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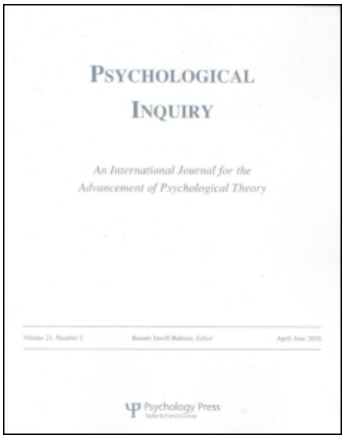

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Three Problems With Dual Systems

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Three Problems With Dual Systems

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There is something inherently satisfying about a dichotomy. It simplifies a large array of information to its essence: a critical set of differences. Furthermore, it is inherently generative: By implying a linked set of commonalities for each classification, it lets us know that if an item fits into category X, then it automatically must possess characteristics A, B, C, and so on. The simplicity and empirical generativity of dichotomies can make them highly appealing to theorists and researchers. In psychology, and particularly in the domain of social cognition, dichotomies are hot.

Despite this intuitive appeal, we propose that our field could generally benefit from a more careful and cautious approach to the development and use of dichotomies. In their target article, Förster and Dannenberg (this issue) propose a new processing system dichotomy, the global versus local processing model, or GLOMO^{sys}. We appreciate that their approach departs from the usual focus in modern processing models on automatic versus controlled, effortless versus effortful, or unconscious versus conscious processing (see, e.g., Chaiken & Trope, 1999; Evans, 2008, E. R. Smith & DeCoster, 2000, for reviews). Förster and Dannenberg remind us that other dimensions of processing may also be relevant and important. However, as with any dichotomy-based model, GLOMO^{sys} must wrestle with a number of important issues. Here, we describe three of these broader issues, and discuss each as it relates to GLOMO^{sys} in particular.

First, there is the question of how to define a new dichotomy and relate it to previously proposed and potentially relevant models. Does a new dichotomy provide new insight into how the mind works, or does it represent a refinement or variation on existing theory and research? We argue that Förster and Dannenberg need to more clearly and carefully define local versus global processing and their relation to other processing distinctions, particularly level of construal (Trope & Liberman, 2010). Second, there is the issue of how to select the most basic, essential moderators that determine which of the two components of the dichotomy are involved or active. It is often unclear why one or two particular moderators should receive priority over others. We suggest that Förster and Dannenberg do not adequately explain why novelty must be, or even could be, the common denominator that determines, in all situations, whether local or global processing occurs. Finally, there is the issue of whether dichotomies are an oversimplification, a great loss of data without gaining additional meaning. Often the main alternative to a dichotomy is a continuum. We argue that Förster and Dannenberg do not present sufficient evidence that local and global processing are indeed two separate systems, rather than two ends of a continuum.

Defining and Distinguishing Local Versus Global Processing

Our first concern is how to define local and global processing. As Förster and Dannenberg explain, the core of this distinction is perceptual: People can either "zoom in" and attend to the details of a stimulus set (e.g., the trees) or "zoom out" and attend to its overall Gestalt (e.g., the forest: Navon, 1977). On the level of perception, local and global processing are well defined. However, the authors emphasize that the local/global distinction also extends to conceptual processing. Unfortunately, though this leap from the perceptual to the conceptual is at the core of the model, the meaning of local/global processing at the conceptual level is not clearly defined.

The authors begin by describing local versus global conceptual processing in terms of breadth of spreading activation. Local conceptual processing involves a narrow spread of activation to close associates, whereas global conceptual processing involves a broad spread of activation that extends to more disparate associates (e.g., Förster, Friedman, Özelsel, & Denzler, 2006). This distinction can be neatly applied to some of the results the authors cite, such as the effect of mood on creativity and the effect of temporal distance on category breadth. Elsewhere, however, the authors seem to relate local versus global processing to level of abstraction, suggesting for example that when individuals adopt a global focus, abstract or more superordinate concepts are activated. The notion of abstraction seems orthogonal to breadth of spreading activation: One can imagine a broad spread of activation to many different concrete associates

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(e.g., bird – egg – omelet – coffee – cup – World Cup – soccer ball), or a narrow spread of activation to a single superordinate associate (e.g., bird – animal). Förster and Dannenberg do not address why or if there is a necessary relation between local/global and concrete/abstract, and yet their discussion of the literature often seems to assume that these concepts are interchangeable. Likewise, if local and global processing are defined in terms of breadth of spreading activation, it is unclear why they should be related to similarity versus dissimilarity testing in the way that the authors assume. What is it about local processing, if it is defined as a narrow spread of activation, that necessarily involves a focus on differences? The authors seem to want to move beyond the initial distinction they make between local and global processing, and yet they never explicitly define these terms in a way that can encompass all the concepts that eventually surface in their discussion.

One problem that often arises with a fuzzy definition is that it can produce conflicting hypotheses, because a model's predictions vary depending on how the definition is reinterpreted for a given domain. GLOMO^{sys} encounters this difficulty most clearly in the domain of context and goals. The authors struggle with the issue of how to reconcile the effects of culture on processing style with the results they have summarized thus far. Why would interdependent selves process information more globally? The authors propose that interdependent selves have a higher epistemic motive or "need to know." They propose that global processing serves this need by incorporating more relational and contextual information, whereas local processing keeps a person focused on his or her own goals. In other words, local processing focuses narrowly on goal-relevant information, whereas global processing includes a wider variety of information, including contextual information.

However, linking local/difference-focused/concrete processing with a focus on goal-relevant information, and global/similarity-focused/abstract processing with context-dependence, contradicts a wide body of results, particularly in the literature on psychological distance and level of construal (e.g., Eyal, Sagristano, Trope, Liberman, & Chaiken, 2009; Fujita, Trope, Liberman, & Levin-Sagi, 2006; Ledgerwood, Trope, & Chaiken, 2010). In fact, given the role that construal level research plays in providing evidence for the authors' model, we could not help but notice the similarities between the local/global distinction and the distinction between low- and high-level construals. We think this comparison helps highlight several gaps in the definition of local and global processing.

According to construal level theory, objects or events that are more psychologically distant from the self, here and now (e.g., distant in time, space, social distance, or hypotheticality) tend to be mentally represented at a more abstract level (Liberman & Trope, 2008; Trope & Liberman, 2010). Psychologically proximal objects tend to be represented in a concrete fashion; these construals are relatively unstructured, contextualized representations that include the object's subordinate and incidental features. As psychological distance increases, people tend to represent an object using more high-level, abstract construals; these schematic and decontextualized representations emphasize superordinate, core features and omit incidental features. In other words, whereas low-level, concrete construals focus on the (sometimes unimportant) details of an object in one particular situation, high-level, abstract construals extract the central, essential features of an object that are unlikely to vary from one context to another, and leave out peripheral details and context-specific information.

Construal level theory provides a neat framework for many of the concepts and effects that surface in Förster and Dannenberg's article. For example, greater temporal and spatial distance both improve performance on the Gestalt Completion Task and increase the use of broader and more superordinate categories (Förster, Friedman, & Liberman, 2004; Henderson, Fujita, Trope, & Liberman, 2006). These results indicate that distance leads to greater "global" perceptual and conceptual processing in the sense that it leads people to extract the core meaning of an object and focus on superordinate features—key characteristics of abstract construals. Likewise, distance increases the extent to which individuals act in accordance with their central, high-level goals rather than being swayed by low-level temptations in the current context (e.g., Ainslie & Haslam, 1992; Mischel & Ebbesen, 1970; see Fujita, 2008; Fujita, Trope, Lieberman, & Levin-Sagi, 2006). In addition, psychological distance increases the extent to which people's evaluative responses reflect their central and overarching values, morals, and ideologies, which tend to apply to an attitude object across contexts, whereas proximity increases the extent to which evaluations reflect low-level details of the current social context (Agerström & Björklund, 2009; Eyal, Liberman, & Trope, 2008; Eyal et al., 2009; Ledgerwood, Trope, & Chaiken, 2010; see Ledgerwood, Trope, & Liberman, in press, for a review). For example, individuals' near-future voting intentions toward a political policy tend to shift in response to an incidental stranger's opinions, whereas distant-future voting intentions are less susceptible to this contextual influence and instead reflect people's own overarching ideological values (Ledgerwood, Trope, & Chaiken, 2010). These effects fit neatly into the concept of levels of construal. Higher-level construals increase one's ability to see the Gestalt, increase breadth of categorization, heighten self-control, and increase the degree to which attitudes and behavioral intentions reflect important and context-independent values; lower-level construals promote attention to detail and narrower

categories, decrease self-control, and heighten susceptibility to context-specific social influences.

In contrast, Förster and Dannenberg's definitions do not allow for a consistent classification of these results. Ability to see the Gestalt and broader categorization fall under global processing, but so does susceptibility to the social context; meanwhile, acting in accordance with one's goals is related to *local* processing. In other words, according to these somewhat loosely-defined categories, the research summarized above demonstrates that psychological distance can increase global *or* local processing, depending on which aspect of the global/local distinction is involved in a particular experiment.

Of interest, similar patterns of findings can be found in other literatures, such as the literature on power. High power has a multitude of cognitive and motivational effects (see P. K. Smith & Galinsky, in press, for a recent review). It leads to the use of broader categories and more abstract thinking in general (Magee, Milliken, & Lurie, 2010; P. K. Smith, Dijksterhuis, & Wigboldus, 2008; P. K. Smith & Trope, 2006; P. K. Smith, Wigboldus, & Dijksterhuis, 2008) as well as more creative thinking (Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, 2008), but also to greater goal focus (Guinote, 2007; P. K. Smith, Jostmann, Galinsky, & van Dijk, 2008) and more goal-directed behavior (e.g., Galinsky, Gruenfeld, & Magee, 2003; Karremans & Smith, in press). By defining local processing in terms of both narrowing and goal-focus, and global processing in terms of both broadening and contextualizing, Förster and Dannenberg make it impossible to consistently classify moderators as relating to local versus global processing. Instead, we are left to conclude, for example, that high power leads to more global processing on some tasks and more local processing on others, without a theoretical reason to predict when each will occur. Therefore, the local/global dichotomy—at least as it is currently defined—does not seem to gain us insight or simplification when applied to a substantial number of existing findings in the literature.

One may wonder whether there is also a tension within construal level theory in terms of how high-level construals can be both broad (e.g., involving superordinate categories) and narrow (e.g., focusing on goal-relevant information) at the same time. However, the crux of high-level construals is that they are more structured than low-level construals. High-level construals extract meaning. They separate what is important from what is unimportant, focusing on the superordinate and central features of an object while screening out subordinate and peripheral details. Importantly, this definition suggests that high-level construals will produce *certain kinds* of perceptual and conceptual breadth. For example, perceptual breadth can result as part of the process of extracting meaning. The meaning of a letter is its overall shape, not its texture or the particular way in which it happens to be drawn. Thus, a high-level construal of a Navon letter will extract its essential gist or meaning (the overall shape of the letter) and screen out concrete details that are not important for understanding this meaning (its component parts). As for conceptual breadth, seemingly disparate objects can all share a key, superordinate feature, and identifying this central commonality facilitates broad categorization. Meanwhile, high-level construals can also lead to a relatively "narrow" focus on a person's most important and central values, while screening out irrelevant information from the "broader" social situation (Ledgerwood, Trope, & Liberman, in press). Thus, by carefully and cleanly defining high- and low-level construals, construal level theory is able to make clear predictions about exactly what types of breadth can be increased or decreased by relatively high-level (vs. low-level) construals. If distinguishing between local and global processing is to provide a useful foundation for a generative theoretical framework, it is important to precisely define these two processing styles in a way that allows for clear and consistent predictions.

Moreover, it is just as important to understand what a theory does *not* predict as to specify what it does predict. In other words, a good theory has boundaries, beyond which it cannot and does not make predictions: A theory can be broad, but its borders should be clearly defined. It therefore might be useful to consider what the boundaries of GLOMO^{sys} should be. For example, early in the article, the authors discuss how their model explains the effect of activating the approach versus avoidance systems on local/global processing. They state that the approach system is associated with global processing, and the avoidance system with local processing. At the end of the aricle, they briefly review a small literature on asymmetries in hemispheric activation and local/global processing, which has associated local processing with left hemisphere processing, and global processing with right hemisphere processing. Taken together, these two claims would suggest that approach, right hemisphere activation, and global processing should all go together, whereas avoidance should be associated with left hemisphere activation and local processing. However, the authors overlook a body of literature associating approach motivation with *left* hemisphere processing and avoidance motivation with *right* hemisphere processing (e.g., Coan & Allen, 2003; Harmon-Jones, 2003; Sutton & Davidson, 1997).

How to reconcile these conflicting findings? We believe these inconsistencies signal that the broad, simple picture drawn by GLOMO^{sys} may in fact be too broad and too simple. Just because something looks like a duck and quacks like a duck, does not mean it is a duck; one must first explore below the surface for the deeper similarities. For instance, as Magee and Smith (2010) have observed, most of the results recently

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published on the social cognition of power can be explained both by construal level theory (P. K. Smith & Trope, 2006; Trope & Liberman, 2010) and the approach-inhibition theory of power (Keltner, Gruenfeld, & Anderson, 2003). It is tempting to assume that these results could all be driven by the same underlying mechanism: one broad explanation for a diverse array of findings. However, more recent research suggests that this would be an oversimplification: Different effects seem driven by different elements of power and are responsive to different moderators (Lammers, Stoker, & Stapel, 2009; P. K. Smith & Lammers, 2010). For example, though Fiske (1993) posited that increased power should lead to increased stereotyping—a prediction that received some empirical support (e.g., Goodwin, Gubin, Fiske, & Yzerbyt, 2000)—Lammers et al. (2009) demonstrated more recently that these effects hold only for personal power (i.e., power over the self). Moreover, these researchers found that increased social power (i.e., power over others) actually leads to *reduced* stereotyping. Likewise, the effects of power on different dependent variables may actually reflect distinct processes. For instance, power's effects on behavioral approach are mediated by increased access to resources (Lammers, Stoker, & Stapel, 2010), but power's effects on abstract thinking are not (P. K. Smith & Lammers, 2010).

Similarly, GLOMO^{sys} may be simply too broad in its present form. It may be that culture functions differently than mood and regulatory focus, and perhaps goal-related processing should not be part of the local/global framework.

One disadvantage of vaguely defined concepts is that they lead to vagueness in the boundaries between what a theory can and cannot explain. If local and global processing are not clearly defined at the conceptual level, then they become potentially applicable to such a diverse array of effects that inconsistencies become almost inevitable. Conversely, clear definitions promote clear boundaries. For instance, if global (vs. local) processing is defined as a broad (vs. narrow) attentional focus, then this distinction should not be applied to goal pursuit because goals are not necessarily broad or narrow. Likewise, it should not be applied to the literature linking psychological distance to a greater focus on central and important features, as central/peripheral and important/unimportant are fundamentally different from a broad/narrow distinction.

Determining When Local or Global Processing Will Occur

Our second concern is how to understand what drives the choice between local and global processing. In a given situation, what main factor or factors predict whether individuals will process locally versus globally? Förster and Dannenberg acknowledge that many possible candidates exist but ultimately argue that novelty lies at the heart of all effects on local versus global processing.

This attempt to integrate and reconcile the many variables that may influence global versus local processing is timely and important. As Förster and Dannenberg note, a wide array of moderators can affect processing style, and it could be useful and parsimonious to seek out and identify one or two key variables that seem to underlie these effects. The area of power is undergoing a similar transformation. An accumulating body of results demonstrates various ways that high power leads to more abstract processing, and low power leads to more concrete processing (e.g., Goodwin et al., 2000; Magee et al., 2010; P. K. Smith & Trope, 2006; P. K. Smith, Wigboldus, et al., 2008). For example, increasing levels of power lead to more goal-directed behavior (Galinsky et al., 2003). However, some of these results have been explained by construal level theory (e.g., P. K. Smith & Trope, 2006), whereas others have been explained by the approach-inhibition theory of power (e.g., Galinsky et al., 2003), and still others have been explained by both (e.g., P. K. Smith, Jostmann, et al., 2008). The theory invoked in a given article seems to be guided more by personal preference than by any empirical or logical rules. Parsimony alone would suggest that two theories are not necessary if they both predict the same thing. However, because the theories are invoked by caprice rather than consistent logic, it is difficult to ascertain the extent to which the two theories actually overlap. Thus, an important next step to advance our understanding of power's psychological effects is to reconcile these two theories (Magee & Smith, 2010): Is it possible to integrate them into one theory? Or does each theory uniquely apply to certain elements of power (or its effects)? If the latter is true, can the circumstances in which each theory is more relevant or applicable be systematically explained? Addressing these questions will provide critical insight into the mechanisms and consequences of power.

Förster and Dannenberg make a similar effort in the general domain of local versus global processing, and again, integrating and refining our understanding of these effects will be an essential next step for this area of research. After reviewing other candidate explanations, such as regulatory focus and psychological distance, Förster and Dannenberg propose that novelty is the common denominator underlying all moderators of local/global processing. However, we think there are a number of problems with this conclusion.

Most important, we believe that novelty could easily be interpreted as another form of psychological distance. Psychological distance, a key moderator of construal level, is defined in terms of how subjectively distant something feels from one's own direct

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experience (i.e., a point of origin characterized by the self, here and now; Liberman & Förster, 2009; Liberman & Trope, 2008). Thus, the more dissimilar something is from direct experience (e.g., from the self), the more psychologically distant it is, and the more individuals should mentally represent it in an abstract way (e.g., Liviatan, Trope, & Liberman, 2008). Novelty could plausibly be conceptualized as one form of psychological distance, specifically distance or dissimilarity from a person's own experience. By definition, something that is novel is not yet part of one's own experience. As an object becomes more familiar, more and more of its aspects are known; in other words, more of it is part of one's own experience, and it is in this way more psychologically proximal. Thus, novel objects and events could potentially be considered more psychologically distant than familiar ones.

The notion that novelty may be a form of psychological distance is easily evident in many of the manipulations used. For example, tasks have been framed as either "similar to other tasks participants have done before" versus "newly invented" (p. 385), and participants have been asked to think of either something that had already happened to them in the past or something they had never experienced (Förster, Liberman, & Shapira, 2009). Such manipulations explicitly define novelty in terms of dissimilarity from one's own experience: Novelty is something that is outside of a person's own experience, and is therefore remote from the self as the point of origin. It seems plausible, then, that novelty could be conceptualized as a form of psychological distance.

However, it is *not* the case that all psychological distances can be conceptualized as a form of novelty, as the authors seem to want to claim. They suggest that a "'lack of experience' or novelty" (p. 184) underlies all dimensions of psychological distance, including temporal distance, social distance, spatial distance, and hypotheticality. It is difficult to understand how this could be the case. For instance, many studies on temporal distance manipulate the time until some future event takes place (e.g., buying a product tomorrow, in the relatively near future, versus a year from now, in the relatively distant future; Trope & Liberman, 2000). Because both points in time occur in the future, neither has yet been directly experienced. In other words, both are presumably equally novel by Förster and Dannenberg's definition. In fact, many studies on psychological distance manipulate the distance of explicitly novel objects or events. For instance, in one study, participants imagined choosing between two new medications either next week (the relatively near future) or next year (the relatively distant future; Ledgerwood, Wakslak, & Wang, 2010). Thus, the novelty of the object is held constant while a particular dimension of distance (in this case, time) is manipulated. It seems difficult to reconcile the results of such studies with the claim that novelty is the mechanism by which psychological distance produces its effects on choice, preference, and processing.

The single piece of empirical evidence that Förster and Dannenberg use to buttress their claim that novelty underlies all distance dimensions is a set of studies by Förster et al. (2009) that manipulated novelty while holding temporal distance constant. In one study, participants were instructed to think of either an event they had never experienced or an event that had already happened, and to imagine this event occurring tomorrow. The logic here seems to be that if novelty influences global (vs. local) processing when temporal distance is held constant, then novelty must explain temporal distance effects. If we extend this logic to most other studies on psychological distance and construal, which tend to manipulate one dimension of distance (e.g., time) while holding all others constant (e.g., space), we would have to conclude that in each case, the variable that is manipulated must explain the variable that is held constant. In other words, this is like claiming that because Festinger and Carlsmith (1959) held constant the dullness of a task while manipulating cognitive dissonance, dissonance must explain the effects of task dullness on enjoyment.

On a side note, we think the authors have also missed an opportunity to explore a potentially important aspect of local/global processing, namely its potential link to size. As previously mentioned, the authors define the conceptual side of local/global processing in terms of width of spreading activation, with local processing being narrow and global processing being broad. This narrowing versus broadening suggests that local/global processing may be associated with physical size. After all, the language we use to describe global processing—"thinking in terms of the big picture"—involves size metaphors. In fact, perusing the various manipulations of local versus global processing in the article, we were struck by how many confounded processing style with size. For example, one manipulation (p. 177) involved having participants feel four square plastic boxes that were arranged so that they were experienced as either four small boxes (local processing) or one large box (global processing). Another manipulation (p. 177) involved listening to a poem that was read either in a disfluent, choppy way so it was a series of short, disconnected elements (local processing) or in a fluent, smooth way so it was one long, continuous experience (global processing). We are not proposing that physical size should be another candidate for the common denominator of local/global processing, but rather that the relation between size and processing could be a fruitful line of research, and that distinguishing between global/local effects and size effects would be important.

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Is It Really a Dichotomy?

Our final concern is whether it is necessary or useful to conceptualize local and global processing as two separate systems. The two processing styles are described as polar opposites, which emphasizes their differences but also suggests they could be two ends of a continuum. As with any dichotomy-based model, GLOMO^{sys} must address two fundamental questions about its dual components: (a) Is a dichotomy more theoretically and/or empirically reasonable than a continuum, and (b) if a dichotomy is indeed more reasonable, how do the two components interact?

Unfortunately, Förster and Dannenberg provide little evidence that local and global processing are in fact separable and fundamentally distinct systems. In fact, the only empirical basis for this claim seems to be a small amount of neurological research associating local processing with the left hemisphere, and global processing with the right hemisphere. However, they themselves note these findings have been difficult to replicate. Furthermore, these are relative differences: The left hemisphere is not completely inactive during global processing, for example.

From a theoretical perspective, it seems more plausible to view local and global processing as a continuum. Certainly perceptual processing can be relatively local or relatively global. In Figure 1, for instance, attention could be focused very locally, on the circles, more globally, on the triangles, or even more globally, on the overall square that is formed by all four triangles together. At the conceptual level, insofar as global and local processing are similar to abstract and concrete construals, they should—like construal level—be continuous rather than dichotomous. If these terms instead refer solely to breadth of spreading activation, it seems likely that such breadth would be relative, and could increase incrementally rather than being *either* broad or narrow. Just as a camera has more than two zoom settings, it seems likely that both perceptual and conceptual attention can zoom in or zoom out in a relatively continuous fashion.

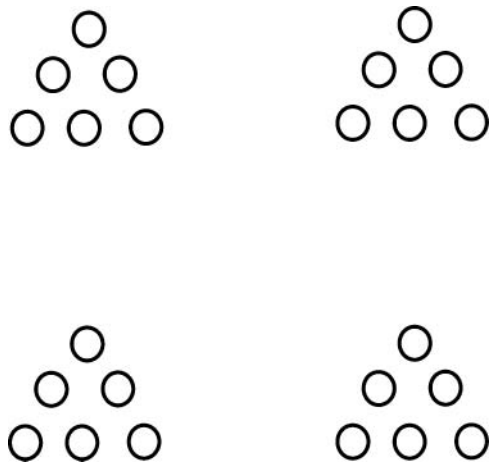

Figure 1. Is global versus local processing a dichotomy or a continuum? In this picture, the distinction between the Gestalt and the details seems relative, rather than absolute.

Moreover, if Förster and Dannenberg want to argue that global and local processing are two separate systems, they need to specify how these two systems interact. Can these processing styles co-occur, or do the authors assume that when one is active, the other is necessarily subdued (see, e.g., Chaiken & Trope, 1999; E. R. Smith & DeCoster, 2000, for discussions of sequential vs. simultaneous processing in dual process theories)? In addition, how do the outputs of each individual system combine? For instance, research on dual-process models of persuasion suggests that heuristic and systematic processing can combine to produce additive or attenuating effects depending on whether the two processing modes yield information that is congruent or incongruent in valence; they can also interact to produce interdependent effects on judgment when heuristic processing biases subsequent systematic processing (see Chaiken & Ledgerwood, in press, for a review). Can individuals process globally and locally at the same time, or switch rapidly between one processing style and the other? More generally, when creating a dual-process model, we believe it is important to specify not only how two processes differ, but also when and how they might come together to jointly impact judgment and behavior.

Why is it important to make this point? There is increasing concern that the field of psychology has fallen into the trap of creating dichotomies when they are not warranted or justified (e.g., Evans, 2008; Keren & Schul, 2009). Though individuals may be more comfortable thinking in terms of dichotomies than continua, much information is lost for the sake of greater ease of processing.

In conclusion, we reiterate our appreciation of Förster and Dannenberg's attempt to reconcile an array of similar-but-not-quite-identical results in a variety of domains, including mood, culture, and regulatory focus. Integrative approaches that seek to bring together a wide array of findings are far too rare in social psychology, and we applaud the effort to bring these literatures together. Yet the success and usefulness of such attempts depends critically on the clarity and carefulness with which an integrative theory is built, and we worry that the foundations of this model are neither careful nor clear. In this commentary, we have raised three fundamental concerns that can be examined with respect to any dichotomy-based model: (a) What *is* the dichotomy, and how does it relate to previous theory and research? (b) What is the key variable that underlies various predictors of which process will occur? and (c) Is a dichotomy necessary and useful, or would a

continuum be more appropriate? With respect to GLOMO^{sys}, we believe that addressing these questions will help create a model of global and local processing that can explain existing data, generate clear predictions, and increase our understanding of the interplay between perceptual and conceptual processing.

Note

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