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Hawthorne revisited: Organizational implications of the physical work environment

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Abstract

The influence of the Hawthorne studies on the field of Organizational Behavior is pervasive. Originally intended to demonstrate the effect of the physical work environment on worker productivity, the Hawthorne studies reached an unexpected conclusion that social relations, but not the physical environment, shape organizational outcomes, spawning an enormously generative social relations movement. This chapter attempts to revisit the conclusions of the Hawthorne studies and revitalize interest in influences of physical work environments on diverse organizational outcomes. We do so by reviewing recent research in related disciplines suggesting that concrete physical constructs, such as light and darkness, are not only features of the physical environment, but also important psychological foundations for abstract understanding. We discuss how findings in metaphor and embodied cognition can illuminate our understanding of how, why, and when features of the physical work environment, such as illumination, temperature, and space may shape organizational behavior.

Contents

No other social science experiments have had more impact on organizational theory than the Hawthorne studies conducted in the 1920s and 30s. Originally funded by General Electric in an attempt to demonstrate that physical working conditions, such as illumination, could improve worker productivity (Wrege, 1976), the Hawthorne studies reached the opposite conclusion: Variations in physical conditions had little impact on productivity (Snow, 1927) compared to social factors such as supervisory attention (Mayo, 1933; Roethlisberger & Dickson, 1939). These

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unexpected findings triggered a social relations movement in the fields of human resources and industrial relations and started a wave of studies investigating social factors in work environments, such as job satisfaction, organizational commitment, and supervisory relations. Despite continuing discussions of the methodological rigor and validity of the Hawthorne studies' conclusions (Gillespie, 1991; Izawa, French, & Hedge, 2011; Levitt & List, 2011), their impact persists and has influenced subsequent organizational research for close to a century. In the meantime, while a small body of research into physical work environments exists (see Baron, 1994; Elsbach & Pratt, 2007 for reviews), physical working conditions have not received the scholarly attention that a growing body of literature from related disciplines indicates they deserve.

Drawing upon recent developments in metaphor and embodied cognition, this paper revisits the conclusions of the Hawthorne studies. With emerging theories and new evidence on how physical conditions, such as illumination, temperature, and odor, may directly alter social perception and behaviors through the human body's sensory systems, we discuss the diverse effects that the physical work environment may have on important organizational processes and outcomes such as ethical decision making and group dynamics. In so doing, we hope to demonstrate that physical work conditions are not ancillary to organizations' social environment and that the conceptual metaphor theory and research on embodied cognition may provide an overarching theoretical framework for understanding the importance of physical work environments for organizations.

1. Metaphor and embodied cognition

The focus on thoughts and feelings about work tasks, incentives, subordinates, peers, and supervisors, rather than the physical context where those thoughts and feelings occur, parallels the predominant approach in contemporary psychological research, which views information and knowledge as composed of 'amodal,' abstract symbols (devoid of sensory information) that are separate from the sensory sources and contexts in which they are processed (Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). So long as physical workplace conditions do not induce negative affect (Baron, 1994) or signal the extent of organizational support (e.g., an inhumane sweatshop), whether organizational behaviors and decisions take place in well lit or dim rooms, cold or warm temperatures, or clean or messy offices, are largely considered irrelevant factors by organizational scholars. Emerging research on metaphor and embodied cognition, however, has accumulated substantial evidence suggesting that this may not be the case.

Dominant views in both philosophy and psychology tend to consider our mental activities as separate from bodily sensations and experiences. Reminiscent of René Descartes' notion of mind and body separation, many contemporary cognitive and social psychologists adopt a computer metaphor to understand the mind: Abstract, higher level processes such as attitudes, memories and logical thinking (i.e., ''software'') are thought to be the product of amodal symbol processing and are considered orthogonal to the body (i.e., ''hardware'') that makes them possible (Gigerenzer & Goldstein, 1996). From this perspective, the body is merely a medium of sensory receptors and motor systems through which the mind interacts with the world.

However, this amodal view of cognition is difficult to reconcile with more recent findings that incidental changes to concrete bodily experiences can sometimes influence abstract thoughts. For example, Wells and Petty (1980; Briñol & Petty, 2003) reported that vertical head movements (i.e., nodding) while listening to persuasive messages led to more persuasion than horizontal head movements (i.e., shaking). Similarly, Strack, Martin, and Stepper (1988) unobtrusively facilitated or inhibited contraction of the zygomatic (smile) muscles by asking participants to hold a pen between their teeth or lips while they evaluated humorous cartoons. Participants judged the cartoons to be funnier when smiling was facilitated (i.e., pen between teeth) rather than inhibited (i.e., pen between lips). Cacioppo, Priester, and Berntson (1993) also observed that English speakers' evaluation of unfamiliar Chinese ideographs was more favorable when those ideographs were presented during arm flexion (an action associated with approach) as opposed to arm extension (an action associated with avoidance). In these examples, the stimulation of sensorimotor systems is incidental to cognitive and emotional appraisal of independent stimuli, and therefore should not affect appraisal according to an amodal view of cognitive functioning. The observation that concrete bodily experiences can affect abstract cognition suggests that our mental models need to be modified.

Multiple theories from different fields have converged on revising mental models in ways that bridge the abstract and the concrete. Among the most influential work includes Damasio's (1994) somatic marker hypothesis, Barsalou's (1999, 2008) perceptual symbol systems model, and Lakoff and Johnson's (1999) conceptual metaphor theory. Damasio et al. studied patients who suffered from ventromedial prefrontal cortex (VMPFC) damage, which causes

generalized loss of emotional responsiveness while leaving other cognitive abilities, such as those measured by IQ, intact. A series of experiments comparing VMPFC damaged individuals to individuals with lesions in different brain areas as well as healthy, matched controls revealed that, although these individuals continued to have normal reasoning abilities, they were unable to make adaptive, value-based decisions in a variety of practical and moral contexts and were more likely to display antisocial behaviors (e.g., Bechara, Damasio, Damasio, & Anderson, 1994; Bechara, Tranel, Damasio, & Damasio, 1996; Damasio, Tranel, & Damasio, 1990). Based on these observations, Damasio (1994) proposed that somatic states, which include not only emotions but also sensations from viscera, muscles, and sensory organs, participate directly in regulating behaviors by signaling values and preferences associated with real or imagined behavioral options. Damasio illustrates this role of somatic states using the example of anticipating a reunion with an old friend: The thought of seeing an old friend activates not only abstract representations of that person and the relationship, but also somatic changes such as increased heart rate, flushed cheeks, and a feeling of warmth. Importantly, such bodily sensations are not merely epiphenomenal, but may actually inform and reinforce the extent to which we look forward to the reunion. For example, consider a classic misattribution experiment in which male participants were surveyed by a female researcher just after they had crossed either a swinging suspension bridge over a deep gorge or a sturdy bridge over a shallow gulley (Dutton & Aron, 1974). Participants were given the researcher's number and told to call her later if they wished to speak further. Significantly more participants subsequently called the female researcher if they had been approached just after crossing the heart-pounding suspension bridge than the sturdy bridge, suggesting that the physiological arousal produced by the bridge influenced participants' attraction to the researcher (a similar pattern was not found with male participants and a male researcher). Thus, thinking not only involves our mind, as traditionally understood, but also the body, in the sense that somatic experiences are an integral part of mental processes.

This view resonates with Barsalou's (1999, 2008) perceptual symbols systems model, which posits that mental concepts contain more than a set of amodal symbols, and instead also include modality-specific representations of sensations, motor activity, and other bodily states that occur during interactions with stimuli related to those concepts. Correspondingly, conceptual processing involves the simulation, or neural reactivation, of associated bodily states, even when the individual is not currently interacting with relevant stimuli. In a representative study by Bargh, Chen, and Burrows (1996), participants completed a sentence-descrambling task designed to subtly prime words referring to either characteristics of the elderly (e.g., *wrinkled*, *gray*, *retired*) or a control concept. The experimenters then surreptitiously recorded participants' walking speed as they left the laboratory. Participants primed with the elderly characteristics walked more slowly, presumably because the abstract, stereotypic construct of the elderly includes motoric representations of slowed walking. As James (1890/1950, p. 526) observed, "every representation of a movement awakens in some degree the actual movement."

Both Damasio's somatic marker hypothesis and Barsalou's perceptual symbol theory see concrete bodily states as another source of information involved in thinking and reasoning through associative conditioning-like processes. In this sense, somatic markers or perceptual symbols are no different from abstract concepts – they can all be stored in memory, retrieved, and activated for mental simulation and cognitive processing. Lakoff and Johnson's (1999) theory of conceptual metaphor, however, places greater importance and centrality on concrete concepts' involvement in supporting cognitive development. According to conceptual metaphor theory, concrete constructs are not only part of abstract thinking but also ground thinking – they make it possible for people to comprehend abstract constructs through the use of metaphors. The theory posits that individuals learn concrete physical concepts, such as bright vs. dark, cold vs. warm, and up vs. down, early in their development based on direct contact with their immediate physical environment. Once learned, these concrete concepts become a mental scaffold that can support the understanding of abstract constructs that would otherwise be difficult to comprehend (see also Williams, Huang, & Bargh, 2009). For instance, time is an abstract construct that one cannot see, hear, or touch. In order to make sense of time, people map this ephemeral construct onto the concrete experience of physical, spatial relations. This enables us to think and talk about time as if it were physical space, which is easier to visualize and mentally represent. Metaphors such as "I look *forward* to seeing you," or "the meeting has been moved *back* two hours," reveal how the mental models we use to understand time are based on the concrete experience of physical distance and spatial relations.

Importantly, the "time as space" metaphor is not just a linguistic expression, but an organizing schema used by our minds to make sense of the abstract construct of time. For example, in one experiment, Boroditsky and Ramscar (2002) surveyed students lining up in front of a café and asked them to interpret an ambiguous sentence (e.g., "the meeting on Wednesday has been moved forward two days," which could either mean that the meeting is now on Friday or

Monday, depending on whether a person imagines themselves traveling through time or time as moving toward them). They found that students who had been in line the longest, and hence experienced the most forward motion, tended to be more likely to think that the meeting had been postponed to Friday. Similarly, in another experiment (Casasanto & Boroditsky, 2008), participants were instructed to estimate the period of time for which a line segment appeared on a computer screen by subsequently pressing a key for the same duration. Although the length of the line segment and the duration for which it was shown varied independently, the length of each line segment positively influenced participants' estimates of the elapsed duration. In both examples, the "time as space" metaphor is more of a mental model that shapes abstract thoughts and perceptions than a communication tool.[1]

Thus, the main idea underlying theories of embodied cognition is that cognitive representations and operations are grounded in physical context. Rather than relying solely on amodal abstractions that exist independently of their concrete instantiation, cognition relies heavily on the brain's modality-specific systems and on actual bodily states. In the past decade or so, these theories have spawned a substantial literature that documents the embodiment of a variety of abstract, social constructs and processes in concrete physical context. This chapter attempts to provide a review of that literature and discusses how this perspective may inform our understanding of physical workplace environments' impact on important organizational processes and outcomes.

2. The organizational implications of the physical work environment

2.1. Illumination

The Hawthorne experiments originally set out to test the influence of artificial lighting on productivity. Initiated by the Committee on Industrial Lighting (CIL) division of the National Research Council, the experiments hoped to prove that more lighting would increase productivity (Wrege, 1976). Much to CIL's dismay, however, the series of experiments concluded that lighting had no impact on productivity and that it was attention paid to workers, not physical working conditions per se, that held the potential to improve performance and productivity. Despite the far-reaching impact that these findings have had on social science and management practices and research, re-analyses of recently discovered lost data suggest that the original results of the Hawthorne experiments may not withstand close scrutiny with modern methodological and statistical techniques. Levitt and List (2011), for example, conclude that the data patterns commonly attributed to the Hawthorne experiments are entirely illusory. Moreover, Izawa et al. (2011) actually found evidence, albeit weak and inconsistent, of an effect of lighting across several Hawthorne illumination studies.

Regardless of whether the data from the Hawthorne experiments support the CIL's hypotheses, we suggest that the narrow scope of these studies may have precluded detection of more subtle influences of illumination. The Hawthorne illumination studies focused on measures of worker productivity that were germane to the industrial technologies of the time, involving simplistic, repetitive tasks (relay assembly, coil winding, and inspection) that require very limited skills and creative input, and are mostly void of social interactions. Even if those studies provide no evidence of a relationship between lighting and productivity, it would be premature to conclude that lighting has no impact on other aspects of performance and social dynamics in the workplace.

Indeed, early sociological and psychological studies on lighting have focused on its necessity for visual identification and linked lighting to crime prevention and the inhibition of aggressive behaviors. Hartley (1974) and Karnes (1960), for example, observed that criminal assaults are most frequent during hours of darkness. In the lab, Page and Moss (1976) found that participants delivered stronger electrical shocks to a confederate when assigned to a darkly lit room compared to one that was brightly lit. These observations are consistent with the literature on deindividuation, which has shown that anonymity, whether achieved through wearing concealing hoods and baggy clothing (e.g., Zimbardo, 1969) or blending in with a crowd (e.g., Festinger, Pepiton, & Newcomb, 1952; Singer, Brush, & Lublin, 1965), increases aggressive, impulsive, and uncontrolled behaviors. Thus, Emerson's (1860/1888) observation that "gaslight is the best nocturnal police" accurately communicates the inhibiting effects of light on

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[1] Note that the "time as space" metaphor does not draw parallel between time passing and horizontal movements per se, as Mandarin speakers can also construe time in terms of vertical movements (Boroditsky, Fuhrman, & McCormick, 2010). In both cases, however, time is mentally structured in terms of physical spatial relations.

deviant behavior, which may have contributed to the popularization of urban street lights during the nineteenth century (Bouman, 1987).

Although these studies are informative in revealing potential social consequences of the large variation in lighting that occurs in nature (e.g., night vs. day) and across our built environment (e.g., rural vs. urban), they are unlikely to explain a broad spectrum of organizational behaviors other than in industries that similarly feature large illumination variation (e.g., factories processing light sensitive materials, subterranean mining or dimly lit entertainment venues). In most organizational settings, variations in lighting rarely drop below the threshold that actually impairs visibility. However, recent research has started to probe whether subtle variations in lighting that do not impair vision may trigger general psychological processes that influence behavior.

Zhong, Bohns, and Gino (2010) examined perceived rather than actual anonymity in conditions of subtly dimed lighting. They argued that when people experience moderately reduced lighting, such as being in a dimly lit room or donning a pair of sunglasses, they may feel anonymous even though the dim room or sunglasses do not literally conceal their identity. This perceived, or illusory, anonymity may stem from people's tendency to anchor their estimation of others' perceptions based on their own phenomenological experience. Thus, when people put on a pair of sunglasses they automatically generalize the experience of reduced light to others and expect that others will be less able to see them. Piaget (1936) described this kind of egocentrism among young children. When presented with a three-dimensional model of a scene with a small doll sitting on one side and asked to describe what the doll sees, children between the ages of four and seven tend to identify an image that shows what *they* see regardless of where the doll is placed (Piaget & Inhelder, 1956). Even though adults are better able to take others' perspectives, they never completely grow out of egocentrism (e.g., Epley, Morewedge, & Keysar, 2004; Tversky & Kahneman, 1974). For example, people tend to overestimate the extent to which their thoughts, feelings, and sensations are accessible to others because they are anchored on their own experience, using it as a starting point to predict others' experiences (Gilovich, Savitsky, & Medvec, 1998). Thus, just as young children playing "hide-and-seek" will close their eyes and believe that others cannot see them, the experience of reduced lighting may lead adults to feel they are hidden from others, regardless of whether that is actually true.

In three experiments, Zhong et al. (2010) manipulated reduced lighting by having participants wear a pair of sunglasses (vs. regular glasses) or assigning them to work in rooms with reduced lighting. In the room lighting study specifically (Study 1), the well-lit control room (15 ft × 14 ft) was illuminated by 12 fluorescent lights mounted to the ceiling, whereas the dim room (about the same size) was lit by 4 fluorescent lights. In both rooms the lighting was such that there was no real reduction in visibility or sight. Nevertheless, the authors found that individuals working in the dim room were more likely to misreport their performance to earn extra cash from the experimenter. Similar results were also found when dimness was manipulated through the donning of sunglasses, which led participants to act more selfishly in an anonymous, computer-mediated dictator game where they divided a given sum of money between themselves and a participant in another room (Study 2). Finally, dim lighting indeed increased ethically questionable behaviors, partially through inducing an increased sense of anonymity (Study 3). These experimental findings, combined with early observations on darkness and anonymity, suggest that even subtle variations in lighting conditions at the workplace may have important psychological implications. For instance, it is possible that organizations with reduced lighting may risk increased fraudulent or counterproductive behaviors from their employees.

Lighting may also have psychological influences independent of perceived anonymity. The amount of light determines how much visual information is available because of the differing light sensitivity of human rods and cones. In low light conditions, for which rod receptors are optimally tuned, visual input is grainy and lacks color information, such that only a holistic, black-and-white impression of our environment is possible; bright light, on the other hand, allows our cone-packed foveae to capture color-rich and precise visual information, enabling detailed examination of individual objects. The lack of detailed concrete information in low light settings may activate a global and gestalt processing that focuses on high level, abstract constructs. For example, a dimly illuminated person is likely to be mentally represented by abstract categories such as a "tall male" rather than "Charley, the tall and handsome man with a ruddy complexion." Indeed, studies have found that individuals in dim rooms tend to define categories more broadly and abstractly by including weaker exemplars into a category than those in brightly lit rooms (Baron, Rea, & Daniels, 1992; Steidle, Werth, & Hanke, 2011).

Perceived anonymity and abstract construal level activated by dim lighting may work concertedly to increase unethical behaviors. For example, because abstract level thinking promotes broad, category-based social cognition

that may encourage the use of stereotypes and prejudicial behavior (McCrea, Wieber, & Myers, 2012), and perceived anonymity from reduced lighting may also lessen the fear of looking prejudicial in the eyes of others, a strong relationship between dim lighting and prejudicial behaviors at the workplace seems likely. At the same time, perceived anonymity and abstract construal level may also differentially influence different processes and behaviors, producing sometimes ironic outcomes. For example, while dimmed lighting may increase unethical behaviors through inducing a sense of anonymity; it may also lead people to be harsher judges of immoral behavior because thinking abstractly focuses attention on moral principles rather than any situation-specific attenuating circumstances (Eyal, Liberman, & Trope, 2008). As a result, dimly lit workplaces may promote hypocrisy if the effects of lighting on moral behavior and judgment are orthogonal within the same individual (Lammers, 2012).

It is important to note that the consequences of dim lighting are not always negative. As with other disinhibitors, such as alcohol, previous research has found that anonymity may unleash both positive and negative behaviors that are normally suppressed (see Hirsh, Galinsky, & Zhong, 2011). For example, in group brainstorming tasks participants are often hesitant to propose novel ideas for fear of negative feedback. Anonymity has been identified as an effective means of reducing this barrier and increasing the quality of ideas generated (e.g., Connolly, Jessup, & Valacich, 1990; Kraemer & King, 1988). Studies have also found that anonymous communication channels reduce the perception of personal cost associated with whistle-blowing (Kaplan & Whitecotton, 2001; Schultz, Johnson, Morris, & Dyrnes, 1993) and hence may increase employees' willingness to report wrongdoing inside the organization (Graham, 1986). Thus, even though dim lighting may risk greater moral transgressions, it may also encourage employees to speak up against those transgressions. Similarly, although global information processing may lead to the use of stereotype information or license harsher moral judgment, it has also has been found to promote creative thinking (e.g., Friedman, Fishbach, Förster, & Werth, 2003). Indeed, researchers have begun to explore whether dimming the lights may be an effective means of increasing employees' creative output (Steidle, Hanke, & Werth, 2011).

Thus, a metaphor and embodied perspective suggests that illumination may have far more diverse and subtle influences than previously thought. Because dimmed lighting can both enhance subjective perceptions of anonymity and activate global thought processes, other organizationally relevant thoughts and behaviors that are affected by perceived anonymity or construal level may also be impacted by ambient lighting. Moreover, the presence of at least two mechanisms implies the need to search for and understand the interactions between them. Such hypotheses related to the mechanisms of perceived anonymity and construal level offer a sharp contrast to the narrow focus of the Hawthorne studies, which were only interested in studying the effect of lighting on factory worker productivity. Although the Hawthorne studies may have sparked an enormously beneficial social relations movement, it also appears to have resulted in a decades-long delay in research into the important influence of artificial lighting on a diverse set of organizationally relevant variables.

2.2. Temperature

Most climates around the world regularly produce ambient temperatures that can be hazardous to human health if exposure is unregulated (e.g., heat stroke, hypothermia, and frostbite). Given that ambient temperature is a critical environmental feature requiring behavioral adaptation, its influence on our social environment is readily understandable. A large criminology literature started in the 1970s has explored the association between ambient temperature and aggression and found a positive correlation between violence rates and average regional temperatures as well as fluctuations in temperature over time (e.g., Bell & Baron, 1976; Michael & Zumpe, 1983). Others have suggested that the evidence supports a curvilinear relationship between temperature and violence, such that rates of violence peak with warm weather and are reduced during cooler or hot weather (Cohn & Rotton, 1997, 2005). This relationship is most often interpreted through a negative affect lens, whereby uncomfortable heat induces negative affect, potentiating violent behavior, but intense heat activates avoidance motivations that reduce social interactions altogether, thereby producing an inverted U-shaped function.

Despite these early findings, organizational researchers have rarely considered ambient temperature a relevant contextual factor in influencing organizational behaviors and outcomes, with a few exceptions. van de Vliert and van Yperen (1996), for instance, applied the negative affect approach to studying the relationship between national variations in ambient temperature and role overload, or employees' lack of personal resources needed to fulfill commitments, obligations, or requirements (Peterson et al., 1995). They discovered that in regions of warmer temperature, employees tended to report more role overload compared to regions of colder temperature, presumably

because heat induces negative affect, which in turn reduces productivity and increases role stress. An alternative perspective is that culture is the variable that mediates such associations between average temperature and worker behavior at the national level (Peterson & Smith, 1997). For example, cultures from warm climates tend to be more masculine than those from colder and hot climates, and this may explain the curvilinear relationship between average regional temperatures and violence (van de Vliert, Schwartz, Huismans, Hofstede, & Daan, 1999). According to evolutionary theories such as paternal investment theory (e.g., Miller, 1994), men face a trade off between investing time and effort in a single family or fertilizing additional mates to increase the number of surviving offspring. Importantly, the latter strategy is only advantageous in resource abundant environments where fewer adults are needed to rear young and it tends to favor dominant males that can successfully compete for mates. Conversely, colder climates with long winters or hot arid regions are resource scarce and favor males that are willing to cooperate with their family and community to increase collective survival. Affect and culture-based explanations of associations with temperature need not be contradictory, of course; the existing evidence appears to suggest that the two mechanisms operate at individual and regional levels of analysis concurrently.

The paucity of organizational research on ambient temperature might have to do with the limited range of temperature fluctuations across modern workplaces. Most modern building designs are climate controlled and adhere to the thermal comfort standards specified by the American Society of Heating, Refrigerating and Air-Conditioning Engineers. Despite this, employees' subjective perception of thermal comfort may still vary greatly because of personal and social factors. Dress codes and protective clothing may make an otherwise comfortable temperature feel too warm; individuals with a high metabolism rate (e.g., after physical activities) tend to have low tolerance for heat; employees of different gender may have different levels of thermal comfort (Karjalainen, 2012); and perceived room temperature may be influenced by contrast effects with exterior weather conditions: the same indoor temperature may feel like a warm embrace or cool respite, depending on whether employees enter the building from a blizzard or blistering summer heat. Thus, we contend that subjective ambient temperature remains an important contextual factor in organizational functioning, due not only to its affective and cultural associations, but also because thermal perception, the feeling of being warm or cold, is closely linked to the social perception of inclusion and rejection.

Lakoff and Johnson's conceptual metaphor theory suggests that we make sense of our social relations through the lens of thermal experience. Specifically, social alienation and affiliation is understood through physical cold and warmth: Rejection is cold and welcome warm. Indeed, we use terms such as ''cold shoulder'' or ''icy stare'' to depict social alienation and rejection, and ''warm smile'' to suggest positive social encounters. In addition, traits that are related to social connectedness, such as generous, sociable, popular, and humane, cluster around the impression of a ''warm'' person (Asch, 1946; Cuddy, Glick, & Beninger, 2011), and, in an early experiment, lecturers tended to receive more audience participation when they were described as ''warm'' as opposed to ''cold'' prior to presenting (Kelley, 1950). At the extreme, members of groups that are seen as less warm and competent (e.g., the homeless) activate brain patterns in observers that resembled those of non-social objects (Harris & Fiske, 2006). The popular 1970s song *Lonely This Christmas*, in which Nicky Chinn and Mike Chapman crooned, ''It'll be lonely this Christmas, lonely and cold, it'll be cold so cold, without you to hold,'' may be an example of this overlap in the feelings of coldness and loneliness manifested in public consciousness.

More importantly, the overlap between thermal perception and social perception is not merely linguistic. The association between cold and alienation can be traced back to infancy. Being held closely by a caregiver produces warmth, whereas distance from a caregiver can leave a small bodied infant vulnerable to cold. This basic exposure may produce our first understanding that social closeness equals warmth, whereas social distance feels cold (Williams & Bargh, 2008b). This overlap extends into adulthood with the common observation that ambient temperature tends to rise when densely packed crowds gather due to body heat emission. If memories of social connectedness are always associated with physical warmth, and loneliness with coldness, then thermal perception may become an integral part of our conceptual understanding of social rejection and inclusion. Barsalou suggests that sensory perceptions, recorded by systems of neurons in sensory-motor regions of the brain that capture information about perceived events in the environment and body, can be stored in conjunction with the abstract, amodal concepts regarding those events. In other words, cognition includes not only abstract and amodal mental representations, but also modal perceptual content from various sensory organs (Barsalou, 1999; Varela, Thompson, & Rosch, 1991).

Once co-stored with amodal symbols, the activation of such perceptual sensations is no longer contingent on the physical conditions in the environment that originally gave rise to the overlap. For example, recalling a high school

reunion where one was surrounded by friends might automatically activate the somatic sensation of warmth, even though one is no longer subjected to the elevated temperature produced by the crowd. This co-activation of conceptual and perceptual information is typically adaptive because it makes possible high fidelity simulations using sensory-enhanced mental models for the purpose of perception, categorization, and judgment (Barsalou, 1999). The more closely mental models represent past experiences, including their perceptual content, the more likely they are to accurately predict future experiences and provide a sound basis for decision-making and behavior. If merely thinking about a special someone is enough to get you ''hot and bothered,'' perhaps you will be more likely to remember to apply antiperspirant in anticipation of your next encounter. Thus the inclusion of sensory information in our understanding of social constructs has the potential to improve the connection between those constructs and the physical world in which they are iteratively acted out.

Recent research has begun to provide empirical evidence of the involvement of thermal perceptions in social cognition regarding inclusion and rejection. Zhong and Leonardelli (2008) demonstrated the automatic activation of perceptual temperature sensations contingent on social rejection and inclusion. In one experiment, participants were asked to recall an experience of being socially excluded or included and then report their estimate of the current room temperature under the guise of a lab maintenance survey; in another, participants were actually excluded or included in a virtual ball tossing game (Williams, Cheung, & Choi, 2000) before they indicated their preferences for foods and drinks in a supposedly unrelated marketing study. The authors found that being socially rejected led participants to estimate a lower room temperature, compared to being socially included; it also led participants to express a greater preference for warm foods and drinks. Similarly, IJzerman and Semin (2010) found that social proximity (as opposed to social distance), whether it was primed by physical proximity or verbal concepts, led participants to estimate higher ambient temperature. More recently, using the same virtual ball tossing exclusion manipulation, IJzerman et al. (2012) have shown that these perceptual temperature changes may actually reflect physiological changes in peripheral body temperature. These convergent findings suggest that physical cold and warmth may not be mere by-products of social interactions, but are an integral part of our social understanding. In this sense, temperature acts as an embodied social thermometer that we use to monitor and navigate social relationships.

If physical temperature is part of how people construe social relations, then sensing cold or warm ambient temperatures may activate amodal concepts regarding social rejection and inclusion and hence color our evaluation of social situations or the perception of others. In a study by Williams and Bargh (2008b), for example, the experimenter asked participants to hold a cup of hot or iced coffee before completing some trait assessments of a stranger. This very subtle temperature manipulation changed people's assessment of personality traits: contact with a cup of hot coffee led individuals to rate the stranger as warmer and friendlier than contact with a cup of iced coffee. Presumably feeling the icy coffee activated perceptual concepts of coldness, which in turn spread to activate mental schemas of social distance and rejection that colored participants' perception of the stranger. Multiple subsequent studies corroborated this finding. IJzerman and Semin (2009), for instance, showed that warmer ambient temperature led to closer perceived social proximity on the inclusion of others scale and caused more relational focus, while Fay and Maner (2012) found that that priming warmth led to an increased affiliation motive. Similarly, Steinmetz and Mussweiler (2011) showed that warmer temperature, in both natural weather variation and controlled lab room temperature, led people to perceive themselves as more similar to a comparison person. Importantly, such changes to social perceptions are not without behavioral consequences. Kang, Williams, Clark, Gray, and Bargh (2011) have recently demonstrated that handling a warm rather than cold object led participants to trust an anonymous stranger more, and children with a secure attachment style are more likely to share with their peers in a warm room than in a cold one (IJzerman, Karremans, Thomsen, & Schubert, in press).

Based on these findings, we could speculate that ambient temperature in organizations may be associated with employees' perceptions of workplace relationships. For example, warmer room temperature may prompt the initial impression that one's supervisor is warm and supportive; it could also increase the perception of cohesion in group tasks and, as a consequence, promote citizenship behaviors. Even if the ambient temperature of a workplace is relatively stable, we may be able to make systematic predictions based on variations in natural weather, physical activity, gender, or dress code. For instance, employees may find their workplace more welcoming and report greater organizational commitment in winter months due to the contrast between the warmth of the office building and cold temperatures outside; on the other hand, chilly air conditioning during the summer may cool employees' feelings for an organization, reducing commitment and job satisfaction. In addition, physical warmth may also be used to assuage negative consequences of social rejection at the workplace. Bargh and Shalev (2012) found that experiencing physical

warmth (e.g., taking a warm bath) significantly reduced the distress that results from recalling a memory of social rejection.

It should be mentioned that these predictions are likely to be applicable only within a certain range of temperatures. For example, implementing a comfortably warm temperature at the workplace may result in perceived cohesion among team members, but once the temperature becomes uncomfortably hot, the sociological data presented at the beginning of this section suggests that agitation and aggressive behavior may result as a consequence of negative affect produced by the heat. Similarly, while teams working in cooler rooms may generally perceive less cohesion than those working in warmer rooms, when the temperature drops to a certain point they may experience such coldness that they are motivated to seek warmth. This may lead people to want to be affiliated with others such that the social warmth could help them combat the physical cold. Indeed, there is initial evidence that colder ambient temperatures can motivate social affiliation goals in the form of service employees' customer orientation (Kolb, Gockel, & Werth, 2012). Thus, the social implications of physical temperature are likely to be complex and subject to the influence of many contextual factors. Nevertheless, emerging research in social psychology seems to suggest that physical temperature may have important organizational consequences, and organizational researchers have not paid adequate attention to ambient temperature as a determinant of organizational behavior.

2.3. Cleanliness

Cleanliness is extremely important in hospitals and service industries for public health reasons. For example, hand hygiene practices are a critical factor in the reduction of hospital-acquired infections (Backman, Zoutman, & Marck, 2008). In service industries, particularly food and hotel establishments, cleanliness is perhaps the most important predictor of customer satisfaction (e.g., Barber & Scarcelli, 2010). Yet cleanliness seems to also be psychologically important outside of those sectors where fear of contamination is most warranted. Aside from seedy pawn shops and low end strip clubs, the vast majority of retail environments we regularly experience are maintained spotless and gleaming. The pursuit of cleanliness in the corporate world and society in general (at least in the United States) certainly surpasses what is necessary for health and hygiene concerns. Coupled with the society's pervasive distaste for dirty jobs (e.g., Ashforth & Kreiner, 1999), it seems that Americans are obsessed with cleanliness.

The obsession with cleanliness and disdain for dirt may be of symbolic origin. Dirt and pollution are not always defined by their corporeal threat to health and well-being. Although it is certainly true that potential vectors of disease, like cockroaches, rotting food, and bodily excrement, are typically considered dirty, many harmless things are also maligned as dirt. Soil, for instance, is neither poisonous nor contaminating, yet despite its absolutely essential role in food production we are more likely to refer to it by a pejorative name. Douglas (1966) argued that dirt and purity are not objective, inherent properties, but relative categories within a larger symbolic system of order. Soil in an organic garden is desirable, and might even be considered pure, but that same substance tracked into the home is dirt. Dirt thus refers to things that fall outside of or disrupt order and can only be defined with reference to an existing system of order. In this sense, even though the concept of dirt may be universal among human cultures, the specific content of dirt differs across contexts. For example, in the Hindu hierarchy of purity, the water used to wash the feet of a Goddess would subsequently become defiling to her but sacred to any lower saints and mortals (Douglas, 1966). Because of this symbolic and relative nature, dirt is not limited to material objects but can also represent violations to social order. Criminals that bring chaos to society, for instance, are referred to as "scum" and "dirt," pornography is often labeled "filth," and countercultural minorities are often described as literal or figurative vectors of disease. From this perspective, cleanliness may be psychologically impactful because it signals the absence of threats to our physical being as well as to our social and moral order.

Douglas's argument that dirt and purity are conceptual categories which apply to more than literal filth corresponds with observations from linguistics and psychology. Both disciplines link the concept of dirt with breaching moral orders. In everyday language people frequently use synonyms of dirt to refer to moral transgressions. In English, for example, the phrase "money laundering" signifies that the proceeds of crime are "tainted" and need to be "cleaned" in order to pass as legitimate; a "tarnished reputation" communicates that previous transgressions indicate an immoral disposition; and both Psalm 24:4, "he that hath clean hands, and pure heart" (King James Version) and the common phrase "caught red-handed" imply that immoral conduct sullies the transgressor with an incriminating residue. These phrases are not results of recent linguistic innovation, but have existed since early human history. The book of Leviticus, for example, repeatedly equates sin with impurity and holiness with

cleanliness, and labels foods, actions and states that fall outside of the ancient Israelites' social and moral order as abominations (Klawans, 2000).

Furthermore, people not only speak of physical filth and moral pollution interchangeably, they also react to them in similar ways. More than two decades of research in social psychology has documented the affective overlap between dirt and moral transgression. Disgust was originally a gustatory emotion rooted in our evolutionary past as a motivational mechanism that inhibits the consumption of contaminating substances. Over time it expanded to include social and cultural meanings, including categories of social and moral violations (Rozin, Haidt, & McCauley, 1993). A good example would be the moralizing of, and disgust reactions to, smoking, which only emerged as the health consequences of smoking and second-hand smoke became apparent (Rozin & Singh, 1999). Indeed, research has found that physical and moral disgust share similar facial expressions and physiological activation (Chapman, Kim, Susskind, & Anderson, 2009; Rozin, Lowery, & Ebert, 1994), and employ partially overlapping brain regions of the frontal and temporal lobes (Borg, Lieberman, & Kiehl, 2008; Moll et al., 2002).

These anthropological, linguistic, and psychological observations of the overlap between physical dirt and moral purity fit well with Lakoff and Johnson's (1999) conceptual metaphor theory. Compared to concrete concepts such as clean and dirty, ethics and morality are abstract concepts that people only start to comprehend in much later stages of cognitive development. Rather than creating conceptual frameworks and corresponding neural circuitry for morality entirely from scratch, people likely adapt existing conceptual frameworks and neural networks (see Anderson (2010) and responding articles in the same issue for neural reuse theories generally). Because both dirt and moral deviants can threaten one's safety and survival, the co-opting of the older defensive systems designed for biological threats (e.g., disgust) in order to avoid social threats may serve adaptive purposes (Rozin, 1999). If that is the case, we should expect the concepts of filth and moral transgression to be psychologically equivalent at some level. Indeed, a number of recent studies have found that moral transgressions literally feel physically dirty. Zhong and Liljenquist (2006), for example, found that challenges to one's moral identity, operationalized by having participants recall past transgressions, induced the desire to physically cleanse. Similarly, Lee and Schwarz (2010) found that participants who were induced to lie through voice mail (vs. e-mail) preferred mouth wash as opposed to hand sanitizers and vice versa, further demonstrating that the overlap between filth and morality can be modality specific (i.e., dirty hands vs. a dirty mouth). More recently, Gollwitzer and Melzer (2012) found that after playing violent video games, inexperienced gamers reported greater preference for hygiene products compared to those who played nonviolent video games. However, experienced gamers do not seem to be influenced by violent game play, presumably because they have become habituated to the violence with extensive exposure.

Thus, evidence supports the view that dirt is not only an indicator of physical contamination threats, but also a meter of moral deviation. In this sense, cleanliness is literally next to godliness whereas dirtiness is sinful. Indeed, people tend to judge disgusting actions that do not harm others as immoral (Haidt, 2001). One hypothetical example used to explore this phenomenon involves kissing on the mouth between adult siblings; another, masturbating using the carcass of a chicken before cooking and eating it. People who read such vignettes were quick to judge that the actors had behaved immorally, but were unable to articulate a rationale for their judgments (Haidt, Koller, & Dias, 1993). Moreover, incidentally induced disgust, if misattributed to the target of judgment, can also sway moral judgment. For example, Schnall, Benton, and Harvey (2008) induced disgust with a foul odor and found that participants made more severe moral judgments in the presence of that smell than in a control condition. Others have induced disgust through gustatory taste (Eskine, Kacinik, & Prinz, 2011) or hypnosis (Wheatley & Haidt, 2005) and found similar results. Finally, individuals who are more disgust sensitive – those who are easily disgusted in general – tend to pass harsher moral judgment (Inbar, Pizarro, Knobe, & Bloom, 2009; Jones & Fitness, 2008).

In addition to the dirtiness of the target, moral judgment is also influenced by the cleanliness of the judge. Imagine stepping out of a refreshing shower and then think about how desirable gardening or playing football might be. Although you might normally relish the chance to get down in the dirt, such activities likely seem less enjoyable in a state of hyper-cleanliness because the cleaner the self is, the dirtier everything else looks. In this sense, cleanliness separates us from the mundane, chaotic, and messy. Since cleanliness and moral purity are conflated, we would expect that cleanliness also separates and distances us from the impure and immoral and hence increases the severity of our judgments of others. This is what Zhong, Strejcek, and Sivanathan (2010) found. In three experiments, they demonstrated that participants who cleansed their hands or simply imagined themselves in a clean, spotless state before passing judgment on a series of social issues, such as smoking, obesity, and homosexuality, made harsher judgments than those who had not cleansed their hands or imagined themselves to be in a physically dirty state.

Further, being in a clean state seemed to have induced a sense of moral superiority, leading participants to feel that they were more moral compared to their peers, and this self righteousness was partly responsible for their harsh judgments of others. Thus, physical cleanliness reflects more than our desire to be separated from pollution and contamination, it also embodies the desire for transcendence, the belief that we are more than our animalistic and earthly selves (see Nussbaum, 2004).

The conflation between physical and moral purity makes cleanliness a powerful force driving social segregation and stratification. It not only motivates people to distance themselves from the dirty and the earthly, but also justifies such separation: If what is dirty is immoral, then the segregation of dirty from clean is not only logical but justified. Indeed, people doing dirty jobs struggle to establish a positive self identity in the face of the stigma and segregation from society (Ashforth & Kreiner, 1999). The term dirty work was coined by Hughes (1951) to refer to jobs that are typically seen as disgusting, degrading, or morally insulting. Although dirty work can be tainted by physical (e.g., garbage collectors), social (e.g., correction officers), or moral sources (e.g., stripers), as a whole it suffers from the image of being morally inferior (Ashforth & Kreiner, 1999). The stigma of dirty jobs even seems to acquire some of the properties commonly associated with dirt, including the transfer of dirt between entities and its tendency to leave stains (Zhong & House, in press). Correction officers, for example, face stigma because they deal with criminals, and it is as if the moral taint of the prisoners has rubbed off onto them (Tracy & Scott, 2006). Moreover, many individuals who leave dirty jobs remain stigmatized afterwards, as though their former occupation has left a permanent stain on their reputation (Bergman & Chalkley, 2007).

More dramatic examples of segregation from the modern history of the United States, South Africa, and India illustrate the same points. India's caste system is perhaps the most cited example of the endeavor for purity within a social system (Dumont, 1980; Milner, 1994). Within the caste system, a member's defining aspect is their purity: Brahmans, considered the purest, are afforded the highest positions in society, whereas Dalits, those engaging in unpleasant physical labor (e.g., sanitary workers), are not only considered physically dirty, but also morally tainted. These ''untouchables'' are not allowed to marry into families of higher caste, participate in religious activities, or even share physical proximity with upper castes. In the event that a ''pure'' individual comes in social or physical contact with an ''untouchable,'' this now tainted individual is required to forcefully cleanse to wash away the contamination. Thus, cleanliness and purity can serve as one of the bases for class and social stratification and justify the discrimination and segregation of those lower on the social ladder, who are seen as both impure and immoral. Indeed, the symbolic distinction between blue and white-collar workers originates from the difficulty of keeping white clothing clean during manual labor (Wickman, 2012).

Division of labor and increasing separation of mental and physical work means that managers and CEOs are often hermetically sealed in a bubble of cleanliness, leaving them vulnerable to purity based classifications. An excellent illustration is Thiel's (2007) study of a class-based, discursive symbolic system among managers and workers in a British construction company that is partly centered on the division between minds vs. bodies, mental vs. manual, and clean vs. dirty work. Thiel observes that even the managers of construction companies have little to no contact with dirt and sweat in their daily jobs, and, that in this construction company in particular, cleanliness became a symbolic fault line that shaped identities of both managers and construction workers. Among construction workers, for example, managers were often depicted as ''snobs'' who wore clean suits and shoes and walked around the site without doing ''real'' work; in the mean time, managers looked down upon construction workers who handled the dirty work. For construction workers, mud, dust, tar, and alike are not dirt to be feared, they are part of everyday work; by rejecting the essential features of construction work as dirt, managers at the construction company declared themselves as essentially different and distant from the workers.

Inside a bubble of cleanliness, any impurities, physical or social, can seem threatening and undesirable. Moreover, what we fear as physically dirty often reflects how we perceive and think about social others. For example, the notion that drinking from the same glass with a stranger is gross speaks not only to our hygiene standards but also to our belief that people (especially those from whom we are different) can be threatening and dangerous. Indeed, Inbar et al. (2009) found that the extent to which people are disgust sensitive (e.g., how easily they are disgusted by things such as sipping from a stranger's can of soda) strongly predicts the extent to which they reject and condemn perceived social deviants, such as homosexuals. Just like soil on the kitchen floor, social groups that do not neatly fit into the social order may be considered dirty, and hence immoral, even though they pose no threat to others.

Thus, it may be beneficial to breach the bubble of cleanliness and get one's hands dirty. Physical labor, and the various forms of dirt that it entails (e.g., soil, dust, grease), may highlight the harmless nature of dirt and impurities and

our fundamental human connection with others. In Thomas Hardy's novel, *Far from the Madding Crowd* (1874), for example, the farm laborers commended the shepherd as a ''nice unparticular man'' when he refused a clean mug for his cider. '''No-not at all,' said Gabriel [the shepherd], in a reproving tone of considerateness. 'I never fuss about dirt in its pure state and when I know what sort it is. . .I wouldn't think of giving such trouble to neighbors in washing up when there is so much work to be done in the world already''' (c.f., Douglas, 1966). For Hardy's agricultural laborers, dirt is simply part of honest work. By accepting their ''dirt in its pure state,'' the shepherd signals that he considers himself equal with the farm laborers and shares their system of order. On the contrary, the managers of a construction company who never visited the gritty construction sites could never truly understand the ins and outs of construction work; similarly, doctors and criminal lawyers who avoid patients' beds or dirty prison cells are unlikely to truly empathize with their clients' pain and suffering. Perhaps Douglas (1966) and Nussbaum (2004) are right that underneath our fear of pollution and desire for cleanliness is the rejection of ourselves being the animals we are. Dirt reminds us of our earthly existence and inevitable decay; cleanliness allows us to transcend above flesh and blood. The danger in cleanliness, of course, as Nussbaum warned, is that we may lose touch with our humanity and humility.

Ironically, the historically unprecedented levels of cleanliness in the United States and other Western countries, which are intended to promote health and wellbeing, appear to be making people sick. Mounting epidemiological evidence appears to show that excessive hygiene and sanitation may cause the immune system to become hypersensitive, resulting in dangerous immunological responses to benign substances (e.g., asthma and allergies) (Hampton, 2011). Could this excessive cleanliness similarly sensitize our moral immune systems? Work environments in manufacturing and service industries that require high levels of cleanliness, and even sterility, promise a rich testing ground for generalizing the laboratory results discussed above to the field. Working in an environment that is literally free of dirt, day after day, may alter employees' perceptions of both physical and moral dirt. In a sterile work environment, any and all dirt is viewed as an impediment to your objectives and must be expunged. Such an unnatural intolerance of physical dirt may in turn influence intolerance of moral and social deviations. Fortunately, the means of counteracting any negative consequences of excessive cleanliness may be as easy as getting one's hands dirty. A little dirt at the right times may go a long way to reminding ourselves and others that we are imperfect, earthly beings who should accept the impurities and differences of others.

2.4. Distance

Imagine you are the CEO of a multinational corporation with headquarters in New York, reading reports from the Sydney office about a possible public relation crisis. How urgent do you think the matter is? How likely is it to actually transpire? Can you trust the foreign managers to handle the situation? Would your assessment of the facts be any different if they occurred in a foreign city in the same time zone, like Toronto or Santiago? With increasing mobility and globalization, corporations and organizations have spread their networks around the circumference of the earth. Operating in multiple countries introduces great challenges for managers who need to effectively navigate time differences, language barriers, currency exchanges, cultural differences, disparate legal and political systems, and the list goes on. In most cases, physical distance is assumed to matter to the extent that it results in logistical hurdles and linguistic and cultural differences. However, recent research suggests that physical distance itself can influence social cognition. In the above example, matters that happen closer to us seem more important, urgent, and probable than things happening at greater distance.

The very notion of embodied cognition presumes the fact that we are physical beings cohabiting three-dimensional space. Simply because modern technology allows us to bridge distance faster and more efficiently than ever before does not mean that physical distance has become a less important feature of our psychological landscape. This is because space is not only a medium across which interpersonal communication takes place, but also a medium through which abstract thoughts and feelings are psychologically represented (Schubert & Maass, 2011). That we regularly speak of future events as *far off* or already *here*; possibilities that were *near* misses or *long* shots; and people that are *close* friends or *distant* acquaintances, suggests that how people think about time, probability, and social relationships is structured according to a mental model of distance. Trope et al. (see Liberman & Förster, 2011; Trope & Liberman, 2010, for reviews) argue that space, time, probability and social relationships are all different dimensions of psychological distance. Events, objects and people become more psychologically distant and are represented more abstractly to the extent that they are not directly experienced, irrespective of whether they are separated by spatial distance (Fujita, Henderson, Eng, Trope, & Liberman, 2006), temporal distance (Liberman & Trope, 1998; Liberman,

Sagristano, & Trope, 2002), probabilistic distance (Wakslak, Trope, Liberman, & Alony, 2006), or social distance (Liviatan, Trope, & Liberman, 2008; Stephan, Liberman, & Trope, 2010). Unlike Trope et al. who consider all forms of distances psychologically equivalent, Boroditsky et al. (e.g., Boroditsky, 2001; Boroditsky & Ramscar, 2002; Schubert, Waldzus, & Seibt, 2011) emphasize the prominence of spatial distance as being the underlying conception of distance upon which the other dimensions are built (but see Santiago, Román, & Ouellet, 2011, for a contrasting view).

An elegant demonstration of space, time, probability and social relationships sharing a common underlying mental model was conducted by Bar-Anan, Liberman, Trope, and Algom (2007) using a modified Stroop task in which words were placed either in the foreground (perceptually nearer to the viewer) or background (further away) of landscape photographs. Participants processed words such as ''decade,'' ''maybe'' and ''them'' faster when they appeared in the background of the landscape and words like ''tomorrow,'' ''sure,'' and ''us'' faster in the foreground. Cognitive interference as a result of distance-incongruence across these dimensions implies a shared psychological basis, and perhaps neural substrate, for the constructs of space, time, probability and social relationships.

Consequently, perceived spatial distance can influence perceptions of distance along the other dimensions. For example, recent research has demonstrated that events that will occur in a geographically distant location also appear to be further away in time than those events that will occur near one's present location (Kim, Zauberman, & Bettman, 2012). Likewise, people predict that improbable events are more likely to occur in distant locations than they are to occur nearby (Wakslak, 2012; Wakslak et al., 2006). Compared to temporal or probabilistic distance, the association between spatial distance and social distance has been established for a much longer time in the psychological literature. Social psychologists have been regularly using spatial representations of social distance in well validated measures for two decades now. The inclusion of Self in Other-scale (Aron, Aron, & Smollan, 1992), for instance, uses spatial distance as a measure of intimacy, and the distance at which participants place their chair from another chair purportedly reserved for an AIDS patient or a skinhead is an ingenious implicit measure of attitudes toward these groups (e.g., Macrae, Bodenhausen, Milne, & Jetten, 1994; Mooney, Cohn, & Swift, 1992). Furthermore, even abstract distance can prime social distance. Williams and Bargh (2008a) observed effects by having participants plot proximate or distant points on a Cartesian graph. Following this subtle prime, participants demonstrated less empathy and reported less emotional connection to their family and hometown.

The organizational implications of physical distance are likely to be extensive. For example, it may be particularly challenging for multinational corporations to foster cohesion and identification among managers and employees located across the world. It can be equally challenging for small groups separated by physical distance to function well. Wilson, Crisp, and Mortensen (in press) proposed that psychological distance may be a useful overarching framework to understand distributed groups, also referred to as virtual groups, where group members are separated by geographic or temporal distance (or both). Because physically separated groups are also represented as more psychologically distant, groups working from great distance may have a harder time feeling socially intimate and establishing common understandings of attitudes, relationships and events. It is important to note, however, that the influence of physical distance on psychological and group processes may not only depend on objective distance, but also perceived distance. Thousands of miles may seem unreachable by foot, but a jet plane can bridge that distance in mere hours. In order to estimate distance, it appears that people simulate the relevant process that would be used to bridge that distance. When participants are in possession of a tool that extends their reach, they estimate distance to objects that can be reached with that tool as shorter, presumably because the distance to the object is now more easily overcome (Witt & Proffitt, 2008; Witt, Proffitt, & Epstein, 2005). Thus, perhaps the psychological effects of spatial distance depend on the tools that people intend to use to overcome that distance. From email and telephone, to planes, trains, and cargo ships, the observation that the perception of spatial distance is itself is embodied certainly complicates predictions and offers many potential avenues for future organizational research. For example, studies could explore whether advanced technologies that offer real time communications (e.g., Skype, FaceTime) would be able to at least mitigate the effects of physical distance on psychological representations of others.

In addition to horizontal distance, vertical distance may also have organizational implications. In both language and organizational charts, hierarchy is represented by vertical distance: Those who have successfully climbed the career *ladder* (i.e., managers, directors, and officers) are often referred to as ''higher-ups'' because they have people *under* their supervision, and those organizations with few or no bureaucratic *levels* are described as *flat* or *horizontal*. This connection between height and power, dominance, status, and leadership appears to be culturally universal (Fiske, 2004) and recognized in infants as young as nine months of age (Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011; Weinraub & Putney, 1978). Likely derived from the general association between tallness and physical strength, as well

as the universal experience that children have with towering adults, vertical distance continues to be a robust indicator of power and status, both as it relates to men's physical stature (Gawley, Perks, & Curtis, 2009; Hensley & Cooper, 1987; Judge & Cable, 2004; Melamed & Bozionelos, 1992; Mueller & Mazur, 2001) and more symbolic schematic representations (Schubert et al., 2011). These abundant and diverse symbolic associations, together with experimental evidence that the effects of power distance and social distance on information processing are much the same (Smith & Trope, 2006), suggest that power and status are mentally represented as psychological distance along a vertical axis.

For example, the vertical distance between a manager and subordinates in an organizational chart positively influences estimates of the manager's power and influence (Giessner & Schubert, 2007). In a subsequent experiment, Giessner and Schubert also found that, across purportedly unrelated tasks, greater length disparities between vertical, but not horizontal, lines increased estimates of managers' power and influence. Thus, independent of the actual distribution of administrative power in an organization, the schematic vertical distance in the organizational design alone may contribute to the impression of centralized power and greater power distance. Furthermore, priming participants with powerful or powerless groups automatically orients visual attention upwards and downwards, respectively (Zanolie et al., 2012), and this vertical bias in visual attention has been observed to vary with individual differences in dominance orientation as well (Robinson, Zabelina, Ode, & Moeller, 2008). That the mapping of vertical distance onto social power is so universal, automatic, and innate may explain its instrumentality in maintaining hierarchical structures through cultural artifacts that symbolize institutional power through impressive height (Earle, 2004; Fiske, 1991). Thrones, crowns and skyscrapers all accentuate height and command respect, both from the self (Chen, Lee-Chai, & Bargh, 2001; Sun, Wang, & Li, 2011) and from others (Schwartz, Tesser, & Powell, 1982; Spiegel & Machotka, 1974). Thus, it is no coincidence that Judge's occupy the highest seat in the courtroom, or that many CEOs have traditionally located their office on the headquarters' top floor. Increasingly, however, CEOs are conscious of the potential impact of such vertical symbolism, and, like Sergio Marchionne when he took over Chrysler, are abandoning top floor offices in favor of offices in more central locations (Boudette, 2009). Although we await empirical tests, architects and interior designers are already reporting anecdotal evidence that integrating executives into open plan offices, where they are not floors above all employees, decreases apparent social distances, thereby enhancing communication, empathy, and positive affectivity (Cocking, 2011). Power and status are influential variables of interest for organizational scholars, and whether their effects on important outcomes, such as organizational identification, cohesion, and decision-making, to name a few, can be moderated by the physical position of executives within an organization is an exciting research question waiting to be explored.

3. Discussion and conclusion

The authors of this chapter are not the first to propose or pursue metaphors as an important subject of interest in organizational research. Other scholars have argued that by applying meanings from an unrelated domain, metaphors can activate and highlight an entire set of relevant attributes of organizations without in-depth elaboration. For instance, metaphorically describing work teams as family highlights the nurturing and supporting aspects of teamwork and team building, whereas describing teams as military units emphasizes discipline and goal fulfillment (see Gibson & Zellmer-Bruhn, 2001). Similarly, the metaphor of organizations as machines or administrative staff as faceless bureaucrats highlights the hierarchical, bureaucratic nature of organizations, while the organization as organism metaphor emphasizes the embeddedness of organizations within broader social context and the need for constant exchange and adaptation (Morgan, 1980). In these cases, metaphors are useful linguistic tools that succinctly and efficiently communicate meanings for practitioners and researchers alike.

Metaphors, however, are more than linguistic tools of communication, but fundamental ways through which our mind structures mental representations. The metaphor ''icy stare,'' for example, reflects not only an overlap in the meanings associated with coldness and social rejection; these domains are psychologically merged such that the experience of temperature becomes part of our mental representations of social relationships. After all, our abstract concepts originate and arise from the physical world and thus must be influenced by our physical surroundings. It is in this sense that we expect that the physical environment of organizations may affect their social functioning. Our analysis of the influences of the physical work environment through the lens of conceptual metaphor and embodiment offers unique perspectives compared to earlier work on similar topics. For example, Baron (1994) carried out a thorough review of studies that examined the influences of physical work environment such as illumination, temperature, and noise on work performance and job satisfaction. In his framework, work context such as illumination

and temperature influence work related outcomes mainly through changing arousal level and positive or negative affect. From this perspective, concrete physical environments were not considered an integral part of thought processes, but were thought to influence attitudes indirectly through provoking autonomic or emotional responses. The conceptual metaphor framework that focuses on how the physical work environment may directly impact social perception and cognition not only reinforces the idea that both affective and cognitive processes are important determinants of social outcomes, but also completes the picture of a more integrative framework for understanding the complex dynamics between an expansive list of physical work environments and a diverse set of organizationally relevant outcomes.

Metaphor and embodied cognition research has stirred considerable interest across a wide range of related disciplines, including, but not limited to, philosophy, psychology, linguistics, sociology, and computer science (Semin & Smith, 2002). We feel that it is time to think about how they may inform organizational research. We summarized four areas of the physical work environment that might influence social perceptions and dynamics in organizations and offered some specific predictions of how illumination, temperature, cleanliness, and distance may affect a diverse set of organizational outcomes. Whether these outcomes involve ethics, social perception, or creativity, they stand in sharp relief against the singular focus on productivity held by the Hawthorne studies. Together they reflect how our understanding of organizations has transformed over the last century: From one of a coordinating machine with the singular goal of production to organic communities embedded in complex social relationships and exchanges. Thus, even though the Hawthorne studies might have temporarily turned scholarly attention away from physical work environment, they nevertheless have stimulated a literature examining the rich human interactions within organizations and thereby set the stage for future explorations of the complex relationships between social dynamics and the physical work environment.

It is worth mentioning that illumination, temperature, cleanliness, and distance are not the only relevant aspects of work environment. For example, recent research has demonstrated that the tactile experience of objects can shape abstract judgments metaphorically. Jostmann, Lakens, and Schubert (2009) revealed that merely filling out a questionnaire attached to a heavy (vs. light) clipboard can increase perceptions of importance across a range of domains and even affect evaluations of a job candidate's resume (Ackerman, Nocera, Christopher, & Bargh, 2010). In several additional studies, Ackerman et al. (2010) went on to illustrate that there are many other ways in which touch is metaphorically related to abstract cognition that deserve further exploration. When participants handled rough, as opposed to smooth puzzle pieces, they were more likely to rate an ambiguous vignette as involving more disagreement, but no greater social distance. Rough puzzle pieces also increased the amount of money that participants offered in an ultimatum game, which suggests that greasing someone's palm with money in order to reduce social friction is a concept that we all viscerally understand. Finally, Ackerman et al. (2010) also found that experiencing hard, rather than soft, objects, including the seat that participants were sitting in, lead people to judge others as being stricter and induced them to be more intransigent during a negotiation exercise. Undoubtedly, future research will continue to reveal other dimensions of the physical environment that may influence organizational processes.

However, it is more important to understand when the physical environment will or will not influence organizational outcomes than to further expand a taxonomy of features of the physical environment with organizational implications. Although each of the physical dimensions discussed in this chapter may have different boundary conditions, we believe that metaphorical influences of physical work environments in general may be moderated by at least two contextual factors: construal level and culture. First, given that conceptual metaphor research and embodied cognition examine the interplay between concrete constructs and abstract constructs, embodied effects may be stronger when concrete information or experiences are more salient. Indeed, Maglio and Trope (2012) found that construal level in cognitive processes moderates embodied influences. In one of their studies, the researchers primed construal level by having people write about why they do something (abstract processing) as opposed to how they do something (concrete processing). They then asked participants to estimate a distance while wearing a heavy or light jacket. In the typical embodied findings, people wearing a heavy jacket tend to estimate the distance to be longer compared to those wearing a light jacket, suggesting again that people simulate the process of crossing a distance when estimating length. This was indeed what they found in the concrete processing condition. In the abstract processing condition, however, such effects were not observed. This finding confirms that the physical environment may exert stronger effects when our minds are "tuned" to listen to concrete, physiological experiences. If this is the case, we would expect physical influences to vary across task contexts and organizational rank. For example, construction workers are more physical and concrete compared to managers who deal with numbers and statistics;

similarly, lower level workers are more likely to focus on how they will implement instructions (concrete processing), while managers are more likely to think about why they should adopt one course of action over another (abstract processing). Thus, we expect physical environment to have stronger impact on employees working in jobs that require more concrete processing than abstract processing.

Second, culture is another factor that may moderate the influence of the physical work environment. Oriental cultures tend to be intuitive, holistic, and pay more attention to situational surroundings (e.g., Kitayama, Duffy, Kawamura, & Larsen, 2003; Nisbett, 2003); whereas Western cultures tend to be rational, analytic, and focus on person attribution. Given that the influence of the contextual environment may partly depend on the extent to which the situational surroundings are paid attention, we might expect the workplace environment to have a greater impact among East Asian cultures than Western cultures. Indeed, in Eastern folk culture, the concept of ''feng shui'' is a popular idea that one's surroundings (e.g., room shape, lighting, presence of water) directly impact one's success and health. Instead of a magical explanation, perhaps the effect of physical environment on individual outcomes can be explained through metaphorical mapping and symbolic interpretation. Water, for instance, symbolizes flexibility and creativity (i.e., the free flow of thoughts and ideas) and the presence of flowing water may indeed improve creativity through symbolic priming. Slepian and Ambady (2012), for example, showed that people who incidentally experience the fluid motion of arm movement tend to display increased creativity.

Thus, we are more connected to the physical world around us than we previously thought because our conceptual systems are products of the physical world from which they originate. Incorporating this insight into organizational research and practice may offer many novel insights into the relationship between physical work environments and organizational behavior that were previously underemphasized or overlooked.

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