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People perception: Social vision of groups and consequences for organizing and interacting☆

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A B S T R A C T

An enormous amount of research on person perception exists. This literature documents how people form impressions of one another and how these impressions influence behavior. However, this literature surprisingly has not been extended to *people perception*—how people visually perceive and judge *groups* (e.g., teams, classrooms, boards, crowds) rather than individuals. We propose a model of people perception processes, including three stages of Selection, Extraction, and Application (the SEA model). We integrate this model with literature from organizational, social, cognitive, and visual sciences to describe the important role of people perception in organizational and social behavior. We focus our discussion on organizational and social phenomena such as group tone, group hierarchy, and group evaluation.

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[1] In memoriam.

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1. Introduction

Reflecting on his first day meeting his new team, former Notre Dame football coach Lou Holtz notes:

> The team sat in the meeting room, kicked back. I could tell they were either feeling sorry for themselves after their big loss, or taking a lackadaisical attitude toward my arrival. Both were unacceptable. (Holtz, 2006, p 205)

Organizational theories (and lore) emphasize that an ability to sense or feel the character of groups is critical for leaders and group members to function effectively. Just as Lou Holtz intuited the attitude of his team, the start-up pitch expert can "sense" the feelings of a group of investors during a pitch (Morgan, 2001), managers assign tasks to work teams based on their intuitions about those teams (Hackman, 1987), and TED talk gurus adjust to the collective mood of their audiences (Elsbach, 2003; Greatbatch & Clark, 2005). More generally, leaders inspire their followers by accurately reading, then responding, to the needs, hopes, and mood of the group (DeRue & Ashford, 2010; DeRue, 2011; Pescosolido, 2002). These experiences illustrate complicated processes critical to social life—the perception and evaluation of groups.

Whether coaching a football team in the 1980s or walking in the African Savannah 100,000 years ago, any given human routinely encounters dyads, triads, social gatherings, and other groups. Such groups—and the capacity for individuals to organize and coordinate within them—have been critical to both human and organizational success (Heath & Staudenmayer, 2000). An ability to quickly evaluate groups, rather than taking time to deliberate and analyze each group member individually, should pay frequent dividends, as when managers intuitively select the best work team for a task (Hackman, 1987) or avoid punishment by accurately perceiving their own status in a group (Anderson, Ames, & Gosling, 2008). Speedy and accurate group perceptions, whether in ancient caves or in contemporary board rooms, should enable people to succeed in organizations and social life more generally.

What, then, is group perception? Group perception has traditionally been examined as an analogy, with "perception" referring to interpretation and evaluation. Indeed, ample research has demonstrated the importance of cognitive processes in the evaluation of groups (cf. Fiske & Taylor, 2013; Hamilton, 2005; Hamilton & Sherman, 1996). Yet this substantial literature has emerged in the absence of an emphasis on actual perception. Hence, while burgeoning research on face perception has clearly demonstrated that visual processes play an essential role in how people think about other *individuals*, a corresponding revolution has yet to occur in research on groups. Here, we begin to fill this lacuna by drawing from the large literature on the visual perception of individuals (cf. Adams, Ambady, Nakayama, & Shimojo, 2011; Balcetis & Lassiter, 2010) to generate a model of *people perception*.

We believe such a model is long past due, not only for advancing scientific knowledge in social cognition but also with respect to organizational and social behavior. Teachers see their classrooms, athletes see their teammates and opponents, performers see their audiences, leaders see their followers, and managers see their applicants, employees, and boards of directors. People perception processes are thus likely to shape perceivers' own behavior through a variety of mechanisms (e.g., by signaling group norms). As influential models of organizational dynamics note, team leaders, lecturers, and middle-managers often have to update their beliefs about a group in real time, adjusting ongoing behavior accordingly (e.g. by explaining in more detail or deferring on a point; Morgan, 2001). Hence, when a middle-manager gives a report to a group of executives, she likely becomes aware of the status hierarchy as well as the general mood and receptiveness of the group, and modifies her behavior accordingly.

Consistent with these examples, many theories of organizational behavior rely in part on the assumption that people frequently and accurately form speedy group impressions. This idea is inherent to follower theories of leadership (e.g., DeRue, 2011), motivational speaking (e.g., Greatbatch & Clark, 2005), status interactions (e.g., Anderson & Kilduff, 2009; Ridgeway, 2000), organizational acculturation (e.g. Nahavandi & Malekzadeh, 1988), and organizational identity (e.g., Elsbach, 2003; Hsu & Hannan, 2005). Yet whereas some research has examined how people use this sort of knowledge in organizational behavior (Gardner & Avolio, 1998; Gardner & Martinko,

1988; Harrison, Price, Gavin, & Florey, 2002; Levine & Higgins, 2001; Pescosolido, 2002), there is little scholarship on processes involved in how people extract that knowledge in the first place (but see Ginzel, Kramer, & Sutton, 1993; Dane & Pratt, 2007). Indeed, the very early stages of group and team behaviors have not been adequately explored (Cronin, Weingart, & Todorova, 2011; Roe, Waller, & Clegg, 2008), despite the important effects early group impressions are likely to have on downstream organizational behaviors (e.g., Curhan & Pentland, 2007; Harrison et al., 2002).

Our model begins to fill these gaps by describing the important role that perceptual, nonverbal processes play in how people accumulate organizational knowledge. Organizational and social environments are often made-up of groups such as cliques, teams, classrooms, boards, departments, crowds, families, and audiences. When an individual interacts with(in) these groups, the first cognitive processes to become active are sensory and perceptual processes (Gleitman, Gross, & Reisberg, 2010). In general, we argue that sensory and perceptual cues shape and interact with high-level social cognitions to produce impressions of groups.

Although encounters with perceptible cues can be brief and may seem unimportant to subsequent interactions with the group, considerable research suggests that perceptual processes play a fundamental role in impression formation (see Adams et al., 2011; Balcetis & Lassiter, 2010; Freeman & Ambady, 2011a). It seems likely that the role of perception in social cognition is not limited to persons but extends to people. Of course, *people* stimuli are likely to be more complex than *person* stimuli, as the features that comprise the former are, by definition, more diverse and greater in number than the latter. In short, people perception occurs frequently, is likely to be instrumental to impressions about groups, and is likely to be more complex than person perception. Whether sizing up a group of venture capitalists, a rival soccer team, or the various cliques in a high school lunchroom, fast and accurate visual perception of groups may be important to social interaction and even survival. For example, to the extent that the middle-manager or the leader is incorrect or too slow to perceive group hierarchy, mood, and receptiveness, her performance and even her job may be at risk.

Our model is in keeping with arguments that low-level cognitive and nonverbal processes play an important role in organizational behavior (Bazerman & Moore, 2013; Hodgkinson & Healey, 2008; Jost et al., 2009; Tiedens & Fragale, 2003; Ziegert & Hanges, 2005). Specifically, we integrate the literature on visual perception of persons with work on group cognition to arrive at a model of *people perception*—the SEA (Selection, Extraction, and Application) model, which specifies three stages through which perception influences group cognition and behavior in social and organizational settings. In so doing, we explore the implications of social vision for organizing, coordinating, and interacting with and within groups.

This review is organized into four main sections. First, we consider the functionality and relevance of people perception processes to social and organizational behavior. Second, we propose the SEA model and its three stages, which describe the people perception process. We explore in detail how SEA processes may function as perceivers form specific kinds of impressions (hierarchy, diversity, cohesion, emotion, and competence) about groups. Third, we reflect on the ways in which people perception processes and methodology may inform and influence team and group behavior. We specifically consider the consequences of people perception for group composition, task assignment, tone, organization, interaction, performance, and culture/identity. Finally, we conclude with an eye toward future directions and implications of the SEA model for organizational and behavioral research. Overall, we suggest that rapid and accurate perception of groups is both likely and useful for fundamentally social beings, and is especially relevant, common, and consequential in organizational settings.

1.1. Definitions and scope

1.1.1. Perception

"Perception" is often treated as a fuzzy concept in psychological research. Traditionally in psychology, perception refers to the immediate products of sensory experience, whether through taste, sight, hearing, touch, or smell (e.g., Gleitman et al., 2010). Alternatively, as often used in social psychology, perception can denote the downstream processes of forming and interacting with mental representations about people, such as categorizing or stereotyping in "social perception" (e.g., Hamilton, 2005).

We will use the word "perception" in the traditional sense, to specifically reference the immediate products of sensation. Although the model we present should apply to any mode of perceiving people (e.g., hearing, smell), we focus here on visual perception. Our emphasis on visual processes is practical, rather than theoretical. While there is some evidence regarding the role of auditory (Bachorowski & Owren, 2001; Freeman & Ambady, 2011b; Piazza, Sweeny, Wessel, Silver, & Whitney, 2013), tactile (Hertenstein, Keltner, App, Bulleit, & Jaskolka, 2006), and olfactory (Chaix, Cao, & Donnelly, 2008; Takahashi, Nakashima, Hong, & Watanabe, 2005; Zhou & Chen, 2009) processes in social thought, the specific nature of these processes in social cognition is relatively understudied and somewhat unclear. Conversely, there is a large literature that has provided new and important insights into the instrumental role of *visual* mechanisms in social cognitions, emotions, and behavior (Adams et al., 2011; Balcetis & Lassiter, 2010).

The past several decades of person perception research have revealed a great deal about the processes, characteristics, and outcomes associated with seeing other individuals (see Macrae & Quadflieg, 2010 for a review). It is now clear, for example, that facial features are automatically encoded in terms of social categories (e.g., race, gender, age), mental states (e.g., emotions, intentions), and traits (e.g., warmth, dominance, trustworthiness, competence; Fiske, Cuddy, & Glick, 2007; Ito & Urland, 2003; Oosterhof & Todorov, 2008; Todorov, 2012). These perceptions are frequently, though not always, accurate (e.g., Carré, McCormick, & Mondloch, 2009; Rule, Rosen, Slepian, & Ambady, 2011; Todorov, Said, & Verosky, 2011).

Research in this area has examined how attention and memory for people are influenced from the "bottom-up", by sensory cues with attention-grabbing or memory-grabbing features (MacLin, MacLin, & Malpass, 2001; Meissner & Brigham, 2001; Ohman, Flykt, & Esteves, 2001). Conversely, other research has examined how social cognitions and motives influence vision from the "top-down", for instance, when social labels change perceived facial features (Eberhardt, Dasgupta, & Banaszynski, 2003).

Bottom-up visual cues (e.g., low level properties of the stimuli; color, facial features) and top-down social cognitions (e.g. high level properties of the perceiver; motivations, beliefs) interact and influence one another during person perception. However, this burgeoning literature on person perception has, with few exceptions (Hamilton et al., 2013; Whitney, Haberman, & Sweeny, 2013), not been extended to *people* perception. Given the centrality of group dynamics (Hackman & Katz, 2010; Levine & Moreland, 1990), intergroup relations (De Dreu, 2010; Yzerbyt & Demoulin, 2010), and group status (Fiske, 2010; Sidanius & Pratto, 1999) to social and organizational psychology, the relative absence of research on people perception is glaring. Psychologists know little about how people sense and perceive groups. Although it is theoretically possible that visual *people* perception is simply the outcome of visual *person* perception processes, we argue for processing mechanisms unique to group perception.

1.1.2. Groups

Even without physically encountering the group or its members, people can experience feelings and cognitions about those groups. Indeed, there is a long and venerable history of research on group-based cognitions that occur in the absence of physical encounters with those groups. By studying how people respond to descriptions of groups or group members, social and organizational psychologists have learned a great deal about how people categorize, stereotype, and mentally represent groups (Hamilton, 2005; Fiske & Taylor, 2013; Macrae & Bodenhausen, 2000). While this literature is not the focus of our review, we seek a definition of "group" that is in keeping with this prior work. Indeed, this five-letter word has evoked a variety of definitions across the social sciences (cf. Hackman & Katz, 2010) but a common element of most such definitions is that a group is *a collection of people*.

A second component of our definition reflects the purpose of our model and thus the capabilities of human perceivers. Just as models of visual person perception regard judgments of a *perceived* individual, our model of visual people perception regards judgments of a *perceived* group. In other words, groups must also be *perceivable in whole*. As an example, "women" or "African-Americans" or "Microsoft" would not be groups in our model (since they are not perceivable "in whole") but a collection of four women or four African-Americans or four Microsoft workers standing in front of a perceiver *could be* a group. Of course, a small group (e.g., four) may symbolize a broader social category (e.g., African-American) or organization (e.g., Microsoft).

The final element of our definition is that of *interdependence*, defined as shared goals or outcome dependency, a concept that is regarded in both social cognition and economic and organizational research as the hallmark of many or most social relationships (Brown, 1988; Neuberg & Fiske, 1987; Fiske, Lin, & Neuberg, 1999; Wageman, 1995). For example, a collection of four women standing in front of a perceiver would not (objectively) be a group if these women shared no purpose or outcomes (though the perceiver may be unaware that these women are not a group). Contrariwise, a collection of four women standing in front of a perceiver would be a group if those women were interdependent—for instance, if they depended on each other to maintain their house or if they were together to recruit bone marrow donors. Consequently, we define *a group as a perceivable collection of interdependent people.*

This definition may seem somewhat restrictive, especially compared to common lay understandings of the term "group". Yet real human encounters with groups typically conform to the definition we will use throughout the paper. Hence, humans encounter a clique in the high school lunchroom, a board of directors in a meeting, a basketball team playing a game, and so on. We are concerned with the initial inferences that people draw about these groups—including who is part of the group—and how those inferences consequently guide behavior. However, later in this review we discuss how the visual perception of groups may influence judgments of broader entities (e.g., Microsoft) and social categories (e.g., African-Americans).

Importantly, our *group* definition will sometimes be inconsistent with perceivers' *subjective* sense of what counts as a group. Indeed, one purpose of our model is to identify perceptual and cognitive factors that cause people to believe that a collection of people is a group (see also Hamilton, 2005). As we detail below, a perceiver may rely on featural and configural cues, Gestalt grouping principles, prior knowledge and information, expectations, and other factors in determining whether or not certain people constitute a "group." The key point is that we draw a distinction between our a priori definition of groups and perceivers' subjective judgments.

1.2. Functional considerations in people perception

Our argument is that people perception fundamentally shapes cognition within and about groups and teams. This argument is based, in part, on the idea that people perception is necessary for group life. Here we consider the functional importance and implications of people perception from both evolutionary and organizational perspectives.

1.2.1. Evolutionary perspectives

Groups have played a fundamental role in human evolution and survival. For instance, groups provide individuals with increased security and protection (van Vugt & Kameda, 2012) and increased access to resources (Cosmides & Tooby, 2005). Groups can also be uniquely threatening to survival. Throughout human history, ingroup deviants have been frequently punished (Cosmides, Tooby, Fiddick, & Bryant, 2005; Kurzban & Leary, 2001), victorious outgroups have hindered and even

destroyed losers' quality of life (Kurzban & Neuberg, 2005; Sidanius & Pratto, 1999), and social exclusion has led to near-certain death (Baumeister & Leary, 1995; Buss, 1990). In other words, it is likely that certain elements of human cognition about groups developed as a result of evolutionary pressures (Neuberg, Kenrick, & Schaller, 2010).

The ability to see is, of course, also part of the human evolutionary package. As such, human visual systems are thought to prioritize highly relevant information (Kenrick, 1994). Because other people are especially important to human survival and reproduction, one might therefore expect the visual system to prioritize the processing of socially-relevant cues, especially the components and movements of human faces and bodies (Zebrowitz & Montepare, 2006). For example, even newborns devote special attention to human faces (Langlois et al., 1987) and among adults, fitness-relevant facial features are prioritized. Facial structure is processed especially quickly with respect to important traits, such as the trustworthiness and dominance of the face's owner (Oosterhof & Todorov, 2008; Rule, Slepian, & Ambady, 2012). This prioritization results in benefits for perceivers, such that people can (at rates exceeding chance) detect another person's traits from only minimal visual exposure (see Weisbuch & Ambady, 2011). Accuracy is sometimes tied directly to concerns with reproductive fitness, as when women in ovulation (vs. when not ovulating) more accurately perceive male sexual orientation (Rule et al., 2011).

Other approaches emphasize how evolution might design mechanisms that flexibly adapt vision (Gibson, 1933) and social vision (McArthur & Baron, 1983) to features of the environment that become important over an individual's lifetime. Either way, human visual systems have developed to provide attentional and perceptual resources to the rapid and accurate detection of social information relevant to well-being. Thus, it is possible that the human visual system has developed in a way that helps individuals solve an adaptive problem: namely, quickly evaluating and responding to social *groups*.

1.2.2. Organizational perspectives

The evolutionary approach places an emphasis on the function of various processes for human well-being and reproduction. Yet evolution is not the only way that people perception may be "functional". For example, people perception is likely to have an important function in the operation of organizations. Organizations are made up of and structured by groups and teams, which play critical roles in decision-making and task performance (Gladstein, 1984; Hackman & Morris, 1975; Ilgen, 1999). These groups and teams are often purposive, organized to perform tasks such as product development, negotiations, hiring, and more (Hackman & Katz, 2010). Informal groups also emerge, for instance at lunch in the cafeteria or on the company softball team, and inclusion in these groups strengthens job satisfaction and commitment (Fine, 1986; Price, 1985). In general, perceptible groups are prevalent features of corporations, schools, businesses, government agencies, and other organizations.

Groups and teams, then, are a central feature of social and organizational life (Hackman, 1992) and the study of groups and teams has long been considered essential to organizational behavior research (Heath & Sitkin, 2001; Hackman & Katz, 2010). People must select and create groups, interact within groups, and evaluate, negotiate with, and compete against other groups. Further, group-relevant cognitions and behaviors have important implications for group outcomes, and thus the outcomes of organizations as a whole. For example, group-relevant cognitions influence who is in the group (e.g., Mannix & Neale, 2005), how the group interacts (e.g., de Wit, Greer, & Jehn, 2012), and how the group competes against other groups (e.g., Wildschut, Pinter, Vevea, Insko, & Schopler, 2003).

People perception should play an important role in such group processes. For example, perceptual processes should influence how people evaluate group performance (Guzzo & Dickson, 1996), whether or not people decide to engage with, join, or exit a group (van Vugt & Hart, 2004), and how people choose to adjust to a group's demands (Feldman, 1981). After all, visual processes contribute to speedy and better-than-chance social judgments that inform decision-making, at least when *individuals* are the targets of those judgments and decisions (Quinn & Macrae, 2011; Rule et al., 2011; Willis & Todorov, 2006). After seeing brief streams of behavior or even just glimpsing faces, people make judgments of individuals that are predictive of individual performance, competence, and cooperativeness (for reviews, see Ambady, Bernieri, & Richeson, 2000; Weisbuch & Ambady, 2011). Consistent with the predictive validity of such "thin-slice" judgments, brief visual input often becomes the basis for human decisions and behaviors toward specific individuals, such as decisions about hiring (e.g., DeGroot & Gooty, 2009; see also Adams et al., 2011; Balcetis & Lassiter, 2010). It seems reasonable to suggest that perceptual processes also play a key role in the formation of impressions about *groups*.

As they do for person perception, visual processes should allow rapid and even accurate detection of group characteristics, like performance, satisfaction, cohesion, and cooperativeness. Such *people perception* processes are likely to shape social and organizational behavior through a variety of mechanisms. For example, research suggests that people choose to join groups they judge as likely to succeed (competent) and/or be pleasant (warm)—those judgments are almost certainly shaped or biased by people perception (Cuddy, Glick, & Beninger, 2011; Fiske, Cuddy, Glick, & Xu, 2002; Fiske et al., 2007). Hence, immediate perceptions of group cohesion, competence, and warmth are likely to play an important role in the groups that people choose to join, interact with, or compete against. Moreover, evaluations of group performance—whether from management or another entity—are equally likely to be based upon or biased by perceptions of the group in action (e.g., Staw, 1975). In short, a consideration of people perception processes may open new insights into group and organizational behavior.

2. A framework for people perception: introducing the SEA model

People perception is a unique and potentially powerful construct for explaining cognition in and about groups.

Importantly, people perception does *not* simply describe the summation of impressions of individual group members (in which case repeated *person* perception would be sufficient). Such summation fails to capture additional complexity that emerges in the visual perception of groups. For instance, one might infer—from facial features alone—another person's dominance, aggressiveness, or even preference for hierarchy (e.g., Muller & Mazur, 1997; Oosterhof & Todorov, 2008). But one cannot detect another individual's "hierarchy", because hierarchy requires difference in rank or resources among *multiple* individuals. Hierarchy and other properties (e.g., cohesion, diversity) are fundamentally group properties; they are relational in nature and can only emerge in groups. Thus, just as humans have developed the ability to quickly detect certain emotions, mental states, and beliefs in other individuals, people may also have developed perceptual processes for quickly detecting group-emergent information. For instance, speedy detection of outgroup cohesiveness may be critical for perceivers who wish to challenge the outgroup.

Beyond characteristics that only emerge at the group-level, group impressions are unique because they often require the speedy integration of multiple individuals' characteristics. For example, the relative dominance of an individual personality can be quickly detected from facial information (Oosterhof & Todorov, 2008). Quickly and accurately detecting the average dominance of a *group* of people could be useful for perceivers to (a) evaluate if that group could be defeated in competition (Kilduff, Elfenbein, & Staw, 2010), (b) determine the impression management strategies likely to impress that group (Zerbe & Paulhus, 1987), (c) determine one's relative dominance within that group (Anderson et al., 2008), and so on.

Such judgments can inform behavior but do not seem likely to be the product of person-by-person analysis. Such analysis regards multiple objects and therefore must be inefficient compared to an analysis of a single object—a group. And efficiency is often of critical importance in group behavior. For example, in the wild of the jungle or the boardroom, the decision of whether to challenge or surrender to a given group will be maladaptive if rendered too slowly. Hence, even those judgments that could apply to individuals (e.g., competence) would be more efficiently rendered by perceptual mechanisms devoted to processing the group as a whole. The visual detection of group-level information is likely to operate differently than visual detection of individual-level information, not just because of the emergence of properties unique to groups, but also because a group is necessarily a more complex and heterogeneous visual stimulus than any member of the group.

Here we present a model to describe how the *people perception* process may unfold. This is the first model to our knowledge that explicitly describes how the visual perception of groups leads to inferences about those groups. Consequently, the model we present, while based on prior work in related disciplines, is likely to require revision as new evidence (we hope) accumulates. Nonetheless, this model provides an integrated basis from which to derive hypotheses and examine people perception, including both its processes and consequences.

Our model of people perception includes three broad stages: Selection, Extraction, and Application (see Fig. 1). Selection entails the perceptual selection of people into a group; Extraction entails the statistical analysis (e.g., central tendency, variability) of that group on a given characteristic. As detailed below, the Selection and Extraction stages are spontaneous in that they do not depend on goals, intentions, or processing resources of the perceiver. Although both stages are fully automatic (cf. Bargh, 1989, 1994), they are subject to bottom-up and top-down influences, generating a visually-based summary of the group. The visual representation created in these first two stages is used in the third stage (Application) to generate judgments. The Application stage is subject to controlled processes that impact when and how the visual representation itself is used.

2.1. Ensemble coding: a précis

One challenge for a people perception framework, as opposed to person perception models (see Macrae & Quadflieg, 2010 for a recent review), is to explain how diverse visual information involving different objects (i.e., people) is integrated into an impression of a single object (i.e., a group). Work in the vision sciences has demonstrated that in order to efficiently process vast amounts of low-level perceptual information, humans make use of processes in the brain and visual system that statistically track the surrounding environment (e.g., Fiser & Aslin, 2001; Maloney, 2002; Turk-Browne, Junge, & Scholl, 2005). For example, over the course of many trials even infants can learn the probability that specific stimuli appear together (Fiser & Aslin, 2002; Saffran, Aslin, & Newport, 1996).

There are numerous types of statistical-learning but the SEA model emphasizes *ensemble coding*, also known as perceptual summarization, summary representation, or statistical summarization (see Alvarez, 2011; Haberman & Whitney, 2012; Whitney et al., 2013 for recent reviews). Work on ensemble coding suggests that people quickly discern central tendency statistics (e.g., average) of the

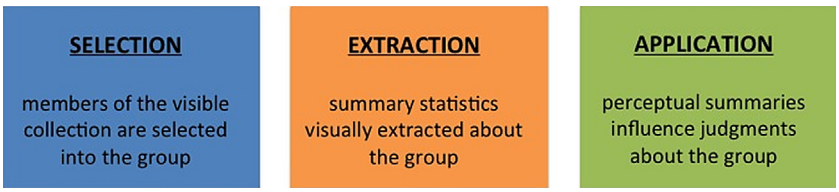

Fig. 1. Three stage SEA model of people perception.

position, speed, and low-level visual features of a collection or set of objects (e.g., Watamaniuk & McKee, 1998). From a brief glance at such a set, perceivers can even extract the central tendency of features typically processed in high-level vision, like human faces and bodies. In other words, people perceive sets of objects or groups of faces by quickly extracting summaries of the target group (Alvarez, 2011; Ariely, 2001; Chong & Treisman, 2003; Haberman & Whitney, 2012; Sweeny, Haroz, & Whitney, 2013). Throughout this article, the abilities of perceivers to extract central tendency from a group plays a central role.[2] Ensemble coding (and statistical learning more broadly) occurs in Selection and Extraction stages of the SEA model, creating the visual representation that is referenced during the Application stage.

One important property of ensemble coding is that it occurs even when perceivers cannot identify individual members of a stimulus group. For instance, Haberman and Whitney (2009) showed that people are adept at detecting mean emotion and gender among a spatially-distributed set of faces. Of interest, these effects occurred even though participants were inaccurate at recalling the details of specific faces within the group. Moreover, people can extract central tendency statistics from a set of faces presented one-by-one, rather than simultaneously. In fact, perceivers seem to update their perceptual summaries as they encounter new members of a group. Haberman, Harp, and Whitney (2009) found that perceivers could identify the average facial expression from a sequence of faces and then update this average to include subsequent faces, even though they do not remember individual group members.

Faces may provide ideal social stimuli for summarization, but ensemble coding in people perception is not limited to faces-other social stimuli may be summarized as well. For example, people extract the average direction of a moving crowd of point-light walkers (Sweeny et al., 2013). All together, such findings point to an efficient statistical learning function by which participants may speedily extract features of a group, including naturalistic groups of moving, speaking, changing, unique looking people.

We highlight ensemble coding in our model of people perception. Because the properties of high-level ensemble coding remain a matter of some debate, we provide a general framework and then consider multiple pathways through which impressions of groups may be formed.

2.2. The SEA model

2.2.1. Selection

We have argued that people perception includes ensemble coding: a spontaneous, efficient, and uncontrollable process that generates a summary of a visually-perceived stimulus group. The process of selecting particular people into a group is the first step in people perception (Selection stage; see Fig. 2), yet this element of ensemble coding remains understudied. We suspect that the absence of research on the selection process can be traced to the high degree of experimental control necessary to identify ensemble coding. In studies employing complex facial stimuli, faces are isolated from other stimuli and equated for a variety of characteristics (e.g., size, color contrast, identity, gender). The process of selection is therefore typically examined in a context of faces or bodies which are identical in many respects and are isolated from any other stimuli—in other words, contexts in which inclusion of all members of the set is highly likely. Given that real life people perception will normally occur in a complex and perceptually-chaotic social environment, the operation of ensemble coding during group impression formation outside the laboratory remains somewhat unclear. However, evidence from existing, highly-controlled studies provides a basis for inference.

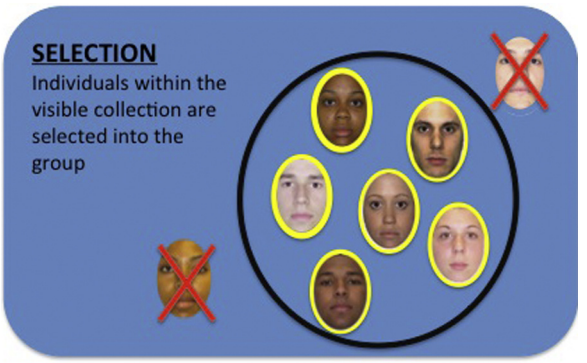

Fig. 2. Selection, the first stage of the SEA model. The perceiver selects which individuals are included in the group, and which are excluded (in this example, via proximity).

2.2.1.1. Selection Hypothesis 1: the existence of selection in people perception. It is possible, in theory, that when confronted with a real-world scene, perceivers will select *all* objects for ensemble coding (see Haberman & Whitney, 2012). However, we expect that—at least in the case of people perception—selection will be more specific. This idea is supported by evidence that when perceivers compute perceptual summaries for a group, they exclude outliers—single stimuli or faces that are far different from the other stimuli in terms of proximity, color, or otherwise (Brady & Alvarez, 2011; Haberman & Whitney, 2010). Additionally, in practice it would be maladaptive to summarize across all classes of stimuli (e.g., cars, people, and trees) into a single representation—the resulting perceptual summary would be a confusing meld. The functional importance of separating humans from other objects is indeed reflected in visual perception, where other humans are perceived especially quickly and with heightened fidelity (e.g., Farah, Wilson, Drain, & Tanaka, 1998; Gauthier & Tarr, 1997; Johansson, 1973; Mather & West, 1993; Morton & Johnson, 1991). We expect *selection processes to delineate the people who will be included in the perceptual*

[2] For practical purposes, we at times substitute the terms "average" or "mean" for "central tendency". This practice is common in the ensemble coding literature and participants in ensemble coding tasks often indicate the "mean" or "average". It is possible however that people routinely extract other dimensions of central tendency (e.g., median) as well.

summaries (*Selection Hypothesis 1*). The remaining Selection hypotheses describe these processes.

2.2.1.2. Selection Hypothesis 2: spontaneity. We expect that *perceivers spontaneously select members into a group* (*Selection Hypothesis 2*). This means that regardless of processing goals or cognitive resources, selection processes operate whenever perceivers encounter a collection of people. Hence, regardless of who a perceiver is or what the organizational context is, any encounter with a collection of individuals should cause perceivers to spontaneously activate selection processes. This hypothesis is indirectly supported by work on ensemble coding with obvious subsets (e.g., circles of different colors)—in the absence of a goal to create separate ensembles for the subsets, perceivers quickly generated perceptual summaries according to the subset groupings (e.g., Brady & Alvarez, 2011). The process of visually selecting or excluding members into the group, therefore, seems to occur spontaneously.

2.2.1.3. Selection Hypothesis 3: bottom-up influences. Perceptual grouping principles provide a bottom-up means for people to select some individuals and exclude others. Specifically, vision scientists have identified numerous perceptual grouping principles, including (but not limited to) proximity, similarity, and shared orientation or direction (Heider & Simmel, 1944; Wade & Swanston, 2013; Wagemans et al., 2012; Wertheimer, 1923). For instance, if objects or people are very close to one another, then perceivers are more likely to believe those objects or people make up a group. Indeed, Haberman and Whitney (2012) have speculated that Gestalt grouping principles may exist for the *purpose* of selecting objects for perceptual summarizing. This hypothesis highlights one contribution of the SEA model to the science of groups and organizational behavior—visual cues that may seem irrelevant to a rational decision-maker can shape that decision-makers' impression of (who is in) a group. Specifically, *to the extent that they are close to one another, have similar appearance, or exhibit coordination, individuals will be included in a group and their characteristics will be ensemble coded* (*Selection Hypothesis 3*).

2.2.1.4. Selection Hypothesis 4: processing goals. We expect *processing goals to influence the selection of members into a perceptual group* (*Selection Hypothesis 4*). Broadly, processing goals are intentions to engage in a particular type of thought process, for instance, intending to pay attention, to visually search, or to consider counterfactuals. Although processing goals appear unnecessary for ensemble coding to occur, such coding can be modulated by processing goals. For example, manipulations which direct perceivers' attention to a particular group member or which narrow perceivers' attentional focus cause perceivers' perceptual summaries to be biased toward the focal individual(s) (Alvarez & Oliva, 2008, 2009; Brady & Alvarez, 2011; Chong & Treisman, 2003, 2005a, 2005b; de Fockert & Marchant, 2008). Such phenomena are not trivial: attentional goals are often active in group settings, with perceivers purposefully focusing their attention on some people more than others (Brown, Tumeo, Larey, & Paulus, 1998). Beyond attention, a variety of additional processing goals (e.g., a goal to be inclusive or exclusive) may influence the individuals selected into a group (Pauker et al., 2009). Indeed, considerable evidence suggests that processing goals weigh heavily even at early stages of visual perception (see Yantis, 2000).

2.2.1.5. Selection Hypothesis 5: existing knowledge. We expect that *existing knowledge about relationships (e.g., of similarity or interdependence) among individuals will influence the selection of members into a perceptual group (Selection Hypothesis 5)*. This follows from evidence that perceivers are more likely to include individuals in the perceptual summary when those individuals are known to be members of a group (cf. Brady & Alvarez, 2011; Haberman & Whitney, 2010). Familiarity may thus play an important role. For instance, a perceiver may encounter a collection of five people, four of whom the perceiver had seen working together the previous night. In this case, perceptual selection of members into the group may exclude the fifth individual by virtue of semantic knowledge (knowledge represented symbolically; e.g., verbally) of a "group" or by virtue of the speedier perception of the other four, given that specific previously-encountered people are perceived especially quickly (Herzmann, Schweinberger, Sommer, & Jentzsch, 2004; Kelley & Jacoby, 2000). Similarly, familiarity with the specific kind of group (e.g., a basketball team fields five players) should influence selection, even though familiarity may not reach the level of conscious knowledge. In general, existing knowledge (versus visual perception) of interdependence increases the likelihood that a perceiver will decide that a collection of people is a group (Campbell, 1958; Gaertner, Iuzzini, Witt, & Orina, 2006; Haslam, Rothschild, & Ernst, 2000; Lickel et al., 2000). Thus, evidence from research on both ensemble coding and impression formation suggests selection should be influenced by knowledge about the extent to which a collection is a group.

2.2.1.6. Selection Hypothesis 6: expectations. We propose that *expectations for relationships should bias perceivers toward encoding a collection of people as a single entity (Selection Hypothesis 6)*. Expectations are not unrelated to existing knowledge, but we refer here specifically to expectations about people in general (e.g., expectations based on stereotypes) independent of existing knowledge about the particular individuals encountered. For example, entering a rival tribe's campsite, executing an external audit at an organization, or instructing a class full of first-day kindergartners may cause a person to experience outgroup status. A person in these circumstances may encode any collection of people she comes across as a group because she expects outgroup members to be alike. Other contexts—such as a city street, a relatively empty mall, or a high-school lunchroom—would not, of themselves, generate expectations of homogeneity. Beyond general outgroup/ingroup expectations, specific stereotypes about kinds of individuals or kinds of groups may generate expectations that may influence selection (e.g., in

Table 1
Selection stage hypotheses.

Stage one: selection	
Hypothesis 1: selection occurs	Selection processes will delineate which members of the collection will be included in the group to be summarized
Hypothesis 2: spontaneity	Perceivers will spontaneously select collection members into the group
Hypothesis 3:bottom-up influences	To the extent that they are close to one another, have similar appearance, or exhibit coordination, individuals will be selected into the group
Hypothesis 4: processing goals	Processing goals will influence the selection of collection members into the group
Hypothesis 5: existing knowledge	Existing knowledge about relationships among individuals will influence selection of members into the group
Hypothesis 6: expectations	Expectations for relationships will bias perceivers toward encoding a collection of people as a group

a sports context, selecting only men into the group). Finally, there is ample evidence from across vision science that expectations bias the visual perception of attended stimuli (see Summerfield & Egner, 2009), suggesting that expectations exert an early enough influence as to modulate the generation of a perceptual summary.

Given the absence of extant research in how exemplars are selected for ensemble coding, we did not hypothesize interactions among the different factors even if such interactions are likely. For example, bottom-up processes (e.g., proximity of people to each other) might trump or shape the influence of top-down processes (e.g., who knows who). However, due to the relative dearth of research on selection we are reluctant to generate specific interactive principles or hypotheses for this stage of the model. Future work should explore these possibilities.

2.2.1.7. Selection summary. Overall, the SEA model suggests that the Selection stage is an important first step in people perception (see Table 1 for summary of hypotheses). The SEA model proposes individual members are first selected into the group to be summarized (*Selection Hypothesis 1*) and that this is a spontaneous process (*Selection Hypothesis 2*). This step is particularly important as it enables the efficient visual summarization of a meaningful group, rather than summarizations that include many irrelevant stimuli and people. Selection is dictated by the physical properties of the people themselves (bottom-up factors; *Selection Hypothesis 3*) as well as by processing goals, existing knowledge, and expectations (top-down factors; *Selection Hypotheses 4, 5, and 6*). Once Selection occurs, summarization of the selected members proceeds in the next stage of the SEA model, which we call *Extraction*.

2.2.2. Extraction

The bulk of research on ensemble coding is concerned with the extraction of summary statistics rather than selection (Extraction stage; see Fig. 3). Even so, debate remains about how perceptual summaries are generated. The predominant view is that parallel processing enables people to efficiently extract information from the entire group (Alvarez, 2011; Ariely, 2008; Chong & Treisman, 2005b; Haberman & Whitney, 2012; Whitney et al., 2013). This view is supported by evidence that increasing set-size does not impair ensemble coding (Haberman & Whitney, 2009); that individual group members are not remembered (Ariely, 2001, 2008); and that perceptual summaries are formed even with minimal exposure time (Alvarez & Oliva, 2008; Alvarez & Oliva, 2009). An alternative view is that a serial processing mechanism fixates on a few stimuli in the group and simply takes the average of those attended stimuli (Myczek & Simons, 2008; Simons & Myczek, 2008). This view is supported by computer modeled simulations which demonstrate that focused attention on limited numbers of individual group members can produce perceptual accuracy effects similar to those found when entire groups are summarized.

Scholars do not argue that perceptual summaries are generated by a focused, thorough analysis of *all* members of a group. Instead, it is clear that perceivers engage in quite shallow processing of all members, or more thoroughly process only a few group members. Hence, perceptual summaries are generated without also generating individual impressions of most group members (Ariely, 2001). In general, perceivers *can* use serial perception of a few group exemplars to arrive at perceptual summaries, though the parallel processing account may better explain the larger literature of ensemble-coding effects (see Ariely, 2008; Chong, Joo, Emmanouil, & Treisman, 2008). Nonetheless, both accounts enable us to generate broad postulates relevant to extraction in ensemble coding.

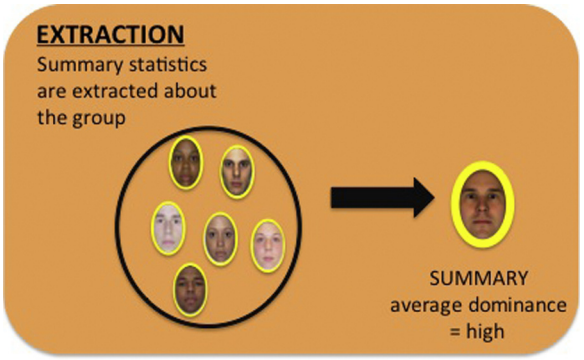

Fig. 3. Extraction, the second stage of the SEA model. The perceiver arrives at a summary of some dimension (in this example, average facial dominance) for the group.

2.2.2.1. Extraction Hypothesis 1: perceptual summary representation. We expect that *the products of ensemble coding are multidimensional perceptual summary representations of group central tendency and dispersion (Extraction Hypothesis 1)*. This means that ensemble coding processes produce a representation of the central tendency and variability for many different characteristics (facial joy, competence, etc.) simultaneously. Statistical, implicit, and associative learning studies have all established that perceptual processes extract statistical representations across many dimensions simultaneously, even in the absence of processing goals (Fiser & Aslin, 2001, 2002; Freeman & Ambady, 2011a; Kirkham, Slemmer, & Johnson, 2002; Saffran et al., 1996). For example, we would expect interviewers to simultaneously extract the average competence, dispersion of power, and average happiness (among other dimensions) from an ensemble of interviewees.

As argued in ensemble coding research (cf. Ariely, 2001; Haberman & Whitney, 2012), central tendency provides an especially informative representation of a group because it provides an efficient summary of the entire group. Although there is less evidence on dispersion summaries in ensemble coding, researchers in the area have argued that such variability *should* be represented, perhaps as an indicator of inherent visual uncertainty (cf. Alvarez, 2011; Gibson, 1958; Won & Jiang, 2013). Indeed, Phillips, Slepian, Hughes, and Ambady (2014) show that people accurately perceive the variance of facial dominance in a group of people. Existing evidence therefore suggests that central tendency and variability can be extracted in ensemble coding. And, these summaries are likely generated for a variety of dimensions, ranging from low-level perceptual elements (e.g., color) to high-level cues (e.g., facial dominance, warmth, age, gender, and emotion; cf. Haberman & Whitney, 2012).

Although recent literature clearly demonstrates that number, central tendency, and variability can be extracted in ensemble coding, we (like others; Alvarez, 2011; Whitney et al., 2013) suspect that perceivers may extract other summary information via ensemble coding, including rough summaries of distribution (e.g., normal versus bimodal) and skew. What's more, these extractions might combine to give perceivers a nuanced representation of any group property. For example, minorities rate groups as more diverse when the group includes a higher percentage of minorities *and* a more equal distribution of minorities throughout the group hierarchy (Unzueta & Binning, 2012). This suggests that when minorities think about the diversity of a group, they account not only for the percentage of minority persons but also the distribution of those persons in the group. Work on faultlines (subgroups with covarying characteristics; e.g., Thatcher & Patel, 2011) also suggests that alignment along multiple dimensions (e.g., correlations of maleness and dominance) is noticeable and leads to the perception or formation of subgroups within a group overall. Finally, group intelligence depends on its distribution within a group as much as its average, and perceivers may note the intelligence distribution when evaluating groups (Podsakoff, Todor, & Schuler, 1983; Stewart & Strasser, 1995; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010; see also Wegner, 1987).

By combining ensemble summaries of different statistical properties of a group characteristic (e.g., central tendency and variability of intelligence), perceivers may quickly draw estimates of the group. Further, perceptual summaries of different characteristics may also interact (e.g., hierarchy and dominance; see *Application Hypothesis 4*). Thus, different kinds of summaries may work in concert to inform group impressions. Nonetheless, given the relatively sparse evidence on perceptual summaries of distribution shape (normality, skew, kurtosis) or correlation, our focus in this article is on how perceptual summaries of central tendency and variability may account for people perception.

2.2.2.2. Extraction Hypothesis 2: spontaneity. We expect that *perceivers spontaneously extract perceptual summaries of groups* (*Extraction Hypothesis 2*). This means that regardless of processing goals or cognitive resources, summary statistics will be generated whenever a (selected) group of people is encountered. Hence, spontaneity is characteristic of both Selection and Extraction, but *Extraction Hypothesis 2* applies only to selected groups. For example, if only four out of five people were spontaneously selected as group members, ensemble summaries would be immediately generated for those four people. This hypothesis follows directly from extant work on high-level ensemble coding which has demonstrated that regardless of processing goals, group size, and peripheral vs. focal view, perceivers generate above-chance summary inferences about a group of stimuli (Alvarez & Oliva, 2008; Alvarez & Oliva, 2009; Brady & Alvarez, 2011; de Fockert & Marchant, 2008; Haberman & Whitney, 2009). This hypothesis captures a key contribution of the SEA model to judgment and decision-making in organizations: managers' intuition (Dane & Pratt, 2007) about the merits of a professional group may derive in part from the perceptual summaries spontaneously generated when encountering that group.

2.2.2.3. Extraction Hypothesis 3: prioritization of people perception. We expect that *when perceivers encounter a group, people perception takes priority over person perception* (*Extraction Hypothesis 3*). That is, the perceptual summaries that perceivers extract from an encountered group (people perception) will influence judgments of individual group members (person perception) before judgments of individual group members influence perceptual summaries. This follows from widespread evidence that perceivers extract summary statistics about the characteristics of a group before those same perceivers can extract corresponding information about the characteristics of each *member* of a group (Ariely, 2008; Chong et al., 2008; Myczek & Simons, 2008; Simons & Myczek, 2008). Thus, while individual group members are often not remembered, the group summary should be remembered. Consequently, when time or cognitive resources are limited, perceivers should form a more accurate impression of a group than the individual members in the group (Ariely, 2001, 2008; Chong et al., 2008; Myczek & Simons, 2008; Simons & Myczek, 2008).

2.2.2.4. Extraction Hypothesis 4: top-down influences. We expect that *top-down influences on extraction occur via attention* (*Extraction Hypothesis 4*). Consequently, while we assume that Extraction occurs spontaneously in the presence of a group of people, top-down factors, such as processing goals or previous expectations, *can* influence the extraction of perceptual summaries. For example, de Fockert and Marchant (2008) demonstrated that under certain processing goals (e.g., instructions to note the largest individual in a group), participants' ensemble representations were biased toward one or two stimuli within the group. Given the efficiency of the Extraction process, we expect top-down influences to be mediated by visual attention. In other words, we expect top-down factors, such as expectations and existing knowledge, to influence who is attended most within a group. Those individuals are then weighted heavily in the perceptual summary (cf. Chong & Treisman, 2005a; de Fockert & Marchant, 2008; Myczek & Simons, 2008).

2.2.2.5. Extraction Hypothesis 5: extraction over time. We expect that *perceivers will update their summaries over time as new group members are added or removed* (*Extraction Hypothesis 5*). For instance, Haberman et al. (2009) showed that, when shown a series of faces, perceivers adjust their representation of the average emotional expression to accommodate additions to the group. In other words, perceivers update their perceptual summaries when new faces are detected, and in turn judgments (see *Application Hypotheses*) based on these perceptual summaries should be affected.

2.2.2.6. Extraction Hypothesis 6: robust to diversity. We expect that once a collection of people has been selected as a group, *perceptual summaries should be robust to the diversity among group members (Extraction Hypothesis 6).* This hypothesis may appear to conflict with *Selection Hypothesis 3*, in which we suggested that perceivers will tend to select individuals into a group to the extent those individuals seem similar. Nonetheless, there is variability in every group not made of identical siblings. Moreover, the threshold for adequate similarity is likely to vary from perceiver-to-perceiver and context-to-context. And, of course, groups will not end up selected solely on the basis of similarity (e.g., proximity, prior knowledge also contribute; see Table 1 for Selection hypotheses). Consequently, diversity should persist beyond the Selection phase: each perceived group is likely to have some degree of diversity (e.g., social categories like age and gender). The current hypothesis suggests that once the group is selected, the extraction process will be robust to any diversity.

In support of this idea, recent work has shown that people are able to detect average dominance (Phillips et al., 2014) and even facial identity itself (de Fockert & Wolfenstein, 2009) across diverse sets of faces. Moreover, Won and Jiang (2013) demonstrated that, when viewing diverse and non-diverse groups of faces, perceivers were equally fast and accurate in judging average facial expression. In summary, whereas we hypothesized that selection processes would be sensitive to dissimiliarity, we hypothesize extraction processes are robust to dissimilarity across individual group members. Together these two processes enable people to select a unitary group (*Selection Hypothesis 3*) and to extract summary statistics despite intragroup variability (*Extraction Hypothesis 6*), making summary statistics quite useful for judgment and impression formation of real life groups (for which members differ in appearance, ignoring any clone-based dystopias; de Fockert & Wolfenstein, 2009; Haberman & Whitney, 2009; Walker & Vul, 2014; Won & Jiang, 2013).

2.2.2.7. Extraction summary. Overall, the SEA model suggests that Extraction occurs when the visual perception of a group is transformed into a summary about that group (see Table 2 for summary of hypotheses). Specifically, we propose that ensemble coding processes extract perceptual summaries, including central tendency and variability, of the group (*Extraction Hypothesis 1*). The Extraction process is spontaneous and prioritized (*Extraction Hypotheses 2 and 3*), is updated over time (*Extraction Hypothesis 5*), robust across diverse stimuli (*Extraction Hypothesis 6*), but subject to the influence of top-down factors via attention (*Extraction Hypothesis 4*). Once Extraction occurs, the resulting group summarizations are applied or used in decision-making and judgments in the next stage of the SEA model, which we call "Application."

2.2.3. Application

We have argued that perceivers generate perceptual representations summarizing groups of people. We further hypothesize that these perceptual summaries help form

Table 2
Extraction stage hypotheses.

Stage two: extraction	
Hypothesis 1: summary representation	The products of ensemble coding will be multidimensional summary representations (perceptual summaries) of group central tendency and dispersion
Hypothesis 2: spontaneity	Perceivers will spontaneously extract summary statistics about groups
Hypothesis 3: people prioritization	When perceivers encounter a group, people perception will take priority over person perception
Hypothesis 4: top-down influences	Top-down influences on extraction occur via attention
Hypothesis 5: update over time	Perceivers will update their summaries over time as new group members are added or removed
Hypothesis 6: robust to diversity	Once a collection of people has been selected into a group, summary statistics will be robust to diversity among members of the group

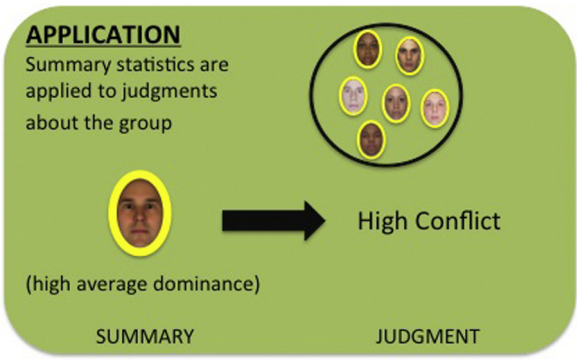

Fig. 4. Application, the third stage of the SEA model. Summary representation is applied to judgments of the group (in this example, summary of high group dominance is applied to judgment of group conflict).

first impressions of groups and are thus used as a basis for more elaborated inferences about the group, expressed in propositional knowledge (verbally-represented beliefs; cf. Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004). While we have discussed perceptual summaries thus far as quantitative or statistically based, these summaries may contribute to quantitative (an average age 40 group) or qualitative (a "good" group) judgments during Application. We argue that perceptual summaries are used as input for decisions about perceived groups (Application stage; see Fig. 4).

We note, however, that the way in which these perceptual summaries are applied to judgments or decisions about groups likely varies by the nature of both the summary and the judgment task, as illustrated in the hypotheses that follow. For instance, groups can be evaluated on a variety of dimensions, some of which may have clear visual correlates (e.g., homogeneity) and others of which may not (e.g., performance); in both cases, perceptual summaries of the groups likely inform verbalized impressions of the group, but perhaps in different ways. Thus, considering the process and factors involved in the application of visual summaries to judgments, decision-making, and behavior about groups is an important component of the SEA model.

2.2.3.1. Application Hypothesis 1: semantic knowledge. We expect that *the availability of judgment-relevant semantic knowledge about a group will be inversely related to the weight of the perceptual summary in forming a group judgment* (*Application Hypothesis 1*). In other words, people will increasingly rely on the perceptual summary to the extent that they do not have existing knowledge of that group. This is especially likely when perceivers are unfamiliar with the group, at least with respect to the judgment under consideration. Consequently, the perceptual summary will strongly inform first impressions (and thus, subsequent processing; see *Application Hypothesis 2*). Once a group is well-known, as they might be to an employee who has been part of a team for months, perceptual summaries derived in the present (e.g., at a team meeting) may still influence perceivers' group judgments, but existing knowledge of the group may exert a stronger influence. Thus, *Application Hypothesis 1* represents a step beyond person perception in that most such models entail very little integration of visual and propositional knowledge, instead focusing on one (e.g., Oosterhof & Todorov, 2008) or the other (e.g., Srull & Wyer, 1979) to form hypotheses (but see Freeman & Ambady, 2011a).

This hypothesis reflects the view that perceivers have access to different information when they encounter a familiar vs. unfamiliar group. In the unfamiliar context, basic judgments (e.g., of emotion, competence) can only be extracted from immediate perceptual representations. In the familiar context, knowledge about the purpose of the group, its influential members, its previous history of performance and conflict, and other information is likely available. For example, imagine a person attempting to predict the performance of an office team. If the group is unfamiliar, a perceptual summary may be the only useful information available and hence perceivers may rely on a summary of facial competence (cf. Fiske et al., 2007; Oosterhof & Todorov, 2008; Todorov, Mandisodza, Goren, & Hall, 2005). But when the group is familiar, this summary may be less useful for performance forecasts than, say, recent performance marks. Existing knowledge can influence all three stages of the SEA model, but *Application Hypothesis 1* describes a specific influence occurring at the Application stage.

2.2.3.2. Application Hypothesis 2: primacy of perceptual summaries. We expect that *perceptual summaries contribute heavily to initial group impressions and bias subsequent information processing (Application Hypothesis 2)*. This hypothesis reflects the well-known primacy effect in impression formation by which initial information heavily biases the encoding, interpretation, and influence of later information (Anderson, 1965; Asch, 1946). Indeed, research in person perception demonstrates that initial impressions based strictly on a second (or less) of visual exposure hold sway—they are predictive of impressions formed months later (Ambady et al., 2000; Ambady & Skowronski, 2008; Todorov et al., 2011). The first information that a person will encounter about a group is often visual, such that perceptual summaries are not only heavily weighted in first impressions (*Application Hypothesis 1*) but also shape subsequent cognitions about groups. Consequently, decisions about a group made long after an initial encounter may be strongly influenced by perceptual summaries: even if the perceiver has collected additional information about the group in the interim, that information will be processed in a manner that is biased by the first impression.

2.2.3.3. Application Hypothesis 3: similarity in representation and judgment. We expect that *similarity between the judgment dimension and visual dimensions will be positively related to the weight of perceptual summaries in forming a group judgment (Application Hypothesis 3)*. This hypothesis captures two related corollaries. First, judgments should vary in their relevance to any sort of visual summary (*Corollary 1*). For example, perceptual summaries exert a

substantial influence on judgments of group mood because perceptual summaries of facial emotion (e.g., happiness) can be fairly directly mapped on to mood. In contrast, one's judgment of a group's creativity could derive, in part, from perceptual summaries of brooding facial expressions, but this would require an additional layer of inference that maps brooding onto creativity. Thus, whereas facial happiness can be directly mapped onto perceived mood, neither facial brooding nor any other perceptual summary is directly mapped onto creativity—the latter is therefore less efficient than the former. Hence, perceptual summaries may exert only a minimal influence on judgments when those summaries are distally related to the judgment at hand.

The second corollary (*Corollary 2*) of *Application Hypothesis 3* is that there is wide variability in the relevance of any *specific* perceptual summary to any specific judgment. For example, the concept of competence is probably more similar to intelligence than to sociability, whereas the concept of positive emotion is probably more similar to sociability than to intelligence. Thus, a perceptual representation of a group's facial competence is probably more relevant to judgments of the group's intelligence than to judgments of the group's sociability. The converse is true for perceptual representations of a group's facial emotion. Consequently, a manager assessing a team's collective intelligence may weight the perceptual summary of competence to a greater extent than would a manager assessing a team's sociability, the latter of whom may more heavily weight the perceptual summary of facial emotion.

These corollaries apply to judgments of dispersion, including variability, homogeneity/heterogeneity, or convergence. For instance, organizational research has examined the effects of emotional convergence (homogeneity in team members' emotions; Barsade, 2002; Bartel & Saavedra, 2000; Brief & Weiss, 2002). Perceptual summaries of group facial emotion are likely to be used when judging emotional convergence because variability in group members' facial emotion is similar to variability in group members' felt emotions. Perception of the central tendency or variability of facial competence, on the other hand, would not be relevant to emotional convergence. Importantly, this suggests that some group judgments—for instance, judgments of group political views (see Section 3.3)—may be only loosely based on perceptual summaries, potentially making them more susceptible to error.

Thus, we expect that the judgment context activates visual perceptual summaries to the degree they are *relevant* to the judgment. Consequently, perceivers' judgments may rely on information gleaned from the perceptual summary to the extent that there is a clear relationship between this visual summary and the particular judgment dimension.

2.2.3.4. Application Hypothesis 4: interactions at time of judgment. We expect that *once activated, perceptual summaries can interact or influence one another to inform judgments* (*Application Hypothesis 4*). In other words, people perception may be influenced by the relationships among different, relevant perceptual summaries that emerge at the time of judgment. Once relevant perceptual summaries are activated, they may interact to influence the judgment. Empirical evidence is currently insufficient for us to describe the precise nature of interactions among perceptual summaries; we instead base this hypothesis on evidence that interactivity (rather than independence) is the rule in individual person perception (e.g., Freeman & Ambady, 2011b; Freeman, Penner, Saperstein, Scheutz, & Ambady, 2011; Johnson, Freeman, & Pauker, 2012). For example, prior to reaching a judgment about an Asian male, perceivers activate stereotypes about Asians and about males as well as females (which are cognitively-associated with "Asian") and finally integrate this information before rendering the judgment (Johnson et al., 2012). We thus expect that separate perceptual summaries of a group (relevant to the judgment at hand) will exert an interactive influence on judgments of the group. A variety of interactions may occur. Although we do not describe the precise nature of such interactions, it is possible to speculate about likely interactions.

For example, perceivers may generate perceptual summaries of the central tendency and variability of a rival team's dominance (i.e., two perceptual summaries). If both the average and the variability of dominance are perceived as high, these summaries may interact to produce an impression of a somewhat strong team with a very strong leader. If average dominance summaries are high but variability is low, perceivers may have the impression of an extremely strong team overall—not just a strong leader. Here, we have given the example of central tendency and variability on the same dimension but in theory, interactions among different dimensions may occur as might interactions between perceptual summaries and semantic dimensions.

2.2.3.5. Application Hypothesis 5: motivational and cognitive resources. We expect *motivational and cognitive resources to be inversely related to the application of perceptual summaries in group impressions (Application Hypothesis 5)*. We have argued that selection and extraction occur spontaneously and do not require motivational or cognitive resources.[3] The less a given perceiver is motivated and able to make a deliberate decision, the more perceptual summaries should influence that perceiver's judgments. This broad hypothesis draws upon evidence that people with substantial cognitive resources and/or accuracy motives are especially likely to correct for relatively "automatic" inferences (e.g., Fazio, 1990). For example, in a group interview setting, an interviewee will be motivated to appear invested in the organization. Consequently, even if the interviewee forms a low competence perceptual summary of her

[3] As described in Sections 2.2.1.4, 2.2.1.5, 2.2.1.6 and 2.2.2.4, we do expect motives and beliefs to bias Selection and Extraction. Hence, Selection and Extraction will operate in the relative absence of cognitive resources *but* will still be subject to biases emanating from (for example) existing beliefs. It is, in theory, possible that reduced (or increased) cognitive resources will influence perceptual processes, but we expect that such influences are more likely at the Application stage.

interviewers, she might not rely on this impression in the interview setting. Instead, she may discount, correct for, or ignore this low competence summary, again due to motivations to both like and appear to like the organization and potential future bosses.

Perceivers may choose to adopt a piecemeal approach that is both more deliberate and time consuming than relying on perceptual summaries. For example, if the judgment is extremely important, and if the perceiver has cognitive resources and time, that perceiver may choose to think about each member of the group, store that impression, repeat, and then base a judgment on this accumulated knowledge. Overall, just as motivation and cognitive resources have been shown to influence the extent to which various sorts of "automatic" information is applied to decision-making (e.g., Fazio, 1990), we expect motivation and cognitive resources to influence the degree to which visual perceptual summaries are applied to judgments themselves.

2.2.3.6. Application Hypothesis 6: role of person perception. We expect that *semantic knowledge about individuals within the group may influence the application of perceptual summaries to judgments (Application Hypothesis 6).* After perceptual summaries have been formed, the group impression may be augmented or discounted according to a perceiver's knowledge about one or more salient individuals in the group. For example, the leader of a group may be known to be unusually aggressive despite her appearance. Thus, a perceiver may discount any low aggression perceptual summary of the group, because the perceiver is familiar with the aggressiveness of the leader (a key individual in the group). We expect that cognitive resources are necessary to incorporate this type of semantic information (see *Application Hypothesis 5).* Moreover, information about extremely salient individuals is likely to generate augmentation or discounting. Augmentation should occur to the extent that perceivers "consciously" regard the individual as similar to the rest of the group, and discounting should occur to the extent that perceivers regard the individual as a unique member of the group (cf. Schwarz & Bless, 1992). This does not mean that perceivers will necessarily remember individuals' characteristics or process these characteristics deeply during the Selection or Extraction phases (they don't; e.g., Ariely, 2001). Rather, semantic knowledge of extremely salient individuals may become active at Application, after the Selection and Extraction phases.

2.2.3.7. Application Hypothesis 7: entitativity. We expect that *confidence of group impressions will be weighted by entitativity* (*Application Hypothesis 7*). Research on group impressions demonstrates that perceptions of *entitativity*, or "the degree to which a collection of persons are (regarded) as being bonded together in a coherent unit" (Lickel et al., 2000, p. 224; parenthetical substitution), vary across evaluators and targets. Many of the factors critical to entitativity (e.g., similarity, coordination) also play a role in the Selection stage, but during Application the confidence of perceivers' judgments is likely to be influenced by the broader sense that the group is truly a group. A perceptual summary of a group with a high degree of, for example, facial competence, may cause a perceiver to judge this group as competent, but if semantic knowledge of "low entitativity" exists, this perceiver may lack confidence in her judgment.

2.2.3.8. Application summary. The SEA model suggests that visual perceptions of groups of people are applied to decision-making, judgments, and behavior (see Table 3 for summary of hypotheses). The model specifically proposes that visual summaries are more likely to be applied to judgments to the extent other relevant information is less available (*Application Hypothesis 1*), visual summaries are relevant to the judgment or decision (*Application Hypothesis 3*), and motivational or cognitive resources are weakened (*Application Hypothesis 5*). We also suggest that the application of information generated from visual summaries has a strong initial influence on impressions of groups (*Application Hypothesis 2*), given these summaries' primacy. Further, the SEA model proposes that the application of these visual summaries to judgments will be influenced (whether augmented or discounted) by knowledge of individual group members (*Application Hypothesis*

Table 3
Application stage hypotheses.

Stage three: application	
Hypothesis 1: relevant semantic knowledge	The availability of judgment-relevant semantic knowledge about a group will be inversely related to the weight of the perceptual summary in forming a group judgment
Hypothesis 2: primacy	Perceptual summaries will contribute heavily to initial impressions and thereby bias subsequent information processing about a group
Hypothesis 3: judgment-summary dimension similarity	Similarity between the judgment dimension and visual dimensions will be positively related to the weight of the perceptual summary in forming a group judgment
Hypothesis 4: interacting summaries	Once activated, perceptual summaries can interact to inform judgments
Hypothesis 5: motivational and cognitive resources	Motivational and cognitive resources will be inversely related to the use of perceptual summaries in group impressions
Hypothesis 6: role of person perception	Semantic knowledge about individuals within the group can influence the application of perceptual summaries to judgments
Hypothesis 7: entitativity	Confidence of group impressions will be weighted by entitativity

6), by visual summaries of other dimensions (*Application Hypothesis 4*), and by knowledge of the group's entitativity (*Application Hypothesis 7*).

2.2.4. Summary of the SEA model

The SEA model proposes a process of people perception, or the visual processing of groups. First, in the Selection stage, individual members of a collection are selected into a group for processing. Second, perceptual summaries characterizing the group are generated in the Extraction stage. Both Selection and Extraction are spontaneous and prioritized above individual person perception, but Selection and Extraction are also both influenced by bottom-up (physical properties of the group) and top-down (goals, knowledge) factors. The resulting perceptual summaries are translated into judgments, decision-making, and/or behaviors in the Application stage. This stage is subject to many of the same moderators that shape the application of accessible knowledge (see Higgins, 1996). Taken together, Selection, Extraction, and Application comprise the SEA model and describe the basic process of people perception.

3. Domains of people perception

Here we explore the above hypotheses within specific organizational and social psychological domains. We use the SEA model to explore how perceivers might form impressions of group-*specific* characteristics, such as hierarchy and homogeneity/diversity. We also use the SEA model to consider how people form impressions of groups with respect to characteristics that can be applied to individuals (emotion and competence), focusing on how group impressions may differ from person impressions. Impressions of group central tendencies *and* variability—important variables for many group processes (Chan, 1998)—are prominent in our discussion. We consider how perception influences impressions of group hierarchy, diversity, cohesion, emotion, and competence, and ultimately, organizational decision-making and behavior.

3.1. Impressions of group hierarchy

Hierarchy has been theorized to be one of the most important and ubiquitous properties of groups (Gruenfeld & Tiedens, 2010). Hierarchies are frequently functional (Anderson & Brown, 2010; Halevy, Chou, & Galinsky, 2011), helping teams and groups coordinate behavior and align interests, motivation, and goals. Misperceiving the hierarchy threatens this coordination and can result in group member punishment (Anderson et al., 2008), team conflict (Bendersky & Hays, 2012; Greer & van Kleef, 2010), and overall poor team performance or efficiency (Bendersky & Hays, 2012).

The SEA model posits that hierarchy can be efficiently detected via perceptual representations of group variability. That is, hierarchy reflects group variability in power, status, or control, and prior work demonstrates that *individual* power and status can be derived from visual cues (e.g., height, facial dominance, postural expansion; Hall, Coats, & LeBeau, 2005; Oosterhof & Todorov, 2008). Thus, to perceive group hierarchy, perceivers can simply reference their perceptual representation of variability across group members' dominance, status, or power. The ability to automatically derive hierarchy from mere exposure to a group could be invaluable for enhancing team efficiency and performance. After all, appropriate detection of hierarchy can increase interaction smoothness and coordination (Halevy, Chou, Galinsky, & Murnighan, 2012; Magee & Galinsky, 2008; Tiedens & Fragale, 2003) and prevent performance-reducing team conflict (Anderson & Brown, 2010; Boehm, 1999; Greer & van Kleef, 2010).

The substantial benefits of hierarchy perception make it an especially likely candidate for people perception. Indeed, in one recent study participants were successively shown two groups of people for two seconds each, then asked to compare how hierarchical the groups were. Participants exhibited above chance accuracy in detecting the more hierarchical group (i.e., the group with more variance in facial dominance; Phillips et al., 2014). According to the current model, participants would have *extracted* a visual representation that included variability in facial dominance (*Extraction Hypothesis 1*) and then *applied* that representation to their judgments of hierarchy (*Application Hypothesis 3*).

The SEA model posits several factors likely to influence impressions of hierarchy in people perception. Top-down influences may be especially important, as illustrated in the following example. At the Selection stage, knowledge about the group may influence who is selected as part of the group (e.g., employees vs. interns; *Selection Hypotheses 5 and 6*). To the extent interns are not selected into the group, then group hierarchy is likely to be perceived as less steep as compared to when interns are included in the group. At the Extraction stage, those known to be on top of the hierarchy may be attended and weighted more as the impression of the group is formed. With knowledge of leaders' identities and increased weighting of those individuals, an impression of especially steep hierarchy would occur if those individuals exhibit dominance or power cues (*Extraction Hypothesis 4*). At the Application stage, knowledge might attenuate or augment the influence of perceptual summaries on group evaluation (*Application Hypothesis 1*). For example, even if perceivers form a perceptual summary of steep hierarchy in a group, they may conclude that the group is only mildly hierarchical if they previously heard that the group is egalitarian. This example illustrates just a few of the factors (see hypotheses) that can influence impressions of group hierarchy in people perception.

All together, people perception should influence how individuals evaluate group hierarchy, both when they are outside the group and when they are inside the group (e.g., judgments of their own position within the group; Anderson et al., 2008; Ridgeway, 2000; Tiedens & Fragale, 2003). Perceptual summaries of group hierarchy in turn may also influence other judgments about groups (*Application Hypothesis 3*), including perceptions of group fairness (Sidanius & Pratto, 1999) and likelihood of group success or effectiveness (Anderson & Brown, 2010). These impressions should in turn impact perceivers' behavior, including decisions about group composition and structure (see Section 4) as well as individual status competition

(Anderson & Kilduff, 2009; Pettit, Sivanathan, Gladstone, & Marr, 2013).

3.2. Impressions of group homogeneity and diversity

Homogenity is the other dimension (along with hierarchy) theorized to be the most important and ubiquitous property of groups (Gruenfeld & Tiedens, 2010), and research has recently demonstrated that perceived diversity can have important effects on teams, independent of objective diversity (Homan, Greer, Jehn, & Koning, 2010; see Shemla et al., 2014 for a review). According to the SEA model, visual perceptions of homogeneity should influence judgments of group homogeneity or diversity. This influence may take several forms, as described in what follows.

First, according to the SEA model, visual similarity of group members should influence Selection (*Selection Hypothesis 3*). That is, following Gestalt grouping principles, people who look or move similarly will be Selected into the group. But selection is not based *only* on physical similarity (see Table 1). Moreover, to the degree that physical similarity plays a large role in Selection, that role is necessarily limited—very few people look identical to each other (identical siblings, clones) so some similarity threshold would be necessary, across a variety of similarity dimensions (e.g., movement, height, color). Hence, perceptual groups will still have *some* degree of heterogeneity.

After Selection, group variability in dimensions such as facial morphology (de Fockert & Wolfenstein, 2009), expression (Haberman & Whitney, 2009; Won & Jiang, 2013), gender (Haberman & Whitney, 2009), and bodies (Sweeny et al., 2013) should be captured in perceptual summaries. In turn, these summaries should be applied to judgments of group homogeneity or diversity, whether that be demographic diversity, emotional convergence, or some other form: perceptual summaries of more variability along some dimension should lead to judgments of more group diversity.

SEA Application hypotheses are especially relevant here. For example, to the extent that groups evolve over time, the weight of variability summaries at Application may change over time. Early in group interactions, judgments of group diversity may be based on variability summaries of important social cues, such as those of age, race, and gender (Hughes, 1945; see also Adams et al., 2011; Ito & Urland, 2003). Later, such visual summaries may play a lesser role as perceivers focus on what they believe to be the most important differences for this particular group (e.g., functional background or political beliefs; Harrison et al., 2002) and as more semantic knowledge reduces the impact of perceptual representations (*Application Hypotheses 1 and 2*). Although, of course, to the extent people continue to treat age, gender, and race as meaningful features (explicitly or implicitly, which is likely; Eagly & Chin, 2010a; Ito & Urland, 2003), then summaries of these features may still influence judgments. Similarly, perceivers may differ in their beliefs as to what dimensions are relevant to diversity judgments or whether diversity is important at all (Brief, Butz, & Deitch, 2005; Bunderson & Sutcliffe, 2002; Ely & Thomas, 2001; Harrison, Price, & Bell, 1998; Harrison et al., 2002; Jehn & Greer, 2012; Pauker & Ambady, 2009; Unzueta, Knowles, & Ho, 2012; van Knippenberg, van Ginkel, & Homan, 2013; Waller, Huber, & Glick, 1995; Zitek & Tiedens, 2012). Thus, the relevance and weight of a given perceptual summary to judgments of diversity/homogeneity will depend on the judge (*Application Hypotheses 3 and 5*).

Overall, perceptual representations across multiple dimensions should inform judgments of group homogeneity and diversity (and potentially other group dimensions; see Section 3.3). In turn, these judgments should influence managers' understanding of group and organizational diversity and potentially influence how they make hiring and group assignment decisions. In general, SEA processes are likely to shape judgments about group and organizational diversity and those judgments are likely to cascade into behavior toward and within groups and organizations (see Section 4).

3.3. Impressions of group cohesiveness

Evaluations of group homogeneity often influence evaluations of group cohesion and cooperativeness (Hamilton, 2007). Group cohesion is an important dimension in organizational behavior and social psychology: cohesion often helps predict group performance and member satisfaction (e.g., Evans & Dion, 1991; Gladstein, 1984; Greer, 2012), thus making cohesion a dimension that managers judge frequently. Of course, cohesion is not *always* a positive variable (Greer, 2012)—a supervisor is unlikely to be pleased with employees who are cohesive in their hostility toward authority. Whether positive or negative, judgments of cohesion are likely to be,at least partially, contingent on perceptual representations of low variability.

Yet, whereas low variability summaries of identity (e.g., gender, race) may be especially relevant in judgments of group homogeneity, low variability summaries of dynamic variables (e.g., emotion, bodily movement) may be especially relevant to judgments of group cohesion *(Application Hypothesis 3)*. Consistent with this idea, coordinated movement (e.g., Bernieri & Rosenthal, 1991; Stillman, Gilovich, & Fujita, 2014) can signal group cohesion, as can facial expression redundancy (Magee & Tiedens, 2006). Thus, in addition to central tendency of dimensions like warmth, impressions of group cohesiveness may be influenced by visual summarizations of group *variability* along several dimensions. In general, overall low variability in perceptual summaries of group dimensions is likely to positively influence impressions of group cohesiveness.

3.4. Impressions of group emotion

Group mood is yet another important organizational phenomenon that predicts group performance as well as member satisfaction (Barsade, 2002; Barsade & Gibson, 1998, 2012; Bartel & Saavedra, 2000; Brief & Weiss, 2002; George, 1996; Hareli & Rafaeli, 2008; Kelly & Barsade, 2001; Sanchez-Burks & Huy, 2009; Sy, Cote, & Saavedra, 2005). As such,

impressions of group mood may inform managers' decisions (for example) to offer incentives, raise morale, or dissolve the group. Impressions of group mood are likely to be heavily influenced by perceptual summaries of average facial expression, especially given the considerable influence perception of facial expressions has on impressions of individuals' moods (cf. Ambady & Weisbuch, 2010). In fact, previous work has shown that group insiders and outsiders are able to detect group mood accurately based on facial and vocal expression, particularly when the mood involves high expressivity (e.g. happiness or anger as opposed to calm; Bartel & Saavedra, 2000; see also Haberman & Whitney, 2009; Won & Jiang, 2013). Indeed, perceptual summarizations likely explain managers' intuitions about group mood (Brief & Weiss, 2002; Sanchez-Burks & Huy, 2009).

According to the SEA model, however, average group facial emotion should not be the only influence: variability of facial expressions should also be extracted, and in turn informing judgments of group mood. The variability and range of mood across individual group members can be important to understanding group emotional experience (Barsade & Gibson, 1998). For instance, high variability in mood can suggest group conflict or incohesion (Barsade, 2002; Magee & Tiedens, 2006). Thus, a perceptual summary of high variability in facial expression might be Applied to the impression that a group diverges in mood. SEA processes may enable supervisors to draw accurate impressions of group mood and, to the extent that shared emotion influences important team processes like coordination and cohesion (Bartel & Saavedra, 2000), help supervisors make decisions accordingly.

The ability to efficiently Extract group mood should not only benefit supervisors but also group members. Convergence in mood within a group can be a product of emotional comparison, modeling, or contagion among group members (Bartel & Saavedra, 2000; Elfenbein, 2014; Hareli & Rafaeli, 2008; Kelly & Barsade, 2001). The contribution of these factors to collective mood is noteworthy because comparison, modeling, and contagion often require the perception of nonverbal behaviors. For instance, individual group members detect others' facial, vocal, and postural emotion (Bartel & Saavedra, 2000; Elfenbein, Polzer, & Ambady, 2007), and emotional contagion often spreads through facial, vocal, or postural mimicry/social tuning (Sy et al., 2005). Members of groups are thus likely to Extract perceptual summaries of average facial expression and embodied emotion, which are then Applied to an impression of collective mood. Group members may then assimilate to this mood, thus explaining emotional convergence in groups.

This process of Extracting and then Applying perceptual summaries of group emotion has important implications for team behavior. For instance, emotional convergence has facilitating influences on team performance (Bartel & Saavedra, 2000). To the extent individual group members accurately perceive group mood via SEA processes, contagion and convergence are likely to occur.

3.5. Impressions of group competence

Group competence and performance are perhaps the most studied phenomena in organizational research on groups (cf. Hackman & Morris, 1975; Heath & Sitkin, 2001). Competence, creativity, and performance are what managers hope to elicit, what group members hope to achieve, and what researchers hope to measure, manipulate, and predict. Recent work has demonstrated the complexity of such group competence, including the fact that it is *not* simply predicted by the best or average competencies among group members (Woolley et al., 2010). The distribution of individual competence or expertise has been shown to influence *group* competence and ultimately performance, with more variability in skills being better for complex tasks and with competence being far more important in group leaders than in non-leader group members (Mannix & Neale, 2005; Podsakoff et al., 1983; Stewart & Strasser, 1995).

Person perception research demonstrates that perceivers agree and are even accurate in their judgments of competence derived from faces (Todorov et al., 2005; Todorov et al., 2011) and brief but dynamic nonverbal behavior (Weisbuch & Ambady, 2011; Ambady & Rosenthal, 1993). Building on this work, the SEA model suggests that average and variability of competence will be Extracted from a group into a perceptual summary. In turn, these perceptual summaries should influence judgments of group competence overall.

Perceptual summaries of competence may help to explain a classic finding about groups—the *big fish in a little pond effect*: people evaluate their own competence more positively when the people around them have relatively low (versus high) competence (Alicke, Zell, & Bloom, 2010; Marsh & Parker, 1984). This effect is traced to social comparison processes, but in real organizations people typically do not have access to others' IQ or SAT scores (for example) and therefore must base their evaluations of others' competence on different factors. It seems reasonable that in real groups and organizations, people Extract perceptual summaries of group competence and then compare themselves to that summary. It is thus possible to use the SEA model to predict group members' self-evaluations of competence—where a perceptual summary of high group competence might yield *relatively* low self-evaluations of competence.

More generally, impressions of competence and predictions of future performance are likely to recruit many SEA processes. First, a processing goal (to judge competence) is likely activated for any person evaluating a group's competence or likely performance. This processing goal is likely to focus visual attention on the group leader (if known), overly weighting that individual in competence perceptual summaries (*Extraction Hypothesis 4*). Second, with knowledge of the performance task, perceivers may rely on different perceptual summaries in their judgments of likely performance and competence. For example, perceivers may recruit a perceptual summary of physical height (among other representations) to judge a basketball team's capabilities, or age and attractiveness to judge a sales team's capabilities (*Application Hypothesis 3*).

Overall, perceptual summaries of facial competence should influence judgments of group competence, and related dimensions like group performance. For instance, a

recent study showed perceivers can accurately predict companies' success based on pictures of boards of directors (Stillman, Gilovich, & Fuijita, 2014). Similar effects should be expected for other traits—for example, perceptual summaries of dominance and power should influence judgments of group dominance and power.

4. Organizational implications

Rapid, automatic perceptions of groups, and the use of these perceptions in judgment and decision-making, are likely important to a variety of organizational and social psychological phenomena. Such perceptual processes may offer explanatory insight into a host of social and organizational processes, including managers' decisions about group composition, evaluation, and rewards, as well as individuals' understanding of their own relative competence, mood, and status. In particular, people perception is likely to play a foundational role in small group and team dynamics within organizations, with implications for organizations as a whole. In this section, we describe how organizational researchers can apply the SEA model as a lens for examining topics central to the discipline.

Given the ubiquity and importance of groups, much research in organizational behavior and psychology has considered the automatic and deliberative processes by which these groups develop, interact, and perform (see Hackman & Katz, 2010 for a recent review). For instance, work on individual impression formation has shown that women and minorities are less likely than men to be included in work groups and when included, they are less likely to become leaders, in part because people form low-competence impressions of women compared to men (Bertrand & Mullainathan, 2003; Eagly & Chin, 2010b; Eagly & Karau, 2002; Rudman & Phelan, 2008). It is possible that such automatic processes and impressions play a similar role when people select and interact with *groups*, rather than individuals. The groups an individual chooses to work with, the teams an individual feels her group can defeat, and the evaluations of group performance formed by managers are all likely to be affected by *people* perception processes, representing yet another source of automatic influence on group processes. In the following sections, we will consider how the SEA model can inform research and theory regarding group composition, task assignment, tone, organization/structure, interactions, performance, and culture/identity. In each case, we consider how features of groups (e.g., composition) can influence people perception processes, as well as how people perception processes are likely to influence features of groups (e.g., via composition).

4.1. Group composition

Groups must be composed of individual members, and choosing this composition is among the more important and common tasks managers take on (see Hinds, Carley, Krackhardt, & Wholey, 2000). This composition process can be formal or informal, self- or other-selected (Forbes, Borchert, Zellmer-Bruhn, & Sapienza, 2006; Hinds et al., 2000). But in determining which group to join, leave, add someone to, or remove someone from, perceptions of the existing group are likely to be quite influential. For example, managers often want to add employees to groups that seem to need the most help or are in need of other resources (Forbes et al., 2006) and reject applicants that seem likely to disrupt group cohesion (Cable & Judge, 1996; Rivera, 2012). Both sorts of decisions require group impressions, and group impressions are likely to be informed by perceptual representations—including via primacy effects (*Application Hypothesis 3*). Hence, perceptual representations of low mood variability may cause managers to intuit that a given group has high cohesiveness, and this intuition may increase the likelihood the manager rejects new applicants on the basis of fit. Perceptual summaries of low cohesion or discord, on the other hand, may lead managers to add modal or even exemplar individuals to the group in order to increase cohesion.

The implications of the SEA model are clear for self-selection. For example, although informal lunch hour seating decisions are likely to take place over the course of a few seconds, a multitude of SEA processes precede this decision. First, Selection processes determine the relevant group of people for perceptual summaries. Second, Extraction processes should generate a variety of perceptual summaries that are called upon for various decisions about the group. Thus, a perceptual summary might cause a perceiver to think (rightly or wrongly) that group by the door is happy and thus fun whereas another perceptual summary (e.g., of competence) might lead a perceiver to think the group sitting near the window is full of movers and shakers. A perceiver's decision on where to sit would then rest on the perceiver's goals (to have fun versus achieve).

The various hypotheses of the SEA model can help researchers predict the groups that particular individuals will choose to join and leave, or to which groups those individuals will be assigned or removed. At the same time, the SEA model can help researchers identify missteps in group composition processes (e.g., lack of employee-organization fit). In short, formal and informal group member entry and exit processes are influenced by members', potential members', and managers' impressions of not just the target member (e.g., Bertrand & Mullainathan, 2003Bertrand & Mullainathan, 2003; Eagly & Karau, 2002; Hinds et al., 2000; Rivera, 2012; Word, Zanna, & Cooper, 1974), but also their impressions of the *group* (Hogg & Turner, 1985; Forbes et al., 2006; Rivera, 2012; van Vugt & Hart, 2004). As such, the way these first impressions are formed and applied to judgments about the group should influence composition decisions down the road.

4.2. Group task assignment

Not only are individuals chosen for group membership, but groups as a whole are assigned to different tasks. And, usually, groups are not selected to perform tasks by a computer algorithm: individual humans make these choices on the basis of their impressions of the groups. For instance, managers have to decide which team should

be assigned to a particular advertising account, which team is best suited for brainstorming a new product, and so on (Hackman, 1987; van Knippenberg, 2003). In this context, perceptual summaries of groups—including warmth, dominance, emotion, and the like—should inform judgments about the competence, cohesiveness, or conflict in these groups, consequently influencing task assignments.

SEA factors are likely to influence group assignment in much the same way that they influence group composition, but from the perspective of a person delegating tasks or projects. According to the SEA model, the strongest influences of ensemble coding are likely to occur before perceivers know the group well. That is, perceptual summaries are expected to exert increasingly less influence as perceivers gain knowledge about the group (*Application Hypothesis 1*). Yet those initial impressions are likely to hold sway to some degree (*Application Hypothesis 3*; Ambady et al., 2000; Ambady & Rosenthal, 1993). In other words, the first few seconds of viewing a group or team may bias interpretation of all subsequent information about that group. In this manner, a competent-looking group may be regarded as *being* competent initially—especially if the perceiver (in this case, a manager) is otherwise cognitively busy (e.g., if presenting to the team) or lacks motivation to correct for appearance factors (*Application Hypothesis 5*; Wilson, Centerbar, & Brekke, 2002). This initial impression may then influence task assignment.

Other influences of SEA factors are also possible. Just as primacy effects are influential in impression formation (Anderson, 1965; Asch, 1946) so too are recency effects (though less influential than primacy). For example, a manager may encounter several members of a team he is considering for an upcoming project, even if in an informal context. She would still extract perceptual summaries of various cues and—especially if she is cognitively busy—those perceptual summaries would influence her impression and ultimately perhaps her choice. Hence, the influence of SEA processes is not limited to unfamiliar groups nor to indirect effects alone—decisions about familiar groups may be directly influenced by SEA processes.

4.3. Group tone

Group performance and competence are not the only standards by which teams are judged. Although people may not consciously report basing their evaluations of a group on any one specific factor, it is clear that team satisfaction and happiness (Bartel & Saavedra, 2000; Brief & Weiss, 2002; George, 1996), creativity (Nijstad & De Dreu, 2002), and cohesion, conflict, and trust (Beersma et al., 2003; De Dreu & Weingart, 2003; Edmondson, 1999; Evans & Dion, 1991; Jehn, 1997; Kramer, 1999; Smith et al., 1994; Rink, Kane, Ellemers, & van der Vegt, 2013; Simons & Peterson, 2000) all play a role in managers' and members' group evaluations. These non-performance based factors feed into group atmosphere or tone: observers' or group members' subjective sense of what the team is like. In turn, these group tone factors can exert strong influences on group behavior and outcomes (Ilgen, Hollenbeck, Johnson, & Jundt, 2005).

The SEA model suggests group tone may be heavily influenced by perceptual processes, particularly because perceivers may not have a great deal of "concrete" (semantic) information on which to base evaluations of group tone (*Application Hypothesis 1*). Indeed, group tone is infrequently measured and is difficult for most laypersons to explicitly assess (at least as compared to performance; e.g., Brief & Weiss, 2002). For instance, previous work has demonstrated that impressions of group happiness are often based on visual experiences of group members' facial expressions (Bartel & Saavedra, 2000) rather than on explicit discussion. The SEA model supports these findings, and suggests impressions of other group tone dimensions are likely to be based at least in part on perceptual experiences.

An important avenue for future research is to explore the perceptual dimensions that are applied to judgments of various group tone factors, and how use of these dimensions contributes to the accuracy of group assessment. Whereas "happiness" may be fairly straightforward to judge from facial features and body positions (Bartel & Saavedra, 2000; Haberman & Whitney, 2009), other group tone dimensions like "creative" or "conflicted" or "supportive" may be harder to discern from visual perceptions alone. Thus, judgments of supportiveness provided by a team may rely on several related dimensions, like facial trustworthiness and fearful vs. calm facial expressions of group members (*Application Hypothesis 3*). By the same token, potential misalignment between perceptual summary dimensions and judgment dimensions could make for flawed impressions. Thus, a manager may assess a team as supportive, when in fact the happy faces of team members reflect schadenfreude or ignorance rather than friendliness.

4.4. Group organization and structure

Internal group structure should both influence and be influenced by processes in the SEA model. For example, impressions of group hierarchy should in part be derived from perceptual summaries of dominance and power dispersion (Phillips et al., 2014; see Section 3.1). In turn, these impressions of hierarchy may inform managers' decisions to increase or decrease hierarchy within a group (e.g., Schminke, Ambrose, & Cropanzano, 2000), and individuals' decisions to make power moves within a group (Anderson & Kilduff, 2009; Anderson et al., 2008).

Subgroup organization—such as faultlines (Lau & Murnighan, 1998; Thatcher & Patel, 2011) or distinct functional and knowledge subgroups (e.g., Carton & Cummings, 2012)—may influence people perception processes. Such subgroup divisions may shift who is selected into the group (*Selection Hypotheses 3 and 6*), or change whether the group is seen as one or two entities (*Application Hypothesis 7*). Consider mixed gender groups, for instance. To the extent females and males in the group also share other characteristics (e.g. females are White, males are Black), then Selection processes may lead to the group being perceived as two different groups. Further, even when the group is

seen as a single entity, faultlines may still influence judgments of group features. For example, if the female subgroup holds power, perceivers may discount the overall perceptual summaries of power or competence of the group due to prior beliefs or expectations about female leadership (*Application Hypothesis 1*). In turn, such impressions might inform future group composition and structuring decisions, such as whether the group needs more diverse members or different leadership.

People perception may also play a role in the structure of leadership. For instance, follower theories of leadership (e.g., DeRue & Ashford, 2010) suggest that leaders gain leadership status and power only because followers grant them status and power. In turn, leaders help manage followers' moods, meaning, and work (Pescosolido, 2002). Hence, leaders must elicit or earn leadership from followers, often by pleasing or impressing them. Just as great performers and speakers tune in and adjust to their audiences, leaders must tune in and adjust to their followers. Given that Selection and Extraction are effortless processes (*Selection Hypotheses 1 and 2*, *Extraction Hypotheses 2 and 3*), leaders likely use perceptual summaries to make judgments of the group and accommodate followers "on the fly". However, to be successful, leaders likely must weight perceptual summaries appropriately in their judgments about groups and followers; in turn, these impressions may influence leaders' behavior toward followers, and ultimately their leadership success. For instance, successful leaders may accurately apply their perceptions of group emotional variability to their impressions of group emotional convergence (see Section 3.4), while unsuccessful leaders may fail to incorporate these perceptions or focus only on average emotion instead (see also emotional aperture; Sanchez-Burks & Huy, 2009). Thus, people perception processes may play a role in determining leader success or failure and, as a result, group leadership structures.

Finally, people perception should also play a role in the social structure of larger organizations. First, perceptual summaries may not only influence individuals' self-selection into organizations themselves, but also, once in the organization, which internal groups that individual strives to join. For instance, perceptions of low warmth or connectivity may signal a "closed" group or network—one that is difficult to join (Dépret & Fiske, 1999; Igarashi & Kashima, 2011; Kilduff, Crossland, Tsai, & Krackhardt, 2008; Krackhardt, 1990). In turn, such perceptions could change individuals' group preferences (which to respect, join, or support) and thus the relative status hierarchy of groups. Second, group task assignment processes straightforwardly dictate whether certain teams or groups are favored within an organization, and thus influence intra-organizational hierarchies among groups. For instance, if one group is perceived as particularly competent, and thus assigned a lucrative product design task, then that group is likely to enjoy increased status (reputation, resources); thus, the between-group hierarchy at the organization may be impacted. Overall, people perception can inform group members' and managers' impressions of group structures and decisions regarding that structure. Thus, people perception processes can influence the social structure of groups and organizations as a whole.

4.5. Group interactions

Organizational behavior includes interactions both within and between groups (Ilgen et al., 2005; van Knippenberg, 2003), which may both impact and be impacted by factors explained by the SEA model. First, impressions of other groups—based on people perception processes—can influence how intergroup interactions ensue. For instance, a team of facially dominant or angry negotiators may evoke (from opposing negotiators) perceptual summaries of dominance or anger at the Extraction stage. In turn, these perceptions would lead to judgments of the team as aggressive, which could start a cycle of competitive behaviors between the teams. In general, expectations and judgments about groups in intergroup interactions should be influenced by perceptual representations and the SEA processes involved in generating them.

Intragroup interactions may be influenced as well. A group member can often see the remainder or at least a subset of her own group. For example, if—through perceptual summaries—a junior salesperson evaluates her own sales team to be quite hierarchical, then she may behave by adjusting to the situation and being sensitive to the chain of command. In addition, individuals bring their own motives and biases to their groups, which may influence their perceptions—for instance, social comparison (Taylor, Wood, & Lichtman, 1983; Festinger, 1954) or groupthink (Esser, 1998) biases could lead perceivers to focus on particular members of the group. In this respect, people perception may well influence how a person behaves within his or her group, particularly during early group interactions before members have gained much knowledge or experience with the group.

4.6. Group performance

Perceivers' impressions of individuals' features, including attractiveness, babyfaceness, Afrocentric features, and dominance, have been shown to influence performance and evaluations in hiring, promotion, pay, and even criminal sentencing (Blair, Chapleau, & Judd, 2005; Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006; Livingston & Pearce, 2009; Rhode, 2010). Similarly, perceivers' impressions of *group* features (e.g., attractiveness, dominance, competence) may have consequences for group performance outcomes and evaluations (e.g., accuracy, quality, efficiency). Of course, group performance and competence are not the only metrics by which teams are evaluated; team satisfaction, cohesion, creativity, cooperativeness, and other group-level considerations also play a role in managers' and members' judgments. Overall, the SEA model suggests that at least some of the characteristics (competence, cohesion) that contribute to group performance, expectations, and evaluation can be summarized rapidly through visual processes. These impressions of the group and its performance should inform subsequent group member and manager behavior, including group composition, structure, and task assignment decisions (e.g., Staw, 1975).

For example, evaluation of group performance may depend on people perception. In many domains (e.g.,

performing arts, marketing pitches, product creativity), there is a highly subjective element to performance, leaving room for existing knowledge and beliefs to influence performance evaluation. The role of existing knowledge on the evaluation of group performance is nicely illustrated by research on the *performance cue effect*: prior team performance influences a variety of impressions relevant to evaluating current team performance (Binning, Zaba, & Whattam, 1986; Guzzo, Wagner, Maguire, Herr, & Hawley, 1986; Staw, 1975). The SEA model suggests visual perceptions of group characteristics (see Section 3.5) should also serve as "performance cues", thereby influencing performance evaluation. In this respect, the diagnosis of group failure or success may depend in part on SEA processes (e.g., perceptions of group competence, cohesion or creativity) much as such diagnosis can depend on knowledge of prior performance.

Second, expectations for group performance may draw in part from perceptual summaries of (facial) competence applied to the group, potentially leading to consequences for *actual* group performance. The SEA model suggests this early perception should exert a strong primacy effect on later judgments of the group (*Application Hypothesis 3*). In turn, these competence expectations may generate self-fulfilling prophecy effects (Eden, 1990; Rosenthal, 1994; Todorov et al., 2005). In other words, group members will raise or lower their performance in accordance to their own or to managers' expectations (derived from perceptual summaries). Alternatively, perceptual summary-based expectations could also cause supervisors to adjust resources allocated to the group. For instance, managers may allocate more resources to a group perceived as competent, thus increasing the likelihood of group success (Tsai, 2002). Or, if the group is visually perceived as incompetent, group members and managers may make remedial changes to the group in an effort to bolster performance. Perceptions of group dominance and other performance-related dimensions should play a similar role in influencing group performance. Thus, SEA processes are likely to influence group performance outcomes.

4.7. Organizational culture and identity

Culture in social groups (Gelder & Thornton, 1997) and organizations (Hogg & Terry, 2000; Hsu & Hannan, 2005) can have important effects on members' behavior as well as on outsiders' impressions of these groups and organizations (Dutton & Heath, 2009; Elsbach, 2003; Schaller & Conway, 1999). Organizations have cultural identities regarding ethics, authenticity, and genre (Balmer & Gray, 2000; Carroll & Wheaton, 2009; Hsu & Hannan, 2005). Beyond cultural identities, groups and organizations have implicit and explicit norms, values, and patterns of behavior (Gelder & Thornton, 1997; Markus & Kitayama, 1991; Schein, 1990). Although impressions of organizations can be influenced in many ways (e.g., advertising, employee training seminars; Elsbach, 2003), SEA processes should also play a role. As insiders and outsiders interact with organizational actors and teams, they form perceptual summaries of those actors and teams—trustworthy, cohesive, happy—which can then influence impressions of the organization overall—trustworthy, inclusive, positive.

SEA processes should shape impressions of organizational identity and culture. For example, as new group members are onboarded, socialized, and acculturated (Bauer & Erdogan, 2011; Nahavandi & Malekzadeh, 1988; Weber & Camerer, 2003) they perceive their new group and team members. Perceptual summaries—of team emotion, hierarchy, trustworthiness, etc.—are likely to (a) inform new members' initial judgments of the team environment (*Application Hypothesis 1*) and (b) exert a primacy effect on later judgments of team culture (*Application Hypothesis 3*). Such judgments of the team should impact employees' understanding of the values and norms of the broader organization, causing them to behave in a way that they perceive as normative (at least until those employees gain substantial experience with the remainder of the organization).

These SEA processes may also influence organizational outsiders' (e.g., applicants, clients, customers, competitors) impressions of the organization, its culture, and its reputation. For instance, outsiders' experiences with a few members of the organization (e.g., customer service, commercial campaign) may lead to perceptual summaries that are then applied to the organization as a whole. In general, perceptual summaries formed by newcomers and outsiders may have strong initial influences on judgments of organizational culture and primacy effects on later judgments of organizational culture and reputation.

5. Conclusion

Impression formation is a historically important topic in both organizational behavior and social psychological literature (e.g., Ambady & Skowronski, 2008; Elsbach, 2003). Yet this work has either been limited to impressions of individuals (e.g., Kristof-Brown, Barrick, & Franke, 2002) or—when examining impressions of groups—has failed to account for perceptual processes involved. Organizing, coordinating, and interacting in groups typically requires perceiving groups, and perception is the basis of expectations, evaluations, and ultimately behavior. From marching through drills at bootcamp to struggling for higher status in the boardroom, *perceiving* groups is critical for organizational and social functioning (Wiltermuth & Heath, 2009). In fact many organizational and social theories posit that perceptions of, impressions of, and understandings of groups are central processes in organizational and social life (e.g., DeRue & Ashford, 2010; DeRue, 2011; Heath & Staudenmayer, 2000; Pescosolido, 2002). But how individuals form these impressions has remained unclear.

We believe that *people perception* is an area ripe for future research. Humans frequently perceive other people—in the home, at school, in the workplace, at social events, and so on. In many social interactions, including intra- and inter-group, perceivers encounter groups of other individuals, rather than single individuals alone. We have argued here that rapid and often accurate visual perceptions of these groups are likely, possible, and functional. We have further suggested the SEA model to

account for the role these group perceptions play in influencing social and organizational judgments, which in turn affect behavior and decision-making.

The general idea of people perception, and the more specific SEA model, represent a call to explore the processes and implications involved with the visual perception of groups. From the SEA model, many specific hypotheses are generated, including predictions as to how people perception influences organizational and social behavior and decision-making. These predictions can be tested within many important organizational domains. More generally, we suggest that many essential organizational and social dimensions, like group competence and group cohesion, are automatically, rapidly, and potentially accurately represented through visual perceptions of groups as a whole. In turn, these visual summaries are applied, in varying extents, to social organizational decisions, judgments, and behaviors, such as those involved in shaping group composition and evaluation decisions. The SEA model can thus lead to productive hypotheses concerning organizational and social processes and outcomes, including team performance (Section 4.6), organizational culture (Section 4.7), leadership emergence (Section 4.4), and mood convergence (Section 3.4).

The SEA model provides a lens for considering how low-level perceptual and cognitive processes influence and interact with high-level social and organizational behavior. As such, the model bridges visual, cognitive, social, and organizational sciences. Such cross-domain research, including social vision and social cognition, has grown rapidly in recent years (e.g., Adams et al., 2011; Balcetis & Lassiter, 2010; Hamilton, 2005; Fiske & Taylor, 2013) and is providing increasingly fruitful insights and methodological opportunities for understanding human and group behavior. In a similar vein, the SEA model provides ample room for future investigations specifying how people perception works and in what ways such processes and perceptions influence social and organizational life.

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