect that participants construed a vacation a year from now more abstractly than the same vacation tomorrow (Liberman & Trope, 1998) was partially mediated by participants' motivation to think: the higher people's need for cognition, the more abstract the construal in the distant future and the more concrete the construal in the proximal future. Furthermore, in the studies by Marguc et al. (2010a), only people that were chronically or temporarily not volatile (and thus, generally highly engaged; Kuhl, 1994) adopted a global processing style upon encountering an obstacle. To illustrate, in one study, to prime high or low volatility, participants were asked to match given descriptions to photographs. Depending on condition, half of the statements represented high volatility (e.g., "Even the most enthralling movie doesn't stop me from getting up and doing something else for a while") or low volatility (e.g., "When I'm watching an enthralling movie, I wouldn't even think of doing something else"), whereas the other half consisted of neutral fillers (e.g., "I like the color white, even if it's technically not a color. I just like it."). After his priming phase, participants guided a cartoon figure through a computer maze. Whereas for half of the participants an obstacle occurred, for the other half the way remained free. In a subsequent remote associate task that is related to global processing (Remote Associates Test; Mednick, 1962), those participants who were primed with low volatility and encountered an obstacle outperformed all the other participant groups. One may suggest that people low in volatility were the ones who wanted to understand the situation and automatically started a global processing style. Obviously, further research is needed to find more direct evidence for epistemic motivation as a moderator for effects on processing levels.

Even though entering domain specificity as a factor into a psychological model lowers its parsimony, the notion of epistemic motives may help to solve some puzzles such as why interdependent selves process more globally. Even if global processing is the default processing style upon encountering novelty, in some cases certain people may well be interested in local details. One may speculate that even though interdependent selves are more vigilant and are closer to others (which should lead to local processing), they are simply more interested in relational and contextual information. Therefore they open up perceptual and conceptual scope, in contrast to independent selves who pursue more individualistic goals and want to protect themselves from group influences or norms by using local processing styles that help to stay focus on one's own goals. Adding a "motive to know" to the novelty → global processing routine may thus explain discrepant results via domain specificity as a result of socialization, personality, or something else.

The literature reveals that, indeed, people can develop different attentional strategies or even stable preferences for the global or the local level (Kinchla, Solis-Macias, & Hoffman, 1983; Klein, 1951; J. Miller, 1981; Ward, 1985). Furthermore, specific novel events may also immediately increase interest in details. To give an example, a recent study by Gervais et al. (2010) examined the "objectification bias" in gaze and memory (Kaschak, 1992), reflecting the fact that usually people encode better the whole than the parts of male targets, whereas they are better at encoding sexual body parts of female targets than their whole bodily shape (Seitz, 2002). Demonstrating the role of different processing styles involved, in one study, global perceptual priming (via the Navon-letter-manipulation) alleviated the effect, in that no differences between memory for whole body versus body parts occurred any more. Another example is the linguistic intergroup bias, reflecting the fact that people encode undesirable out-group behaviors and desirable in-group behaviors on a higher level of abstractness than undesirable in-group behaviors and desirable out-group behaviors (e.g., Maass, Salvi, Arcuri, & Semin, 1989). This kind of perception enables people to keep their positive views of themselves since abstract characteristics are known to be more stable. More generally, it seems that for some events, people have different proclivities for details or Gestalts.[9]

Importantly, NCT defines threat as another boundary condition for the effects and adopts a notion from RFT and attentional tuning, where activated

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[9]The literature also reveals a proclivity for local processing in patients with high levels of obsessionality (Yovel, Revelle, & Mineka, 2005), anxiety (Mikulincer, Kedem, & Paz, 1990), and autism (see Wang et al., 2007). Psychological disorders, however are beyond the scope of our research.

prevention concerns cause a local processing style. As previously mentioned, classic (Easterbrook, 1959) and recent models (see Förster & Higgins, 2005) suggested that being confronted with problematic situations, people narrow the scope of perceptual attention (Cacioppo, Berntson, & Crites, 1996) and search for conventional rather than innovative ways to cope with it (Friedman & Förster, 2008). Consistently, in one study, framing a new task as potentially threatening enhanced local rather than global processing (Förster, Liberman, & Shapira, 2009). Whereas none of the effects of nonthreatening novelty on global processing were mediated by moods, the threatening novelty → local processing effect was partially mediated by negative arousal. Thus, when novelty is perceived as highly threatening, it causes aversive arousal that further triggers local processing.

Altogether, by incorporating the two important motives of self-protection and epistemic motivation, one may consider NCT as an integration of aspects suggested by CLT and RFT that can more fully account for the moderator's effects on processing styles. One may then further suggest that *understanding meaning* is underlying the effects on conceptual and perceptual breadth. Although both the local and the global level of representation provide information, and people in certain cases may have a preference for local details or global information, the global level has the general advantage of inclusion, abstraction, integration, and stability as the subordination principle implies (see Liberman et al., 2007; Vallacher & Wegner, 1989), making it a preferable tool for encoding new, distant or unclear information.

Two Processing Systems: The Global System for Processing Novelty, and the Local System for Processing Familiar Events

In sum, the current analysis suggests two psychological processing systems, the global system (glo-sys) that processes novel events and the local system (lo-sys) that processes familiar events (see Derryberry & Tucker, 1994; Tucker & Williamson, 1984, for a similar distinction). Whereas glo-sys integrates, lo-sys differentiates. Whenever something is novel, unfamiliar, ambiguous, complex, uncertain, distant, unclear, blurry, vague, abstract, or otherwise represents an information-gap (Loewenstein, 1994), glo-sys tries to make sense of it by integrating it into superordinate, inclusive knowledge structures. Upon a global understanding, lo-sys takes over, reflecting a global to local sequence. Whenever something is experienced as familiar, clear, close, proximal, or concrete, lo-sys may simply accept this event as "understood" or may search further for informative details that differentiate this event from others. Routinized processing styles upon

novel/familiar events have further effects, also known as "processing shifts," that can affect other or unrelated tasks (Schooler, 2002). Whereas glo-sys supports creativity, similarity search and generation, abstract construals, assimilation in social judgments, face recognition, metaphor understanding, distancing, inclusion, and halos (i.e., lack of differentiation), it impairs analytic thinking, dissimilarity search and generation, concrete construals, contrast in social judgments, verbal recognition, exclusion, and differentiation. For lo-sys the opposite is true. The processing routines outlined here, however, are interrupted by negative arousal. In case an event is threatening and epistemic motivation is low, people will need to cope with the threat immediately and narrow down attention. Thus, in the end, lo-sys is made for processing familiarity and threat and glo-sys is made for processing novelty and nonthreatening events.[10]

It would be desirable if a "systems" account could be supported by neuropsychological evidence. Does not textbook knowledge suggest a link between global perception and right brain hemisphere activation (RHA) and a link between local perception and left brain hemisphere activation (LHA)? Although there is some evidence for such a relation (measured with completion of fragmented stimuli, Sperry, 1973; or Navon-letter-task, Martin, 1979; Van Kleeck, 1989), we shy away from making strong claims, as many studies had difficulties replicating these "basic" effects (e.g., Boles & Karner, 1996; Studer & Hübner, 2008). Some studies however, identified a variety of task demands and stimulus properties that seem to systematically qualify the effects of global/local perception on RHA/LHA. Notably, many of them are in line with our proposal.

For example, a hemispheric asymmetry is most pronounced for incongruent stimulus displays in the Navon-letter-task, where local and global responses are in conflict, as compared to congruent or neutral stimuli (Hübner, Volberg, & Studer, 2007; Qin & Han, 2007; Volberg & Hübner, 2007). Incongruency may, however, be precisely the type of uncertain situation that glo-sys takes care of. Second, different spatial frequencies lead to distinct hemisphere activations. High spatial frequency images that contain fine-grained and detailed information seem to benefit from left hemisphere processing, whereas low spatial frequency images that are usually perceived as more "blurry" convey global configurational or gestalt information are processed better in the right hemisphere (Fink, Marshall, Halligan, & Dolan, 1999; Flevaris, Bentin, & Robertson, 2010; Han et al., 2002). Third, recent research points to the fact that the right hemisphere is especially active when visual stimuli are occluded (when perceptual

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[10]Recent analyses speak for independence of novelty/familiarity and valence (see Förster et al., 2010; Loewenstein, 1994; Scherer, 2001).

gaps need to be filled in or imagined) as compared to when they are visible (Jian, Ding, Gold, & Powell, 2008). Moreover, the right hemisphere has been found to be especially active for global as well as local responses under impoverished viewing conditions (Boles & Karner, 1996). Thus, it does not seem to be global versus local perceptual input per se that leads to asymmetrical hemisphere activation. Rather, one might conclude that in general, unclear, blurry, or abstract gestalt aspects in global information that include information gaps are processed preferentially by the right hemisphere, whereas it is the detail-richness or concreteness of local information that receives a processing advantage from the left hemisphere (Hellige, 1980). Future research may examine more closely if the relation between global processing and RHA is moderated by novelty or uncertainty, a result that is in line with the GLOMO[sys] main assumption of novelty or "lack of experience" (as the underlying for all kinds of moderators) triggering global perception.[11]

Creative generation is a task in which both global processing (Beeman, 1993; Fiore & Schooler, 1998) and novel ways of problem solving (Amabile, 1996) naturally co-occur. Of interest, the link between creative generation and RHA finds support, as a recent meta-analysis by Mihov, Denzler, and Förster (2010) suggests. Likewise, the effects of power on construal level (Smith & Trope, 2006) and the effect of global/local processing on assimilation/contrast effects (Förster et al., 2008) have been shown to be mediated by right/left hemisphere activation.

In conclusion, we think that our account may contribute to current hemisphere models and may inspire new research questions. For example, one may more closely examine the aforementioned moderators with respect to hemispheric activation. Furthermore, one may manipulate novelty independently (such as when investigating regulatory focus, priming new ideals and oughts vs. familiar ideals and oughts) to specify the underlying mechanism of the effects. Finally, one may manipulate the Navon-letter-task systematically to see whether spatial frequency, complexity, or other variables related to our notion of novelty moderate effects (see Hills & Lewis, 2009).

We admit that at this point many aspects of GLOMO[sys] need to be examined more systematically; however, an advantage of this approach is its enormous heuristic value. The functional links between real-world variables, processing styles, and task affordances enable the examination of relations between variables that have traditionally been studied apart from each other within different subfields.

For instance, one may use the functional similarities among *moderators* to identify overlaps and differences among them. To give some examples: To what extent is high power similar to a promotion focus? Would high power lead to similar effects known to result from a promotion focus, such as better efficiency in speed/accuracy tasks (Förster, Higgins, & Taylor Bianco, 2003), better memory for ideals (Higgins & Tykocinski, 1992), or higher sensitivity to positive as compared to negative feedback (Förster, Grant, Idson, & Higgins, 2001)? Inasmuch as those variables are related to global processing, GLOMO[sys] encourages the development of new research questions.

One may further examine relations among tasks. Would, quite counterintuitively, a focus on similarities increase creativity? Would one be more likely to perceive similarities between the self and another person after solving a creative task? Would thinking concretely about one's life reduce face recognition? Would creative thinking lead to undesirable halos (i.e., lack of differentiation) with respect to relationship partners? From some of the variables, other yet untested implications follow: Based on the finding that similarity between stimuli reduces memory performance (King, Jones, Pearlman, Fishman, & Felix, 2002), would a local processing prime improve memory?

Finally, our model invites to study yet untested *moderator-task* links: Would doctors confronted with novel patients differentiate less among diverse dimensions? Would immigrants that are naturally confronted with a lot of novel information have a distant perspective on life? Would people in good mood assimilate their self-image more towards a comparison standard? Are Catholics better prepared to deal with obstacles because of their prevalent global processing style? And what is the role of epistemic motives for these effects? We hope that our systems account of global and local processing styles and its relation to different moderators and tasks will serve as a source of inspiration for research in the near and distant future.

Acknowledgments

Note

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[11]Researchers within this field also consider the possibility of two processes involved in the global-RHA link. For example, Hübner and Volberg (2005) suggested that at early stages information is encoded independent of processing level and is only later bound to global or local levels; the latter binding process being related to hemispheres. Our model allows for such a processing sequence. It is possible that first people perceive a stimulus and then, when it is appraised as novel (familiar), activate the global (local) level, including activation of the right (left) hemisphere.

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References

Amabile, T. M. (1996). *Creativity in context*. Boulder, CO: Westview Press.

Anderson, M. C., & Spellman, B. A. (1995). On the status of inhibitory mechanisms in cognition: Memory retrieval as a model case. *Psychological Review, 102*, 68–100.

Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin, 134*, 779–806.

Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In R. S. Wyer & T. K. Srull (Eds.), Handbook of social cognition (pp. 1–40). Hillsdale, NJ: Erlbaum.

Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences, 22*, 577–660.

Basso, M. R., Schefft, B. K., Ris M. D., & Dember, W. N. (1996). Mood and global-local visual processing. *Journal of the International Neuropsychological Society, 2*, 249–255.

Baumann, N., & Kuhl, J. (2005). Positive affect and flexibility: Overcoming the precedence of global over local processing of visual information. *Motivation and Emotion, 29*, 123–134.

Beeman, M. (1993). Semantic processing in the right hemisphere may contribute to drawing inferences from discourse. *Brain and Language, 44*, 80–120.

Berlyne, D. E. (1960). *Conflict, arousal, and curiosity*. New York: McGraw-Hill.

Berridge, K. C., & Winkielman, P. (2003). What is an unconscious emotion? The case for unconscious 'liking'. *Cognition and Emotion, 17*, 181–211.

Boles, D. B., & Karner, T. A. (1996). Hemispheric differences in global versus local processing: Still unclear. *Brain and Cognition, 30*, 232–243.

Brendl, M., & Higgins, E. T. (1996). Principles of judging valence: What makes events positive or negative. *Advance in Experimental Social Psychology, 28*, 95–160.

Brewer, M. B., & Gardner, W. L. (1996). Who is this "we"? Levels of collective identity and self representations. *Journal of Personality and Social Psychology, 71*, 83–93.

Cacioppo, J. T., Berntson, G. G., & Crites, S. L., Jr. (1996). Social neuroscience: Principles of psychophysiological arousal and response. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 72–101). New York: Guilford Press.

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42*, 116–131.

Cacioppo, J. T., Priester, J. R., & Berntson, G. G. (1993). Rudimentary determinants of attitudes. II: Arm flexion and extension have differential effects on attitudes. *Journal of Personality and Social Psychology, 65*, 5–17.

Chen, M., & Bargh, J. A. (1999). Nonconscious approach and avoidance behavioral consequences of the automatic evaluation effect. *Personality and Social Psychology Bulletin, 25*, 215–224.

Clore, G. L., Schwarz, N., & Conway, M. (1994). Affective causes and consequences of social information processing. In R. S. Wyer, & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., Vol. 1, pp. 323–418). Hillsdale, NJ: Erlbaum.

Clore, G. L., Wyer R. S., Dienes, B., Gasper, K., Gohm, C. L., & Isbell, L. (2001). Affective feelings as feedback: Some cognitive consequences. In L. L. Martin & G. L. Clore (Eds.), *Theories of mood and cognition: A user's handbook* (pp. 27–62). Mahwah, NJ: Erlbaum.

Colzato, L. S., van den Wildenberg, W., & Hommel, B. (2008). Losing the big picture: How religion may control visual attention. *PLoS ONE*. Retrieved from http://dx.plos.org/10.1371/journal.pone.0003679

De Lange, M. A., & Van Knippenberg, A. (2007). Going against the grain: Regulatory focus and interference by task-irrelevant information. *Experimental Psychology, 54*, 6–13.

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology, 49*, 182–185. Derryberry, D., & Reed, M. A. (1998). Anxiety and attentional focusing: Trait, state and hemispheric influences. *Personality and Individual Differences, 25*, 745–761.

Derryberry, D., & Tucker, D. M. (1994). Motivating the focus of attention. In P. M. Niedenthal & S. Kitayama (Eds.), *Heart's eye: Emotional influences in perception and attention* (pp. 167–196). New York: Academic Press.

Diamond, L. M. (2003). What does sexual orientation orient? A biobehavioral model distinguishing romantic love and sexual desire. *Psychological Review, 110*, 173–192.

Diamond, L. M. (2004). Emerging perspectives on distinctions between romantic love and sexual desire. *Current Directions in Psychological Science, 13*, 116–119.

Easterbrook, J. A. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review, 66*, 183–201.

Ekstrom, R., French, J., Harman, H., & Dermen, D. (1976). *Manual for kit of factor-referenced cognitive tests*. Lawrenceville, NJ: Educational Testing Service.

Elliot, A. J., Maier, M. A., Binser, M. J., Friedman, R. S., & Pekrun, R. (2009). The effect of red on avoidance behavior. *Personality and Social Psychology Bulletin, 35*, 365–375.

Fazio, R. H. (1986). How do attitudes guide behavior? In R. H. Sorrentino & E. T. Higgins (Eds.), *The handbook of motivation and cognition: Foundation of social behavior* (pp. 204–243). New York: Guilford.

Fazio, R. H., Eiser, J. R., & Shook, N. J. (2004). Attitude formation through exploration: Valence asymmetries. *Journal of Personality and Social Psychology, 87,* 293–311.

Fiedler, K. (1988). Emotional mood, cognitive style, and behaviour regulation. In K. Fiedler & J. P. Forgas (Eds.), *Affect, cognition and social behavior* (pp. 100–119). Toronto, Canada: Hogrefe.

Fiore, S. M., & Schooler, J. W. (1998). Right hemisphere contributions to creative problem solving: Converging evidence for divergent thinking. In M. Beeman & C. Chiarello (Eds.), *Right hemisphere language comprehension: Perspectives from cognitive neuroscience* (pp. 349–371). Mahwah, NJ: Lawrence Erlbaum Associates.

Fink, G. R., Marshall, J. C., Halligan, P. W., & Dolan, R. J. (1999). Hemispheric asymmetries in global/local processing are modulated by perceptual salience. *Neuropsychologia, 37*, 31–40.

Finke, R. A. (1985). Theories relating mental imagery to perception. *Psychological Bulletin, 98*, 236–259.

Finke, R. A. (1995). Creative insight and preinventive forms. In R. J. Sternberg & J. E. Davidson (Eds.), *The nature of insight* (pp. 255–280). Cambridge, MA: MIT Press.

Fiske, S. T. (1993). Controlling other people: The impact of power on stereotyping. *American Psychologist, 48*, 621–628.

Fiske, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 23, pp. 1–74). New York: Academic Press.

Flevaris, A. V., Bentin, S., & Robertson, L. C. (2010). Local or Global? Attentional selection of spatial frequencies binds shapes to hierarchical levels. *Psychological Science, 21*, 1–8.

Förster, J., & Strack, F. (1998). Motor actions in retrieval of valenced information: II. Boundary conditions for motor congruency effects. *Perceptual and Motor Skills, 86*, 1423–1426.

Förster, J. (2004). How body feedback influences consumer's evaluation of products. *Journal of Consumer Psychology, 14*, 415–425.

Förster, J. (2009). Relations between perceptual and conceptual scope: How global versus local processing fits a focus on similarity versus dissimilarity. *Journal of Experimental Psychology: General, 138*, 88–111.

Förster, J. (2010a). *Cross-modal processing shifts*. Unpublished manuscript, University of Amsterdam.

Förster, J. (2010b). [Epistemic motives mediate the relation between novelty and construal level]. Unpublished raw data, University of Amsterdam.

Förster, J. (2010c). How love and sex can influence recognition of faces and words: A processing model account. *European Journal of Social Psychology*.

Förster, J. (2010d). *Religion as a regulatory tool*. Unpublished raw data, University of Amsterdam.

Förster, J., Epstude, K, & Özelsel, A. (2009). Why love has wings and sex has not: How reminders of love and sex influence creative and analytic thinking. *Personality and Social Psychology Bulletin, 35*, 1479–1491.

Förster, J., & Friedman, R. S. (2009). *Nonaffective cues and attentional tuning*. Paper submitted for publication.

Förster, J., & Friedman, R. S. (2010). The effect of global versus local processing styles on different phase of the creative process. Unpublished raw data, University of Amsterdam.

Förster, J., Friedman, R. S., & Liberman, N. (2004). Temporal construal effects on abstract and concrete thinking: Consequences for insight and creative cognition. *Journal of Personality and Social Psychology, 87*, 177–189.

Förster, J., Friedman, R. S., Özelsel, A., & Denzler, M. (2006). Enactment of approach and avoidance behavior influences the scope of perceptual and conceptual attention. *Journal of Experimental Social Psychology, 42*, 133–146.

Förster, J., Grant, H., Idson, L. C., & Higgins, E. T. (2001). Success/failure feedback, expectancies, and approach/avoidance motivation: How regulatory focus moderates classic relations. *Journal of Experimental Social Psychology, 37*, 253–260.

Förster, J., & Higgins, E. T. (2005). How global versus local perception fits regulatory focus. *Psychological Science, 16*, 631–636.

Förster, J., Higgins, E. T., & Idson, L. C. (1998). Approach and avoidance strength during goal attainment: Regulatory focus and the "goal looms larger" effect. *Journal of Personality and Social Psychology, 75*, 1115–1131.

Förster, J., Higgins, E. T., & Taylor Bianco, A. (2003). Speed/accuracy in task performance: Build-in trade-off or separate strategic concerns? *Organizational Behavior and Human Decision Processes, 90*, 148–164.

Förster, J., & Liberman, N. (2007). Knowledge activation. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (2nd ed., pp. 201–231). New York: Guilford.

Förster, J., Liberman, N., & Friedman, R. S. (2007). Seven principles of goal activation: A systematic approach to distinguishing goal priming from priming of non–goal constructs. *Personality and Social Psychology Review, 11*, 211–233.

Förster, J., Liberman, N., & Kuschel, S. (2008). The effect of global versus local processing styles on assimilation versus contrast in social judgment. *Journal of Personality and Social Psychology, 94*, 579–599.

Förster, J., Liberman, N., & Shapira, O. (2009). Preparing for novel versus familiar events: Shifts in global and local processing. *Journal of Experimental Psychology: General, 138*, 383–399.

Förster, J., Marguc, J., & Gillebaart, M. (2010). Novelty categorization theory. *Social and Personality Psychology Compass*.

Förster, J., Özelsel, A., & Epstude, K. (2010). How love and lust change people's perception of partners and relationships. *Journal of Experimental Social Psychology*.

Förster, J., & Strack, F. (1997). Motor actions in retrieval of valenced information: A motor congruence effect. *Perceptual and Motor Skills, 85*, 1419–1427.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*, 218–226.

Friedman, R. S., Fishbach, A., Förster, J., & Werth, L. (2003). Attentional priming effects on creativity. *Creativity Research Journal, 15*, 277–286.

Friedman, R. S., & Förster, J. (2000). The effects of approach and avoidance motor actions on the elements of creative insight. *Journal of Personality and Social Psychology, 79*, 477–492.

Friedman, R. S., & Förster, J. (2001). The effects of promotion and prevention cues on creativity. *Journal of Personality and Social Psychology, 81*, 1001–1013.

Friedman, R. S., & Förster, J. (2002). The influence of approach and avoidance motor actions on creative cognition. *Journal of Experimental Social Psychology, 38*, 41–55.

Friedman, R. S., & Förster, J. (2005). The Influence of approach and avoidance cues on attentional flexibility. *Motivation and Emotion, 29*, 69–81.

Friedman, R. S., & Förster, J. (2008). Activation and measurement of motivational states. In A. Elliott (Ed.), *Handbook of approach and avoidance motivation* (pp. 235–246). Mahwah, NJ: Erlbaum.

Friedman, R. S., & Förster, J. (2010). *Implicit affective cues and attentional tuning: An integrative review*. Unpublished manuscript, University of Albany.

Frijda, N. H. (1987). Emotions, cognitive structure and action tendency. *Cognition and Emotion, 1*, 115–144.

Frijda, N. H. (1988). The laws of emotion. *American Psychologist, 43*, 349–358.

Fujita, K., Henderson, M., Eng, J., Trope, Y., & Liberman, N. (2006). Spatial distance and mental construal of social events. *Psychological Science, 17*, 278–282.

Gable, P. A., & Harmon-Jones, E. (2008). Approach-motivated positive affect reduces breadth of attention. *Psychological Science, 19*, 476–482.

Galinsky, A. D., Magee, J. C., Gruenfeld, D. H, Whitson, J., & Liljenquist, K. A. (2008). Social power reduces the strength of the situation: Implications for creativity, conformity, and dissonance. *Journal of Personality and Social Psychology, 95*, 1450–1466.

Gardner, W. L., Gabriel, S., & Lee, A. Y. (1999). "I" value freedom but "we" value relationships: Self-construal priming mirrors cultural dufferences in judgment. *Psychological Science, 10*, 321–326.

Gasper, K. (2004). Do you see what I see? Affect and visual information processing. *Cognition and Emotion, 18*, 405–421.

Gasper, K., & Clore, G. L. (2000). Do you have to pay attention to your feelings in order to be influenced by them? *Personality and Social Psychology Bulletin, 26*, 698–711.

Gasper, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global versus local processing of visual information. *Psychological Science, 13*, 34–40.

Gentner, D. (1983). Structure-mapping: A theoretical framework for analogy. *Cognitive Science, 7*, 155–170.

Gentner, D., & Markman, A. B., (1997). Structure mapping in analogy and similarity. *American Psychologist, 52*, 45–56.

Gervais, S. J., Vescio, T. K., Maass, A., Förster, J., & Suitner, C. (2010). *When her whole = the sum of her parts: Seeing women as sexual objects*. Unpublished manuscript, University of Nebraska-Lincoln.

Gilbert, D. T. (1991). How mental systems believe. *American Psychologist, 46*, 107–119.

Gilovich, T., Kerr, M., & Medvec, V. H. (1993). The effect of temporal perspective on subjective confidence. *Journal of Personality and Social Psychology, 64*, 552–560.

Gough, H. G. (1979). A creative personality scale for the Adjective Check List. *Journal of Personality and Social Psychology, 37*, 1398–1405.

Han, S., Weaver, J. A., Murray, S. O., Kang, X., Yund, E. W., & Woods, D. L. (2002). Hemispheric asymmetry in global/local processing: Effects of stimulus position and spatial frequency. *Neuroimage, 17*, 1290–1299.

Hannover, B., & Kühnen, U. (2004). Culture, context and cognition: The Semantic–Procedural–Interface Model of the self. *European Review of Social Psychology, 15*, 297–333.

Hellige, J. B. (1980). Cerebral hemisphere asymmetry: Methods, issues, and implications. *Educational Communication and Technology 28*, 83–98.

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York: Guilford.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52*, 1280–1300.

Higgins, E. T. (1998). From expectancies to worldviews: Regulatory focus in socialization and cognition. In J. M. Darley & J. Cooper (Eds.), *Attribution and social interaction: The legacy of Edward E. Jones* (pp. 243–309). Washington, DC: American Psychological Association.

Higgins, E. T. (2006). Value from hedonic experience and engagement. *Psychological Review, 113*, 439–460.

Higgins, E. T., May, D., & Mendoza-Denton, R. (2003, January). *Promotion and prevention: Let me count the ways.* Paper presented at the symposium on "Psychological growth and defense: Regulating motivations to expand and protect the self" at Society for Personality and Social Psychology, Universal City, California.

Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. *Journal of Experimental Social Psychology, 13*, 141–154.

Higgins, E. T., Shah, J., & Friedman, R. S. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology, 72*, 515–525.

Higgins, E. T., & Tykocinski, O. (1992). Self-discrepancies and biographical memory: Personality and cognition at the level of psychological situation. *Personality & Social Psychology Bulletin, 18*, 527–535.

Hills, P. J., & Lewis, M. B. (2009). A spatial frequency account of the detriment that local processing of Navon letters has on face recognition. *Journal of Experimental Psychology: Human Perception and Performance, 35*, 1427–1428.

Hirshman, E., & Mulligan, N. (1991). Perceptual interference improves explicit memory, but does not enhance data-driven processing. *Journal of Experimental Psychology: Learning Memory and Cognition, 17*, 507–513.

Hübner, R. & Volberg, G. (2005). The integration of object levels and their content: A theory of global/local processing and related hemispheric differences. *Journal of Experimental Psychology: Human Perception and Performance, 31*, 520–541.

Hübner, R., Volberg, G., & Studer, T. (2007). Hemispheric differences for global/local processing in divided attention tasks: Further evidence for the integration theory. *Perception & Psychophysics, 69*, 413–421.

Idson, L. C., Liberman, N., & Higgins, E. T. (2000). Distinguishing gains from nonlosses and losses from nongains: A regulatory focus perspective on hedonic intensity. *Journal of Experimental Social Psychology, 36*, 252–274.

Isen, A. M. (1987). Positive affect, cognitive processes, and social behavior. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20, pp. 203–253). New York: Academic Press.

Isen, A. M. (2000). Some perspectives on positive affect and self-regulation. *Psychological Inquiry, 11*, 184–187.

Isen, A. M., & Daubman, K. A. (1984). The influence of affect on categorization. *Journal of Personality and Social Psychology, 47*, 1206–1217.

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology, 52*, 1122–1131.

Isen, A. M., Means, B., Patrick, R., & Nowicki, G. (1982). Some factors influencing decision-making strategy and risk taking. In M. S. Clark & S. T. Fiske (Eds.), *Affect and cognition* (pp. 243–262). Hillsdale, NJ: Erlbaum.

James, W. (1890). *The principles of psychology*. New York: Dover.

Jiang Y., Ding J. H., Gold B. T., Powell D. (2008). The hemispheric asymmetries in tracking occluded moving targets with the mind's eye: Simultaneous event-related fMRI and eye-movement recording. *Brain Imaging and Behavior, 2*, 300–308.

Kagan, J. (1972). Motives and development. *Journal of Personality and Social Psychology, 22*, 51–66.

Kaschak, E. (1992). *Engendered lives: A new psychology of women's experience*. New York: Basic Books.

Kashdan, T. B. (2004). Curiosity. In C. Peterson & M. E. P. Seligman (Eds.), *Character strengths and virtues: A handbook and classification* (pp. 125–141). Washington, DC: American Psychological Association and Oxford University Press.

Kashdan, T. B., & Steger, M. F. (2004). Approaching psychological science with Kuhn's eyes. *American Psychologist, 59*, 272–273.

Kashdan, T. B., Steger, M. F. (2007). Curiosity and pathways to well-being and meaning in life: Traits, states, and everyday behaviors. *Motivation and Emotion, 31*, 159–173.

Keltner, D., Gruenfeld, D. H, & Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review, 110*, 265–284.

Keltner, D., Young, R. C., Heerey, E. A., Oemig, C., & Monarch, N. D. (1998). Teasing in hierarchical and intimate relations. *Journal of Personality and Social Psychology, 75*, 1231–1247.

Kimchi, R. (1983). Perceptual organization of visual patterns. (Doctoral Dissertation, University of California, Berkeley, 1982). *Dissertation Abstracts International, 44*, 345B.

Kimchi, R. (1992). Primacy of wholistic processing and global/local paradigm: A critical review. *Psychological Bulletin, 112*, 24–38.

Kimchi, R., & Palmer, S. E. (1982). Form and texture in hierarchically constructed patterns. *Journal of Experimental Psychology: Human Perception and Performance, 8*, 521–535.

Kinchla, R. A., Solis-Macias, V., & Hoffman, J. (1983). Attending to different levels of structure in a visual image. *Perception & Psychophysics, 33*, 1–10.

Kinchla, R. A., & Wolfe, J. M. (1979). The order of visual processing: Top–down, bottom-up or middle-out. *Perception and Psychophysics, 25*, 225–231.

King, D. L., Jones, F. L., Pearlman, R. C., Fishman, A., & Felix, C. A. (2002). The length of the retention interval, forgetting, and subjective similarity. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 28*, 660–671.

Klein, G. S. (1951). A personal world through perception. In R. R. Blake & G. V. Ramsey (Eds.), *Perception: An approach to personality* (pp. 328–355). New York: Ronald Press.

Kuhl, J. (1994). Action versus state orientation: Psychometric properties of the Action Control Scale (acs–90). In J. Kuhl & J. Beckmann (Eds.), *Volition and personality: Action versus state orientation* (pp. 9–46). Toronto, Canada: Hogrefe & Huber.

Kühnen, U., Hannover, B., & Schubert, B. (2001). The Semantic-Procedural Interface Model of the self: The role of self-knowledge for context-dependent versus context-independent modes of thinking. *Journal of Personality and Social Psychology, 80*, 397–409.

Kühnen, U., & Oyserman, D. (2002). Thinking about the self influences thinking in general: Procedural consequences of self–construal activation. *Journal of Experimental Social Psychology, 38*, 492–499.

Kuschel, S., Förster, J., & Denzler, M. (2010). Going beyond information given: How approach versus avoidance cues influence access to higher order information. *Social Psychological and Personality Science, 1*, 4–11.

Lamb, M. R., & Robertson, L. C. (1990). The effect of visual angle on global and local reaction times depends on the set of visual angles presented. *Perception & Psychophysics, 47*, 489–496.

Lammers, J., Stoker, J. I., & Stapel, D. A. (2009). Social and personal power have opposite effects on stereotyping, but parallel effects on behavioral approach. *Psychological Science, 20*, 1543–1548.

Langens, T. A. (2007). Regulatory focus and illusions of control. *Personality and Social Psychology Bulletin, 33*, 1–12.

Lee, A. Y., Aaker, J. L., & Gardner, W. L. (2000). The pleasures and pains of distinct self-construals: The role of interdependence in regulatory focus. *Journal of Personality and Social Psychology, 78*, 1122–1134.

Lewin, K. (1935). *A dynamic theory of personality*. New York: McGraw-Hill.

Liberman, N., & Förster, J. (2008). Expectancy, value and psychological distance: A new look at goal gradients. *Social Cognition, 26*, 515–533.

Liberman, N., & Förster, J. (2009a). Distancing from experienced self: How global versus local perception affects estimation of psychological distance. *Journal of Personality and Social Psychology, 97*, 203–216.

Liberman, N., & Förster, J. (2009b). The effect of psychological distance on perceptual level of construal. *Cognitive Science, 33*, 1330–1341.

Liberman, N., Idson, L. C., Camacho, C. J., & Higgins, E. T., (1999). Promotion and prevention choices between stability and change. *Journal of Personality and Social Psychology, 77*, 1135–1145.

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology, 75*, 5–18.

Liberman, N., & Trope, Y. (2008). The psychology of transcending the here and now. *Science, 322*, 1201–1205.

Liberman, N., Trope, Y., & Stephan, E. (2007). Psychological distance. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (Vol. 2, pp. 353–383). New York: Guilford.

Liviatan, I., Trope, Y., & Liberman, N. (2008). Interpersonal similarity as a social distance dimension: Implications for perception of others' actions. *Journal of Experimental Social Psychology, 44*, 1256–1269 .

Loewenstein, G. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological Bulletin, 116*, 75–98.

Love, B. C., Rouder, J. N., & Wisniewski, E. J. (1999). A structural account of global and local processing. *Cognitive Psychology, 38*, 291–316.

Luu, P., Tucker, D. M., & Derryberry, D. (1998). Anxiety and the motivational basis of working memory. *Cognitive Therapy and Research, 22*, 577–594.

Maass, A., Salvi, L., Arcuri, L., & Semin, G. R. (1989). Language use in intergroup contexts: the linguistic intergroup bias. *Journal of Personality and Social Psychology, 57*, 981–993.

Macrae, C. N., & Lewis, H. L. (2002). Do I know you? Processing orientation and face recognition. *Psychological Science, 13*, 194–196.

Maier, M. A., Elliot, A. J., & Lichtenfeld, S. (2008). Mediation of the negative effect of red on intellectual performance. *Personality and Social Psychology Bulletin, 34*, 1530–1540.

Marguc, J., Förster, J., & van Kleef, G. (2010a). *Stepping back to see the big picture: When obstacles elicit global processing*. Unpublished manuscript, University of Amsterdam.

Marguc, J., Förster, J., & van Kleef, G. (2010b). *Stepping back to see the big picture: When obstacles lead to distancing*. Unpublished raw data, University of Amsterdam.

Marguc, J., van Kleef , G., & Förster, J. (in press). *Obstacles: Their impact on thinking and beyond thinking*. New York: Nova Science Publishers.

Markman, A. B., & Brendl, C. M. (2005). Constraining theories of embodied cognition. *Psychological Science, 16*, 6–10.

Markman, K. D., & McMullen, M. N. (2003). A reflection and evaluation model of comparative thinking. *Personality and Social Psychology Review, 7*, 244–267.

Marsh, R. L., Ward, T. B., & Landau, J. D. (1999). The inadvertent use of prior knowledge in a generative cognitive task. *Memory & Cognition, 27*, 94–105.

Martin, L. L., & Stoner, P. (1996). Mood as input: What we think about how we feel determines what we think. In L. L. Martin & A. Tesser (Eds.), *Striving and feeling: Interactions among goals, affect, and self-regulation* (pp. 279–302). Mahwah, NJ: Erlbaum.

Martin, M. (1979). Hemispheric specialization for local and global processing. *Neuropsychologia, 17*, 33–40.

Martindale, C. (1995). *Creativity and connectionism*. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 249–268). Cambridge, MA: MIT Press.

Masson, M. E. (1995). A distributed memory model of semantic priming. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21*, 3–23.

Mednick, S. (1962). The associative basis of the creative process. *Psychological Review, 69*, 220–232.

Mehta, R., & Zhu, R. (2009). Blue or red? Exploring the effect of color on cognitive task performances. *Science, 323*, 1226–1229.

Michel, C., Rossion, B., Han, J., Chung, C., & Caldara, R. (2006). Holistic processing is finely tuned for faces of one's own race. *Psychological Science, 17*, 608–615.

Mihov, K. M., Denzler, M., & Förster, J. (2010). Hemispheric specialization and creative thinking: A meta-analytic review of lateralization of creativity. *Brain and Cognition, 72*, 442–448.

Mikulincer, M. (1998). Attachment working models and the sense of trust: An exploration of interaction goals and affect regulation. *Journal of Personality and Social Psychology, 74*, 1209–1224.

Mikulincer, M., Kedem, P., & Paz, D. (1990). The impact of trait anxiety and situational stress on the categorization of natural objects. *Anxiety Research, 2*, 85–101.

Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. New York: Guilford.

Miller, J. (1981). Global precedence in attention and decision. *Journal of Experimental Psychology: Human Perception and Performance, 9*, 1161–1174.

Miller, N. (1944). Experimental studies of conflict. In J. McV. Hunt (Ed.), *Personality and the Behavioral Disorders* (Vol. 1, pp. 431–465). New York: Ronald Press.

Morris, C. D., Brandsford, J. D., & Franks, J. J. (1977). Levels of processing versus transfer appropriate processing. *Journal of Verbal Learning and Verbal Behavior, 16*, 519–533.

Mussweiler, T. (2007). Assimilation and contrast as comparison effects: A selective accessibility model. In D. A. Stapel & J. Suls (Eds.), *Assimilation and contrast in social psychology* (pp. 165–185). New York: Psychology Press.

Mussweiler, T., & Strack, F. (2000). The use of category and exemplar knowledge in the solution of anchoring tasks. *Journal of Personality and Social Psychology, 78*, 1038–1052.

Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive Psychology, 9*, 353–383.

Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited-capacity attention. *Journal of Experimental Psychology: General, 106*, 226–254.

Neill, W. T., & Westberry, R. L. (1987). Selective attention and the suppression of cognitive noise. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 13*, 327–334.

Neumann, E., & DeSchepper, B. G. (1992). An inhibition-based fan effect: Evidence for an active suppression mechanism in selective attention. *Canadian Journal of Psychology, 46*, 11–50.

Neumann, R., & Strack, F. (2000). Experiential and non-experiential routes of motor influences on affect and evaluation. In H. Bless & J. P. Forgas (Eds.), *The message within: Subjective experiences and social cognition* (pp. 52–68). Philadelphia: Psychology Press.

Operario, D., & Fiske, S. T. (2001). Effects of trait dominance on powerholders' judgments of subordinates. *Social Cognition, 19*, 161–180.

Oyserman, D., & Lee, S. W. S. (2008). Does culture influence what and how we think? Effects of priming individualism and collectivism. *Psychological Bulletin, 134*, 311–342.

Oyserman, D., Kemmelmeier, M., & Coon, H. (2002). Cultural psychology, a new look: Reply to Bond (2002), Fiske (2002), Kitayama (2002), and Miller (2002). *Psychological Bulletin, 128*, 110–117.

Pennington, G. L., & Roese, N. J. (2003). Regulatory focus and mental simulation. In S. J. Spencer, S. Fein, M. P. Zanna, & J. M. Olson (Eds.), *Motivated social perception: The Ontario Symposium* (Vol. 9, pp. 277–298). Mahwah, NJ: Lawrence Erlbaum Associates.

Piaget, J. (1952). *The child's conception of number*. New York: Humanities Press.

Plutchik, R. (1980). A general psychoevolutionary theory of emotion. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience: Theories of emotion* (Vol. 1, pp. 3–33). New York: Academic Press.

Posner, M. I. (1987). Selective attention and cognitive control. *Trends in Neuroscience, 10*, 13–17.

Qin J., Han S. (2007). The role of parietal cortex in global/local processing of hierarchical stimuli: A transcranial magnetic stimulation study. *Neuroreport, 18*, 1921–1924.

Reeves, R. B., & Bergum, B. O. (1972). Perceptual narrowing as a function of peripheral cue relevance. *Perceptual and Motor Skills, 35*, 719–724.

Roediger, H. L. (1990). Implicit memory: Retention without remembering. *American Psychologist, 45*, 1043–1056.

Rosch, E. (1975). Cognitive representations of semantic categories. *Journal of Experimental Psychology: General, 104*, 192–233.

Roseman, I. (1984). Cognitive determinants of emotions: A structural theory. In P. Shaver (Ed.), *Emotions, Relationships, and Health, Review of Personality and Social Psychology*. Beverly Hills, CA: Sage Publications.

Rubin, D. C., Stoltzfus, E. R., & Wall, K. L. (1991). The abstraction of form in semantic categories. *Memory & Cognition, 19*, 1–7.

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well–being. *Annual Review of Psychology, 52,* 141–166.

Ryff, C. D., & Singer, B. H. (1998). Contours of positive human health. *Psychological Inquiry, 9*, 1–28.

Sassenberg, K., Jonas, K. J., Shah, J. Y., & Brazy, P. C. (2007). Why some groups just feel better: The regulatory fit of group power. *Journal of Personality and Social Psychology, 92*, 249–267.

Seitz, K. (2002). Parts and wholes in person recognition: Developmental trends. *Journal of Experimental Child Psychology, 82*, 367–381.

Scherer, K. R. (2001). Appraisal considered as a process of multilevel sequential checking. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, Methods, Research* (pp. 92–120). New York and Oxford: Oxford University Press.

Schimmel, K., & Förster, J. (2008). How temporal distance changes novices' attitudes towards unconventional arts. *Psychology of Aesthetics, Creativity, and the Arts, 2*, 53–60.

Scholer, A. A., Stroessner, S. J., & Higgins, E. T. (2008). Responding to negativity: How a risky tactic can serve a vigilant strategy. *Journal of Experimental Social Psychology, 44*, 767–774.

Schooler, J. W. (2002). Verbalization produces a transfer inappropriate processing shift. *Applied Cognitive Psychology, 16*, 989–997.

Schooler, J. W., Fiore, S., & Brandimonte, M. (1997). At a loss from words: Verbal overshadowing of perceptual memories. In D. L. Medin (Ed.), *The psychology of learning and motivation: Advances in research and theory*, (Vol. 37, pp. 291–340). San Diego, CA: Academic Press.

Schooler, J. W., & Melcher, J. (1995). The ineffability of insight. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 97–134). Cambridge, MA: MIT Press.

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 527–561). New York: Guilford.

Schwarz, N., & Bless, H. (1991). Happy and mindless, but sad and smart? The impact of affective states on analytic reasoning. In J. P. Forgas (Ed.), *Emotion and social judgments* (pp. 55–71). Oxford: Pergamon.

Schwarz. N., & Bless, H. (1992). Constructing reality and its alternatives: An inclusion/exclusion model of assimilation and contrast effects in social judgment. In L. L. Martin & A. Tesser (Eds.), *The construction of social judgment* (Vol. 8, pp. 217–245). Hillsdale, NJ: Lawrence Erlbaum Associates.

Schwarz, N., & Bless, H. (2007). Mental construal processes: The inclusion/exclusion model. In D. A. Stapel & J. Suls (Eds.), *Assimilation and contrast in social psychology* (pp. 119–141). Philadelphia: Psychology Press.

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology, 45*, 513–523.

Schwarz, N., & Clore, G. L. (1996). Feelings and phenomenal experiences. In E. T. Higgins & A. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 433–465). New York: Guilford.

Silvia, P. J.(2005). What is interesting? Exploring the appraisal structure of interest. *Emotion, 5*, 89–102.

Smith, E. R. (1989). Procedural efficiency: General and specific components and effects on social judgment. *Journal of Experimental Social Psychology, 25*, 500–523.

Smith, E. R., & Branscombe, N. R. (1987). Procedurally mediated social inferences: The case of category accessibility effects. *Journal of Experimental Social Psychology, 23*, 361–382.

Smith, E. R., Branscombe, N. R., & Borman, C. (1988). Generality of the effects of practice on social judgment tasks. *Journal of Personality and Social Psychology, 54*, 385–395.

Smith, P. K., & Trope, Y. (2006). You focus on the forest when you're in charge of the trees: Power priming and abstract information processing. *Journal of Personality and Social Psychology, 90*, 578–596.

Sperry, R. W. (1973). Lateral specialization of cerebral function in surgically separated hemispheres. In F. J. McGuigan & R. A. Schoonover (Eds.), *The psycho- physiology of thinking*. New York: Academic Press.

Sprecher, S., & Regan, P. C. (1998). Passionate and companionate love in courting and young married couples. *Sociological Inquiry, 68*, 163–185.

Srull, T. K., & Wyer, R. S. (1979). The role of category accessibility in the interpretation of information about persons: Some determinants and implications. *Journal of Personality and Social Psychology, 37*, 1660–1672.

Stapel, D. A., & Koomen, W. (2001). The impact of interpretation versus comparison goals on knowledge accessibility effects. *Journal of Experimental Social Psychology, 37*, 134–149.

Strack, F., Martin, L. L., & Stepper, S. (1988). Inhibiting and facilitating conditions of facial expressions: A non-obtrusive test of the facial feedback hypothesis. *Journal of Personality and Social Psychology, 54*, 768–777.

Studer, T., & Hübner, R. (2008). The direction of hemispheric asymmetries for object categorization at different levels of abstraction depends on the task. *Brain and Cognition, 67*, 197–211.

Tanaka, J. W., & Farah, M. J. (1993). Parts and wholes in face recognition. *Quarterly Journal of Experimental Psychology, 46*, 225–245.

Tanaka, J. W., & Sengco, J. A. (1997). Features and their configuration in face recognition. *Memory and Cognition, 25*, 583–592.

Thibaut, J. W., & Kelley, H. H. (1959). Power and dependence. In J. W. Thibaut & H. H. Kelley (Eds.), *The social psychology of groups* (pp. 100–125). New York: Wiley.

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review, 110*, 403–421.

Tucker, D. M., & Williamson, P. A. (1984). Asymmetric neural control systems in human self-regulation. *Psychological Review, 91*, 185–215.

Tulving, E., & Schacter, D. L. (1990). Priming and human memory systems. *Science, 247*, 301–306.

Turner, S. A., Silvia P. J. (2006). Must interesting things be pleasant? A test of competing appraisal structures. *Emotion, 6*, 670–674.

Tyler, S., & Tucker, D. M. (1982). Anxiety and perceptual structure: Individual differences in neuropsychological function. *Journal of Abnormal Psychology, 91*, 210–220.

Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology, 57*, 660–671.

Van Kleeck, M. H. (1989). Hemispheric differences in global versus local processing of hierarchical visual stimuli by normal subjects: New data and a meta-analysis of previous studies. *Neuropsychologia, 27*, 1165–1178.

Vartanian, O., Martindale, C., & Kwiatkowski, J. (2007). Creative potential, attention, and speed of information processing. *Personality & Individual Differences, 34*, 1370–1380.

Volberg, G. & Hübner, R. (2007). Deconfounding the effects of congruency and task difficulty on hemispheric differences in global/local processing. *Experimental Psychology, 54*, 83–88.

Wakslak, C. J., Nussbaum, S., Liberman, N., & Trope, Y. (2008). Representations of the self in the near and distant future. *Journal of Personality and Social Psychology, 95*, 757–773.

Wallach, M. A., & Kogan, N. (1965). *Modes of thinking in young children: a study of the creativity-intelligence distinction*. New York: Holt, Rinehart & Winston.

Wang, L., Mottron, L., Peng, D., Berthiaume, C., Dawson, M. (2007). Local bias and local-to-global interference without global deficit: A robust finding in autism under various conditions of attention, exposure time, and visual angle. *Cognitive Neuropsychology, 24*, 550–574.

Ward, T. B. (1985). Covert focussing of the attentional gaze. *Canadian Journal of Psychology, 39*, 546–563.

Ward, T. B. (1995). What's new about old ideas. In S. M. Smith, T. B. Ward, & R. A. Finke (Eds.), *The creative cognition approach* (pp. 157–178). Cambridge, MA: MIT Press.

Weltman, G., Smith, J. E., & Edstrom, G. H. (1971). Perceptual narrowing during pressure-chamber exposure. *Human Factors, 13*, 99–107.

Werth, L., & Förster, J. (2007). How regulatory focus influences consumer behavior. *European Journal of Social Psychology, 37*, 33–51.

Weston, N. J., Perfect, T. J., Schooler, J. W., & Dennis, I. (2008). Navon processing and verbalisation: A holistic/featural distinction. *European Journal of Cognitive Psychology, 20*, 587–611.

Witkin, H. A., Dyk, R. B., & Faterson, H. F. (1962). *Psychological differentiation: Studies of development*. New York: Wiley.

Witkin, H. A., Oltman, P. K., Raskin, E., & Karp, S. A. (1971). *Manual for the Embedded Figures Test, Childrens's Embedded Figures Test, and Group Embedded Figures Test*. Palo Alto, CA: Consulting Psychologists Press.

Young, A. W., Hellawell, D., & Hay, D. C. (1987). Configurational information in face perception. *Perception, 16*, 747–759.

Yovel, I., Revelle, W., & Mineka, S. (2005). Who sees trees before forest? The obsessive–compulsive style of visual attention. *Psychological Science, 16*, 123–129.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9*, 1–27.