

# Environmental Psychology Matters

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Annu. Rev. Psychol. 2014. 65:541–79

First published online as a Review in Advance on September 11, 2013

The *Annual Review of Psychology* is online at <http://psych.annualreviews.org>

This article's doi:  
10.1146/annurev-psych-010213-115048

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## Keywords

proenvironmental behavior, climate change, nature, place attachment, built environments, interventions, virtual environments

## Abstract

Environmental psychology examines transactions between individuals and their built and natural environments. This includes investigating behaviors that inhibit or foster sustainable, climate-healthy, and nature-enhancing choices, the antecedents and correlates of those behaviors, and interventions to increase proenvironmental behavior. It also includes transactions in which nature provides restoration or inflicts stress, and transactions that are more mutual, such as the development of place attachment and identity and the impacts on and from important physical settings such as home, workplaces, schools, and public spaces. As people spend more time in virtual environments, online transactions are coming under increasing research attention. Every aspect of human existence occurs in one environment or another, and the transactions with and within them have important consequences both for people and their natural and built worlds. Environmental psychology matters.

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## THE BEHAVIORAL SCIENCE OF HUMAN TRANSACTIONS WITH AND WITHIN BUILT AND NATURAL ENVIRONMENTS

Wherever you go, there you are—and it matters. This is the fundamental premise of environmental psychology: We are always embedded in a place. In fact, we are always nested within layers of place, from a room, to a building, to a street, to a community, to a region, to a nation, and to the world. If, instead, we happen to be in a vehicle, an urban park, on the water, or in a wilderness, we are still somewhere. Person-place influences are both mutual and crucial. We shape not only buildings but also the land, the waters, the air, and other life forms—and they shape us.

Environmental psychology includes theory, research, and practice aimed at improving human relations with the natural environment and making the built environment more humane. Considering the enormous investment society makes in developing and shaping the physical environment, and the huge current and potential costs of misusing nature and natural resources, environmental psychology is a key component of human, animal, and environmental welfare. It is essential for policy-making (Vlek 2000). Environmental psychology matters (Gifford 2002).

Environmental psychologists continue to investigate fundamental psychological processes such as environmental perception, spatial cognition, social space, human development, and personality as they filter and structure interactions with the environment. The traditional emphasis of the field on the built environment has remained stable (Giuliani & Scopelliti 2009), and the recent growth of the field stems from investigations of proenvironmental behavior, climate change, interactions with nature, and attachment to place.

Environmental psychology began half a century ago because psychology had rarely extended its concern to the physical setting of behavior; for the most part, the discipline proceeded in its investigations as if people acted and interacted nowhere, in a black void. By implication, the physical locus of existence did not matter, but in reality, of course it does. Obvious as this fundamental premise may be, and even though the first *Annual Review of Psychology* survey of the field appeared 41 years ago (Craik 1973), in operational terms the discipline as a whole still does not fully accept it: Most departments of psychology in 2014 do not include even one environmental psychologist. Those with two or more faculty members who are primarily dedicated to the field probably can be counted on one's fingers.

Despite this severe shortage of landed scientists, research in environmental psychology has somehow managed to flourish. Two comprehensive handbooks have appeared (Bechtel & Churchman 2002, Clayton 2012), and a third is in preparation. The number of submissions to the *Journal of Environmental Psychology* (JEP) quadrupled from 2002 to 2012. This explosion of interest is partially rooted in the global development in the field; JEP received submissions from over 40 countries in 2012. The 2008 American Psychological Association Presidential Address was devoted to psychology's contribution to a sustainable environment (Kazdin 2009).

Perhaps this is because the wider society gradually has awakened to the importance of the natural environment over approximately the same half-century as the lifespan of environmental psychology, including its fragility and vulnerability to human actions and its potential for enhancing human life. Over the same period, the ability of environmental psychology to contribute ideas and solutions to the design of the built environment has been realized. One gets the feeling that, perhaps more than in some other areas of psychology, environmental psychologists are driven by personal conviction to a cause.

This article focuses on key developments in environmental psychology over the past decade or so, but it does not refrain from reaching further back where necessary. The last broadband *ARP* survey of the field was 18 years ago (Sundstrom et al. 1996), which forces the present attempt to update readers to be much more selective than its author would wish.

## PROENVIRONMENTAL CONCERN AND BEHAVIOR

Many environmental problems are rooted in human behavior and can thus be solved by understanding behavior.<sup>1</sup> Proenvironmental behavior matters. Influences on proenvironmental behavior include childhood experience; knowledge and education; personality; perceived behavioral control; values, attitudes, and worldviews of various kinds; felt responsibility and moral commitment; place attachment; norms and habits; goals; affect; and many demographic factors.<sup>2</sup> These influences also quite likely combine to determine behavioral outcomes; that is, they interact. Thus, one important challenge is to learn more about how these influences moderate and mediate one another.

A second challenge is to learn which domains of environment-related behaviors (i.e., the big five related to energy conservation, transportation, food, waste disposal, and material purchases) are more or most influential in which social domains: private (e.g., at home), public (e.g., writing letters or attending meetings), organizational (at work or school), or activist (Stern 2000).

A third challenge is to widen and deepen the field's consideration of how society works in terms of the production and consumption of goods and services and how broader social and political influences contribute to the formation of values, attitudes, and behavior (Uzzell & Rätzhel 2009).

The many influences on environmental concern and behavior are considered next.

### Childhood Experience

Children who spend time in nature are more likely to engage in proenvironmental behavior as adults (Cheng & Monroe 2012); this is more true when the time is spent in “wilder” than in “domesticated” nature (Wells & Lekies 2006). They are also more likely to spend time in nature as adults (Thompson et al. 2008).

### Knowledge and Education

A recent summary of 15 knowledge surveys concluded that Americans are quite knowledgeable about some environmental problems (e.g., what renewable resources are, where garbage goes, and

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<sup>1</sup>Of course, influences at other levels of analysis also influence proenvironmental choices, such as structural barriers, economic and political factors, and technological advances (Gifford 2008b).

<sup>2</sup>Finally, but importantly, we must note that environment-friendly behavior is often undertaken for nonenvironmental reasons, such as to save money or to improve one's health (cf. Whitmarsh 2009). In engaging in behavior choices like these, individuals have been called “honeybees” because, like those insects pollinating fruit trees in the pursuit of a nonenvironmental, self-interested goal, they inadvertently provide important environmental benefits (Gifford 2011).

what causes habitat destruction) but less knowledgeable about others (e.g., climate change, energy production, and water quality) (Robelia & Murphy 2012). Making informed proenvironmental choices obviously depends on having correct knowledge. Even self-reported knowledge, fallible as it may be, seems to predict proenvironmental behavior reasonably well (Fielding & Head 2012).

Education is also important. Individuals with more education in general are more concerned about the environment. Education alone often does not lead to more proenvironmental behavior, but it serves as a priming agent. For example, reading classic environmental books such as Rachel Carson's *Silent Spring* has been associated with more frequent environmental behavior (Mobley et al. 2010). Some forms of education, such as by peers in a workplace (Carrico & Riemer 2011), in a classroom where the desired behavior is proximate (Werner et al. 2012), or in teaching people how to reduce the smoke from their woodstoves (Hine et al. 2011), have been shown to be effective.

## Personality

The Big Five personality factors represent much of the normal personality domain. Openness has been related to more proenvironmental activities (Fraj & Martinez 2006) and to more frequent proenvironmental behaviors, but this relation was fully mediated by environmental attitudes and connection to nature (Markowitz et al. 2012). In a German study, greater openness and greater agreeableness and, to a lesser extent, more conscientiousness and less emotional stability were associated with greater environmental concern (Hirsh 2010). Openness, agreeableness, and conscientiousness were strongly linked to environmental engagement across both persons and nations (Milfont & Sibley 2012). Agreeableness, conscientiousness, and less Machiavellianism were related to more recycling (Swami et al. 2011).

Consideration of future consequences—the tendency to establish and achieve goals and to plan strategies for meeting long-term obligations—was positively related to engaging in sustainable behaviors (Corral-Verdugo & Pinheiro 2006, Milfont & Gouveia 2006), including choosing public transport more often (Joireman et al. 2004).

Internal locus of control and self-efficacy have been associated with stronger proenvironmental intentions and behavior, including less use of cars for commuting (Abrahamse et al. 2009), more recycling in mainland China (Tang et al. 2011) and in Spain (Taberero & Hernández 2011), and less electricity use among Danish consumers (Thøgersen & Grønhøj 2010). Locus of control also seems to moderate the link between one's values and proenvironmental behavior (Engqvist Jonsson & Nilsson 2013). In order for values to be expressed in proenvironmental behavior, people apparently must believe they have some control over events.

## Values and Worldviews

Schwartz's (1992) value theory has been modified to fit environmental issues (e.g., Stern et al. 1993), and support for the categorization of values into biospheric, egocentric, and altruistic dimensions has been reported (e.g., de Groot & Steg 2007). Associations between values and environmental concern seem, at least in a study that included six widely dispersed nations, to be quite consistent (Schultz et al. 2005). Not surprisingly, persons who hold more altruistic, prosocial, and biospheric values report favoring environmental preservation, whereas those who see the environment as a source of resources to be consumed tend to hold self-enhancement values (Kaiser & Byrka 2011, Milfont & Gouveia 2006, Nilsson et al. 2004, Nordlund & Garvill 2002), and these egoistic values result in less environmental concern (de Groot & Steg 2010).

However, their relations with proenvironmental behavior typically are weak, so moderating and mediating variables such as personal norms and beliefs are needed to satisfactorily predict behavior from values (Nordlund & Garvill 2003).

These environmental values are related to the ways that individuals construe themselves. People with independent self-construal (i.e., individuals who differentiate themselves from others) tend to have egoistic values and to report being competitive about managing resources; those with interdependent self-construal (i.e., people who relate to others) tend toward sharing resources; and those with meta-personal self-construal (i.e., individuals who feel fundamentally interconnected with all living things) tend to have biospheric values and to report they would cooperate more in a commons dilemma (Arnocky et al. 2007). Despite these self-reports, in a commons dilemma microworld, participants with prosocial and proself orientations made similar resource management choices (Hine et al. 2009). However, their motives may differ: Proselfs may view harvesting restraint by others as a chance to maximize their own profit, whereas prosocials may be trying to maximize the group's outcome by compensating for what they think might be too much restraint by others. This was supported in that proselfs responded to overharvesting by others by increasing their own harvests, whereas prosocials' harvesting did not increase in response to others' lack of restraint.

In terms of political, economic, and technological values, individuals who value free-market principles, view technology as the solution to environmental problems, and believe that economics is the best measure of progress tend to have less environmental concern (Heath & Gifford 2006).

Postmaterialist values typically are held by more affluent citizens who have fewer worries about the necessities of life; they tend to be concerned with higher-level goals and actions such as self-improvement, personal freedom, and providing direct input to government. Holding post-materialist values and political competence is related to an increased interest in environmental political action (e.g., Oreg & Katz-Gerro 2006), probably because these values are associated with environmental concern and perceived threat, which when combined with these individuals' sense of control, leads to a willingness to sacrifice and thus causes the adoption of proenvironmental behaviors.

Beliefs about the nature of nature are related to one's environmental concern. Those who believe that nature is ephemeral (that it is delicate and fragile and even small disturbances will have drastic consequences) are most concerned; those who hold nature-benign worldviews (that nature is very capable of adapting) are least concerned (Poortinga et al. 2003). Another widespread worldview held by individuals is that threats to the environment are weaker in their own area than in distant places (Gifford et al. 2009). Egalitarians believe this more strongly, and individualists believe it less strongly (Lima & Castro 2005).

However, relations between values and environmental attitudes may not be as simple as some of these findings imply. People have multiple values, and the relations between values must be considered. For example, appeals to environmental values are more effective in increasing proenvironmental behavior than are appeals to self-interest (financial) values (Bolderdijk et al. 2013) or even appeals to the combination of environmental and financial values (Evans et al. 2013). When two values conflict, the difference between the pre-existing level of endorsement of the two values predicts one's environmental attitudes better than the endorsement level of either single value (Howes & Gifford 2009). Moreover, values may combine with motivational style to more strongly predict proenvironmental intentions; for example, the more people hold altruistic and biospheric values and are self-determined as a motivational style, the more they act proenvironmentally (de Groot & Steg 2010).

## **Felt Responsibility, Moral Concerns, and Commitment**

As one might expect, feeling responsible is an important part of environmental concern. This feeling of responsibility apparently stems largely from a sense of guilt (Ferguson & Branscombe 2010). The discourse on environment in such places as newspaper editorials and public service announcements tends to evoke harm and care as the moral foundations for action. These concerns tend to resonate more with liberals, which may be why liberals usually have more proenvironmental attitudes. However, when proenvironmental messages are framed in terms of purity as a moral foundation, conservatives' attitudes toward the environment move much closer to those of liberals (Feinberg & Willer 2013). Finally, making a small symbolic commitment, such as to reuse towels in a hotel, can lead to a considerable (25%–40%) increase in towel reuse and towel hanging (Baca-Motes et al. 2013).

## **Frugality, Diversity, and Empowerment Attitudes**

Three other attitudes appear to assist in the understanding of proenvironmental concern and behavioral intentions. Positive attitudes toward frugality predict intentions to reduce energy choices (Fujii 2006). Positive attitudes toward sociocultural diversity and biodiversity also predict proenvironmental behavior (Corral-Verdugo et al. 2009). If one expects to feel empowered—that is, to develop a sense of self-efficacy and solidarity—one is more likely to participate in the development of a proenvironmental program (Maeda & Hirose 2009).

## **Place Attachment**

If individuals have a strong attachment to a place, they probably want to protect it (Scannell & Gifford 2013). In one study, adding place attachment to the standard values-beliefs-norms (VBN) model doubled the predictability of whether people would conserve native plants (Raymond et al. 2011). However, place attachment comes in multiple varieties, and not all are equally related to proenvironmental behavior: Natural place attachment but not civic place attachment appears to have that connection (Scannell & Gifford 2010a).

## **Norms, Habits, and Defaults: Behavioral Momentum**

Much of today's behavior simply follows from yesterday's behavior. This has been investigated in terms of norms, habits, and defaults, but perhaps an encompassing term for this is behavioral momentum. In terms of norms, if one believes that the "usual thing to do" is to recycle (a descriptive norm), one is likely to recycle. Personal norms represent one's sense of moral obligation toward taking action, for example, to oppose nuclear energy (de Groot & Steg 2010), to reduce car use (Abrahamse et al. 2009), or to conserve water (Corral-Verdugo & Frías 2006). Subjective or injunctive norms represent one's sense that significant others expect a certain pattern of behavior. For example, parents can create norms in young children to recycle and reuse paper (Matthies et al. 2012). Local norms are based on physical proximity; they seem particularly relevant for behaviors that occur in a specific proximate location (Fornara et al. 2011).

Evidence about the influence of norms is strangely mixed. One study reports that in a survey normative influence was a better predictor of proenvironmental behavior than other beliefs, and in a field study norms produced the greatest behavior change, although participants in both studies claimed that norms were the least influential factor (Nolan et al. 2008). In contrast, a recent meta-analysis that examined a variety of social influences (block leaders, public commitment, modeling,



group feedback, social comparison feedback, and social norms) across 29 studies found that norms were the least potent influence on behavior (W. Abrahamse & L. Steg, manuscript under review).

Perhaps this is because the norm-behavior link is not as straightforward as it appears. For example, what happens if a person is faced with multiple norms, and the norms conflict? When an injunctive norm conflicts with a descriptive norm, behavior intentions weaken (Smith et al. 2012). However, other work suggests that norm conflict can actually strengthen perceived environmental effectiveness if the person has a positive attitude toward the issue (McDonald et al. 2013). Nevertheless, when people see evidence of counter-norm behavior (e.g., litter) in the presence of information proscribing that behavior, such as a “Do Not Litter” sign, they often will engage in antinorm behavior, that is, add to the litter (Keizer et al. 2008).

Norms can become habits, a second form of behavioral momentum. Unfortunately, the obvious approach to measuring habit—asking about a person’s past behavior—may not be an adequate way of measuring it (Knussen & Yule 2008). Assessing habits may not be as straightforward as it appears. A third form of behavioral momentum is choosing the default. Often, people will say they prefer the green alternative but in fact they often tend to (passively) “choose” whichever default is offered to them (Pichert & Katsikopoulos 2008). Clearly, the policy strategy implied by this finding is to make the green option the default.

## Affect

Emotions play a role in proenvironmental concern and behavior. For example, a Swedish study reports that worry, hope, and joy play a role in recycling (Ojala 2008). Having an affective connection to nature significantly predicts the intention to engage with it (Hinds & Sparks 2008). Anticipating unpleasant emotions predicts the desire to engage in proenvironmental actions (Carus et al. 2008). On the other hand, positive affect toward one’s pollution-emitting device weakens one’s support for policy measures that would restrict its use and for the willingness to switch to a less-polluting device (Hine et al. 2007).

## Demographic Factors

Age, gender, wealth, religion, urban-rural residence, and identification with a group have been related to environmental concern. Older people generally report more proenvironmental concern or behavior than younger people (e.g., Grønhøj & Thøgersen 2009), but not always (e.g., Sardanou 2007).

Gender differences are inconsistent. In some studies, women report stronger environmental attitudes, concerns, and behaviors than men (e.g., Scannell & Gifford 2013). However, in China, women are more engaged than men in domestic environmental behaviors (e.g., recycling), but outside the home (e.g., environmental organization donations) no gender differences are exhibited, and women express lower levels of concern than men (Xiao & Hong 2010). A possible reason for this pattern is that health and safety, which are threatened by problematic environments are more important to women, particularly women with children at home (see, e.g., Dietz et al. 2002).

One generalization is that environmentalists tend to be middle-class or upper-middle-class individuals. Environmental concern also appears to be related to wealth on the global scale; it has a clear positive relation with national gross domestic product per capita (Franzen 2003). Of course, not everyone in wealthier places is environmentally concerned; for example, conservative white males in the United States clearly are less concerned, on average, than are other US demographic groups (McCright & Dunlap 2012). Meanwhile, some research concludes that citizens



of developing countries have as much, or more, environmental concern as do those of developed countries (Mostafa 2012). Perhaps the resolution of these apparently contradictory findings is that citizens of poorer countries are more concerned about local environmental problems because the problems are salient to them, whereas citizens of wealthy countries are more concerned about global problems because they can afford a more cosmopolitan perspective, given that they have fewer local environmental problems.

The hypothesis that environmental concern is rooted in religious beliefs and values has often been debated. One view within the Judeo-Christian religious tradition is that the Earth was created for people to master and use; the associated implicit belief is that humans are separate from nature, and that belief enables people to exploit nature's resources for their own benefit. However, others within the Judeo-Christian tradition hold stewardship of nature as an ethic. The stewardship ethic also applies in principle for Muslims; humans, according to Islam, are merely a part of the holistic system of life created by Allah, and although humans have the right to survive, they have been given the role of responsible leadership on earth.

Empirical research on this issue remains divided. One recent study found that no differences exist between Christians and non-Christians in the perception of general environmental threats and that Christians judged the threat of genetically modified crops to be more serious than did non-Christians (Biel & Nilsson 2005). Another study found that Islamic religious teachings are associated with proenvironmental behavior, thus lending support to the theory that an Islamic environmental ethic exists (Rice 2006).

People who live in rural areas experience the environment in very different ways from their urban counterparts; doubtless most inhabitants of rural areas are more in touch with nature. Does that result in greater or lesser environmental concern or behavior? Again, the results are mixed. In China, residents of larger cities are more likely to engage in proenvironmental behaviors than are residents of smaller cities (Chen et al. 2011). However, students in the United Kingdom who had grown up in rural areas report more positive orientations toward the natural environment than do urban-raised students (Hinds & Sparks 2008). The anthropocentric beliefs of rural residents seem consistent with their more direct use of natural resources for human ends.

Finally, and perhaps less intuitive than some of the results discussed above, is the finding that individuals with a stronger sense of identification with a group report engaging in more proenvironmental behavior (Dono et al. 2010). However, this depends on which sort of group one identifies with.

## Measures

Many tools for measuring environmental attitudes have been proposed. One compilation includes 14 such measures (Gifford 2007a, chapter 3). Perhaps the most comprehensive recent measure, built from numerous existing measures, is the Environmental Attitudes Inventory (Milfont & Duckitt 2010). The Environmental Attitudes Inventory is a multidimensional instrument that captures the hierarchical nature of environmental attitudes; it is composed of 12 scales that appear to represent most or all of the main constructs tapped by earlier measures. These include enjoyment of nature, support for interventionist conservation policies, intentions of personal environmental activism, support for conservationism if it provides human benefits, confidence that science and technology can solve environmental problems, fear of ecological collapse, support for using nature for development, self-report of personal conservation behaviors, beliefs that humans are meant to dominate nature, beliefs that humans should use nature, beliefs that nature is valuable for its own sake, and support for population control policies.

Another instrument recently created with the specific purpose of combining and building upon earlier measures is the New Human Interdependence Paradigm scale (Corral-Verdugo et al. 2008). However, the most widely used measure so far is the revised New Ecological Paradigm scale (Dunlap et al. 2000).

## MAJOR AND MACRO THEORETICAL APPROACHES

At least seven major theoretical approaches have guided work by environmental psychologists across their range of interests, from the built environment to the natural environment and pro-environmental behavior (Gifford 2007a). These include (a) stimulation theories, which conceptualize the physical environment as a crucial source of sensory information; (b) control theories that emphasize the importance of an individual's real, perceived, or desired control over stimulation; (c) ecological psychology, which emphasizes a dynamic-system approach to person-environment relations; (d) integral approaches such as interactionism, transactionalism, and organismic theory that attempt to describe the full, complex interrelationship of persons and settings; (e) operant approaches, which adopt a direct problem-solving approach that employs behavior modification techniques; (f) environment-centered theories, such as the spiritual-instrumental model and ecopsychology, which emphasize the environment's own welfare; and (g) theories that include such elements as goals, norms, intentions, values, and attitudes. Most of the above might be called macro approaches; the last are more specific meso-scale approaches.

Within the zone of proenvironmental attitudes and behavior, recent theories vary in scope, from the meso to the macro. One such macro-scale proposal is the general model of social dilemmas (Gifford 2006, 2008b). It posits that impactful behavior choices made by individuals (including those who head organizations as well as the average citizen) often have a geophysical influence (e.g., weather, extent and accessibility of the resource), occur within a regulatory context (e.g., policies and pricing), and are influenced by technological developments (e.g., new drilling methods, factory fishing boats) as well as psychological elements (motivations, cognitions, norms, interpersonal influences, and decision-making strategies). The general model of social dilemmas includes downstream consequences of these decisions for (a) the decision maker (and significant others), (b) the community, and (c) the environment. Finally, the model recognizes that these outcomes feed their consequences back upstream, influencing the regulatory context (in particular) but also sometimes influencing the other upstream factors—geophysical (such as climate impacts), technological, and social factors—in a continuing dynamic cycle of influence. However inclusive it might be, such a theory is difficult to test, at least as a whole (although its individual links can and should be tested).

## MESO THEORIES

With fewer constructs, meso-scale theories are far easier to investigate. Among these are the theory of planned behavior (TPB) (Ajzen 2005), VBN theory (Stern 2000), and goal-framing theory (Lindenberg & Steg 2007). Other, less-specified, notions include the reasonable person model (Kaplan & Kaplan 2009) and the human interdependence paradigm (Gärling et al. 2002).

These meso-scale theories propose attractively parsimonious accounts of behavior and therefore are eminently investigable (e.g., Kaiser & Gutscher 2003). The TPB, for example, proposes that attitudes toward a behavior, subjective norms, and perceived behavioral control predict behavioral intention, which predicts actual behavior. However, many studies have identified personal and social factors that enhance the TPB's predictive validity, including habit, descriptive norms, self-identity, and place attachment (e.g., Bamberg & Schmidt 2003, Chen & Tung 2010, Fielding

et al. 2008, Heath & Gifford 2002, Hinds & Sparks 2008, Raymond et al. 2011, Whitmarsh & O'Neill 2010). Structural inadequacies, such as a lack of availability of recycling facilities<sup>3</sup> or public transport, also constrain proenvironmental behavior (e.g., Heath & Gifford 2002, Steg & Gifford 2005). Assuming these factors are useful additions to the understanding and prediction of proenvironmental behavior, they tend to push theoretical thinking back toward the macro scale.

The VBN theory (Stern 2000) predicts, in a chain-like sequence, that one's values (altruistic, biocentric, and not egocentric) cause one to espouse an ecological worldview, which leads one to believe that adverse consequences to the environment can occur, which increases one's perceived ability to reduce threats to the environment, which leads to a sense of obligation to act in a proenvironmental manner, which culminates in four kinds of proenvironmental behavior (activism such as participating in public demonstrations, nonactivist behaviors in the public sphere such as letter writing, private-sphere behaviors such as recycling at home, and behaviors within organizations such as lobbying for double-sided printing). This sequence has been supported for climate-relevant behaviors such as the acceptability of household energy-saving policies (Steg et al. 2005), and parts of it have been verified in terms of values and awareness of consequences (Hansla et al. 2008). That is, researchers have shown that each link in VBN's chain of hypothesized constructs is indeed predicted by its predecessor.

Goal-framing theory (Lindenberg & Steg 2007) posits that three types of goals influence the way people process information and act upon it: hedonic (pleasure oriented), gain (self-interest), and normative (what others are thought to be doing). At any given time, one goal is presumed to be focal while the others are in the background and might increase or decrease the strength of the focal goal.

The reasonable person model (Kaplan & Kaplan 2009) proposes that understanding people's informational needs in particular settings has the potential to make it easier for people to help themselves. People are unreasonable when a place does not support their needs for information and are more likely to be reasonable in environments that do.

The human interdependence paradigm (Gärling et al. 2002) emphasizes the tension between the drive for human development, which tends to require unsustainable use of resources, and concern for the environment, which usually implies preservationist or at least sustainable use of resources. This paradigm reflects the central conflict in commons dilemmas between self-interest and that of a common resource pool, which has been the subject of dozens of studies (cf. Biel et al. 2008, Kopelman et al. 2002) that often have used microworld simulations (e.g., Gifford & Gifford 2000) to investigate the 30 or more influences on cooperation in the commons (Gifford 2007a, chapter 14).

Each of these meso theories certainly includes a part of the truth about proenvironmental behavior, and their relatively few components allow for convenient testing. However, the price of simplicity is incompleteness, and excluded influences undoubtedly play a role.<sup>4</sup>

## **PROENVIRONMENTAL BEHAVIOR IS STILL INSUFFICIENT: WHY?**

The need for more proenvironmental behavior is very widely recognized, but in most built and natural places too little of it is occurring to ensure sustainability. In common dilemma terms, our

<sup>3</sup>One disturbing recent finding deserves further research attention. When participants in two different contexts had structural facilities available for recycling, they used more paper than when facilities were not available (Catlin & Wang 2013).

<sup>4</sup>See Footnote 2.

species is “defecting,” that is, extracting resources faster than they can replenish. The responsibility for this can be placed with the individuals, households, and organizations whose actions are contributing to the problem, but environmental psychology as a science can support those whose job is to create more effective policy by developing improved theory, focusing on the barriers experienced by people, and conducting studies that emphasize behavior change over self-reports.

### **The Main Theories Are Too Exclusive or Too Inclusive**

The meso-scale theories cover important explanatory territory, but they do not overcome the problem that their predictive strength, although often of moderate magnitude, usually does not account for the bulk of the variance in proenvironmental concern or behavior. A further related and longstanding problem is the gap between stated intentions and objective behavior, although some have argued that the attitude-behavior gap is an empirical chimera that does not exist at all, if the phenomenon is considered from Donald Campbell’s (1963) perspective that verbal statements and overt acts both stem from one root behavioral disposition (Kaiser et al. 2010). If the attitude-behavior gap does exist, as most believe it does, it probably occurs in part from the dampening influence of structural barriers (one cannot take public transport if it does not exist in one’s community) and psychological barriers.

A problem with macro-scale theories is that although they are inclusive about the drivers of human behavior, they are difficult to investigate as a whole through conventional empirical study. They do, however, serve as big-picture reminders of the human and nonhuman antecedents and consequences of environment-impactful behavior and therefore can assist policy makers in understanding more about the antecedents and consequences of their policies.

In sum, one reason that proenvironmental behavior remains a challenge may be that meso theories are too narrow for policy makers to effectively utilize and macro theories are too broad for scientists to test. If so, one goal for environmental psychology should be to develop an intermediate-sized theory that incorporates most of the impactful drivers of behavior but remains manageable in size and parsimonious.

### **Psychological Barriers to Proenvironmental Behavior**

Researchers have begun to identify and categorize psychological barriers to proenvironmental behavior (e.g., Gifford 2008a, Lorenzoni et al. 2007). The most exhaustive account of psychological barriers to behavior change organizes about 30 separate “dragons of inaction” into seven conceptual categories: limited cognition, ideologies and worldviews, social influences, sunk costs, discredence, perceived risks, and limited behavior, that is, engaging in a few low-impact actions and rationalizing that contribution to be sufficient (Gifford 2011). These barriers certainly matter, and they present an important research challenge. Whose proenvironmental behavior is constrained by which barriers, and how can they best be overcome?

### **Self-Reports Do Not Change Behavior**

Another problem that impedes understanding of objective proenvironmental behavior is researchers’ reliance on self-reports. After all, to be blunt, not concern for the environment, not felt responsibility, not subjective norms, not attitude toward the behavior, not goals, and not even behavioral intentions solve environmental problems. Only actual behavior will bring a resolution.

Even self-reported proenvironmental behavior does not match actual proenvironmental behavior particularly well. A recent meta-analysis (C. Kormos & R. Gifford, manuscript submitted) found the association between self-reported and actual proenvironmental behavior to be about  $r = 0.45$ , which is to say that these two constructs, which purport to cover the same territory,

share only about 20% of their variance. This gap can be caused in part by imperfect memory, social desirability bias, and the lack of opportunity to observe others' behavior (e.g., in reporting household energy use, the reporter will not always have observed the actions of others in the household). Attempts have been made to overcome this problem by using Rasch models (Kaiser et al. 2007), although the proposed solution itself depends on self-reports of one's past behavior, which may not escape the problem.

### Four Ways Forward

How might these problems be overcome? First, because macro contextual factors such as climate, geography, technology, economic trends, and the political slant of one's government often constrain or encourage proenvironmental behavior, they should be considered more often. Environmental psychologists should work with experts in technical and other social science fields; such teams will have a better grasp on the big picture. Second, increased understanding of how the psychological barriers operate is essential. Third, improved measurement of self-reports is needed, and self-reports should only be relied upon only when objective behavior measurements cannot be made. Fourth, more meta-analyses that examine the relative potency of the many drivers of proenvironmental behavior are needed; each individual study is useful but almost always is limited at least in generalizability resulting from relatively small or localized samples. At least in principle, meta-analyses reveal something closer to the truth of relations between constructs.

Fortunately, four pertinent meta-analyses have been conducted. The first considered 315 relevant studies and concluded that proenvironmental behavior was most strongly predicted by knowledge of the issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, and sense of responsibility (Hines et al. 1986–1987). A second meta-analysis, performed 20 years later, confirmed those results for the most part but also concluded that the intention to engage in proenvironmental behavior mediates the impact of the other personal and social influences, that personal norms influence this intention, and that problem awareness is a significant indirect influence on proenvironmental intention; the impact of problem awareness appears to be mediated by moral and social norms, guilt, and attribution processes (Bamberg & Möser 2007).

A third meta-analysis focused on individuals' commitment to action; the findings confirmed that commitment can be effective but called for further examination of the reasons that it works (Lokhorst et al. 2013). A fourth reported on the relative value of different treatments or interventions for promoting proenvironmental behavior; it concluded that the most effective approaches employed cognitive dissonance, goal setting, social modeling, and prompts, although as might be expected, different treatments are more effective for different proenvironmental behaviors, and combined approaches often work better than single approaches (Osbaldiston & Schott 2012).

In sum, an important goal for environmental psychology is to find a theoretical framework that is more parsimonious than the macro approaches but more inclusive and therefore more predictive of environmental behavior than the meso approaches. This model should include more contextual (extrapsychological) factors, attend to the psychological barriers between concern and action, and make greater use of objective measures of behavior. Given the bewildering plethora of influences on environmental concern, intentions, and behavior, more cooperation with other experts is called for, and more meta-analyses are needed to clarify connections among the constructs and thereby to contribute to a more viable and powerful account of proenvironmental behavior.

## CLIMATE CHANGE AND HUMAN BEHAVIOR

Climate change is not new; the earth's temperature and climate have varied considerably over millions of years. However, in the past century, greenhouse gas (GHG)-emitting human activities

have caused the Earth's temperature to rise higher than it has been since civilization developed 10,000 years ago (Intergov. Panel Climate Change 2007). Worldwide GHG emissions continue to rise despite official efforts to raise awareness and many citizens' efforts to change. Further climate change probably will result not only in higher maximum temperatures (and therefore more heat-related deaths), but also in more frequent extreme weather events, a rise in sea levels, an increase in widespread infectious diseases, and decreases in crop yields and water quality. Climate change matters.

Current climate change is primarily driven by GHG-emitting human behaviors and therefore may be largely mitigated by changes to human behavior. However, human behavior is the least understood aspect of the climate change system (Intergov. Panel Climate Change 2007). Thus, unfortunately, the main cause of the problem is its least understood element. Understanding behavior at the psychological level of analysis therefore is essential, given that the cumulative impact of individuals' decisions and behaviors is the key factor driving climate change (Gifford et al. 2011a).

Fortunately, some environmental psychologists have been working on the problem for more than 30 years (Fischhoff & Furby 1983); they have learned much about different behaviors with different impacts and are actively developing interventions (Gifford 2008a, Spence et al. 2008). The pace of research has accelerated recently, including the American Psychological Association (2010) task force report and subsequent special issue (Swim et al. 2011). At the same time, recognition that the wider political and social context must be considered when interpreting the meaning of attitudes in places with different dominant political ideologies (Räthzel & Uzzell 2009) can and should be integrated with the climate change models and efforts by other disciplines.

## Mitigative and Adaptive Responses

Human responses to climate change can take two basic approaches. Mitigation refers to proactive efforts to prevent further climate change, and adaptation refers to reactive responses to events caused by climate change. Both can take many forms, but an important distinction in the latter is that for nonpsychologists, adaptation usually means structural changes, such as building seawalls, whereas for psychologists, adaptation means the more personal responses such as cognitions, emotions, decision processes, and coping strategies (e.g., Reser & Swim 2011).

As the threat of climate change impacts becomes urgent, a focus on psychological adaptation is needed. Apart from quite salient impacts that are already evident in some northern regions, few opportunities are yet available for studying psychological adaptation to clear and present impacts of climate change. Events that quite probably are climate related include the huge storm that struck the New York and New Jersey areas in October 2012. Until more climate-related events occur, research on individual and collective responses to earlier weather-related disasters such as Hurricane Katrina (e.g., Adeola 2009) can be informative.

Individuals may prepare for the expected increase in climate-related threats such as more extreme weather events and sea-level rise in both behavioral and emotional ways. The former involves precautions to prevent damage and injury; the latter refers to intraindividual awareness, anticipation, and readiness, reflected in one's capacity to psychologically respond in an emergency. Individuals, households, and communities may or may not have resilience, that is, the "inner strengths and coping resources for necessary adaptation to situational demands" (Am. Psychol. Assoc. 2010, p. 117), or experience vulnerability, the extent to which individuals and communities are at risk and are unable to cope with the adverse impacts of climate change (e.g., Smit & Wandel 2006). The more resilience and the less vulnerability that individuals and communities have, the greater their adaptive capacity. Psychology can help with both forms of adaptation; the former by helping to build public understanding and support for necessary infrastructure improvements,



and the latter through its expertise in ameliorating stress and facilitating coping (Swim et al. 2011).

### **High- Versus Low-Impact Mitigation Behaviors**

Distinguishing among environment-relevant behaviors is important because these behaviors can have different psychological and contextual determinants (Stern 2000) and because they vary in environmental impact. Some actions (e.g., recycling) that have relatively little environmental impact tend to be influenced by attitudes, personal norms, and values. In contrast, high-impact behaviors (e.g., driving) tend to be more important to people and are entrenched in habit; the behaviors more often are primarily driven by contextual factors (e.g., commuting distance) and therefore are more difficult to change (Gardner & Stern 2002). Low-impact behaviors have received more attention to date, but given finite resources, high-impact behaviors should receive more attention (Gardner & Stern 2008).

One hope is that people will gravitate from low- to high-impact behaviors, a progression called the spillover effect, via low-impact catalyst behaviors such as recycling. Some evidence for spillover exists (e.g., Thøgersen & Ölander 2003, Whitmarsh & O'Neill 2010), but sometimes action in one behavioral domain actually leads to less action in others so that no net positive effect occurs (Herring & Sorrell 2008).

### **Impact-Oriented Versus Intent-Oriented Mitigation Behaviors**

Whether a behavior is high or low in impact differs from whether a person intends to act pro-environmentally or not. Impact refers to an action's objective impact on the climate; intent refers to a person's intention to act in a way that will have a positive impact on the environment or climate. The two may coincide ("I intend to help by engaging in a high-impact behavior by moving to a plant-based diet"; food choices objectively make an important difference in GHG emissions) or not ("I intend to help by returning plastic bags to the grocery store"; recycling plastic bags, although helpful, has a much less important impact). Intent-oriented environmental actions probably are driven more by one's attitudes, whereas impact-oriented behaviors probably are driven more by motivations, contextual influences (e.g., pricing), and demographic variables. For example, actual household energy use (an impact-oriented behavior) is most strongly related to nonattitude factors such as income, household size, age, health, and convenience (Gatersleben et al. 2002).

In a UK survey, the energy conservation levels of respondents who said they engaged in behaviors to help mitigate climate change surprisingly did not significantly differ from those who did not report engaging in such behaviors (Whitmarsh 2009). Furthermore, a marked discrepancy was observed between the percentage of respondents who stated that they engaged in an action specifically out of concern about climate change (31%) and the percentage who reported actually engaging in energy conservation behavior (96%) (Whitmarsh 2009).

### **Curtailment Versus Efficiency Behaviors**

Curtailment behaviors reduce consumption (e.g., turning off a light); efficiency behaviors are one-time choices to adopt an efficient technology (e.g., installing more insulation or solar panels). Curtailment behaviors have a large potential impact; one study suggests that in households that have not already taken any of 27 curtailment actions in their transport and in-home behaviors, cumulative energy savings could exceed 60% of energy used (Gardner & Stern 2008). That being said, efficiency behaviors may have greater energy-saving potential (Gardner & Stern 2002) mainly



because they do not require consistent, long-term maintenance of the target behavior (Lehman & Geller 2004): Once the change is made, the savings are automatic or behavior free. However, efficiency behaviors may be more subject to losses caused by the rebound effect, the tendency to overspend energy as a psychological compensation for making a climate-virtuous choice.

## INTERVENTION SCIENCE

All the knowledge so far gained can be used in another of environmental psychology's key roles: the development, evaluation, and implementation of interventions that target direct and indirect sustainability and climate-impactful behaviors. Intervention science is not as simple as turning a switch; in order to accomplish its ultimate goal of behavior change, it must take the social, political, economic, and cultural context into account; help to design climate-related policies and regulations; create effective public messages; predict public reactions to proposed policies; provide explanations for the public acceptance or rejection of new technologies, and comprehend how risks associated with climate change are understood. Interventions matter.

In order to be effective, intervention scientists should make several careful decisions in their work plans (e.g., Steg & Vlek 2009). They should carefully consider the behavior in question. Targeted behaviors should have large and negative demonstrated impacts but be amenable to change. The demographics of the key group for that behavior must be taken into account. The type of intervention (see below) must be carefully selected. Resources must be used efficiently. Psychologically important aspects of the targeted behaviors should be considered, such as perceived costs and benefits, norms and habits, and emotional and moral dimensions. The expected outcomes also need to be considered: These can include change in the behavior itself, improvements to the environment, and changes to the person's own quality of life.

### Informational and Communication Strategies

Many interventions focus mainly on informational communication. Although this approach is relatively inexpensive, it has not been very effective in the ultimate goal of behavior change (Abrahamse et al. 2005). However, communication does at least set the stage for action, and without it there would not be the widespread awareness of climate change that currently exists. Nevertheless, communication about climate change is challenging because for most people the phenomenon is not immediately sensed, which naturally leads them to question its existence (cf. Moser 2010).

However, certain communication strategies work better than others in turning awareness into the willingness or intention to act. For example, informing the public that scientists aim to educate people about the consequences of climate change, as opposed to suggesting that people take a particular course of action, results in stronger willingness to act (Rabinovich et al. 2012). Messages framed with motivational or empowering statements (e.g., "We help solve climate change when we take transit, compost, or buy green energy") produce greater perceived competence to deal with climate change, climate change engagement, and some climate-relevant behavioral intentions than do sacrifice messages (e.g., "I am going to have to get used to driving less, turning off the lights, and turning down the heat") (Gifford & Comeau 2011).

### Antecedent Versus Consequence Strategies

Interventions that aim to change the drivers of a selected behavior before it is performed employ antecedent strategies. The most common antecedent strategy is the information campaign, although the "information deficit" model on which such campaigns are based (that people simply

need to become more aware or possess more facts) has been widely criticized (e.g., Kolmuss & Agyeman 2002). A second antecedent strategy is modeling, in which a key player enacts the desired behavior so as to influence proximate others to follow suit (e.g., Sussman et al. 2013). A third such strategy is to obtain behavioral commitments from individuals or organizations (e.g., Baca-Motes et al. 2013). A fourth antecedent strategy uses prompts to change behavior, for example, by posting a sign at an exit door directing individuals to turn off unused lights (e.g., Sussman & Gifford 2012).

Consequence strategies aim to change behavior after it has occurred in order to influence its future occurrence. This family of strategies, including giving people feedback (e.g., new desktop wireless devices tell householders how much energy they are using at the moment), rewards (e.g., rebates for saving energy), and punishment (e.g., fines or even jail for overfishing or poaching), aims to influence the selected behavior after its performance.

### Informational Versus Structural Strategies

The goal of informational strategies is to change the (internal) psychological precursors (e.g., attitudes, knowledge, and motivation) of proenvironmental behavior. The goal of structural strategies is to change the (external) physical, technical, legal, or pricing circumstances surrounding the proenvironmental behavior.

Informational approaches appear to be best suited for easier (i.e., low cost in terms of effort, money, or social disapproval) behaviors with few barriers (Steg & Vlek 2009). They are somewhat effective for (a) prompting and eliciting proenvironmental behavioral commitments (Abrahamse et al. 2005); (b) social marketing, in which an intervention is carefully tailored to the needs and barriers of a particular group (Abrahamse et al. 2007, McKenzie-Mohr 2000, Thøgersen 2007); (c) implementation intention strategies, which ask people not only to commit to some behavior change but also how they plan to do so (see, e.g., Bamberg 2002); and (d) the provision of descriptive norm information, that is, telling people what other proximate individuals, such as neighbors or other hotel guests, are doing for the environment (e.g., Schultz et al. 2007). They may also be effective in campaigns to increase public acceptance of structural strategies, such as policies designed to reduce car use (Gärling & Schuitema 2007).

Structural strategies seem to be more effective for changing less-convenient and higher-cost behaviors (Steg & Vlek 2009), often so that the incentives (or disincentives) render the behavior more (or less) attractive (Thøgersen 2005). Among the main structural strategies (physical design changes that make the desired behavior easier or more obvious, pricing, rewards, and punishments), rewards often are most effective (Geller 2002). However, reward-based structural strategies sometimes last only as long as the rewards are offered, and often they are only effective in conjunction with a person's existing behavior-change goals (Gärling & Loukopoulos 2007). Like efficiency behaviors, to which they are similar, physical forms of structural changes, such as putting a recycling bin in every office instead of down the hall, have the advantage of changing behavior in a more permanent way.

Policy versions of structural strategies for increasing proenvironmental behavior (especially price increases or restrictive changes such as a reduced speed limit) are more acceptable when they are perceived to be fair, when they are effective, and when they do not seriously infringe on individual freedom. They are more acceptable to individuals with strong environmental values, those who are more aware of the problem, and those who feel morally obligated to ease the problem. Policies that can make proenvironmental behavior seem more attractive are likely to be evaluated as more effective and acceptable. Finally, policies that promote the adoption of energy-efficient equipment are preferred to those that seek to reduce the use of existing equipment (Gifford et al. 2011b).

The most effective interventions are tailored to the individual (or household) and to the specific behavior, take into account the particular barriers, and employ mixed strategies. Combinations of strategies, such as implementing information, feedback, and social interaction in a group often are the most effective and durable. In implementing one such combination, 19 of 38 household behaviors in the Netherlands were changed, and the changes were maintained or increased two years later (e.g., Staats et al. 2004). In another Dutch study, a combination of tailored information, goal setting, and tailored feedback was used to encourage households to reduce their gas, electricity, and fuel use (Abrahamse et al. 2007). After five months, intervention households used 5.1% less energy, whereas control households used 0.7% more.

## **NATURE: THE CAPRICIOUS RESTORATIVE AGENT**

Nature matters. Like the Hindu god Shiva, the natural environment both gives and takes away. It has mainly been studied by environmental psychologists as a force for restoring depleted cognitive capacities (e.g., Kaplan 1995, Ulrich 1984), but its destructive power also compels the study of human coping, adaptation, and resilience (e.g., Adeola 2009).

To a lesser extent, nature has been considered as a complex environment to which humans have a variety of hard-wired orientations (e.g., Ornstein & Ehrlich 2000), as a focus of aesthetic appreciation and inspiration (e.g., Williams & Harvey 2001), as the setting for child development (e.g., Korpela et al. 2002), as our basic life-support system that absolutely requires conservation (e.g., Schmuck & Schultz 2002), and as a fount of design ideas (e.g., Joye 2007). Consideration of the natural environment in planning and design is important for human health, well-being, and restoration (e.g., Hartig & Staats 2003).

### **Measuring the Connection**

Seven tools for measuring the human-nature relation have been developed recently. Five focus on nature connectedness or relatedness (Davis et al. 2009, Dutcher et al. 2007, Mayer & Frantz 2004, Nisbet et al. 2009), including one designed to measure children's connections with nature (Cheng & Monroe 2012). The sixth employs a behavior-based measure of the need for recovery among office workers (Smolders et al. 2012). Another was developed to measure six forms of incompatibility, that is, a poor fit between what one would like to do and what is actually happening in a setting, which leads to mental fatigue (and thus a need for restoration). The six forms of incompatibility are being distracted, being in need of information, being on duty, deceiving others, having difficulty, and being in danger (Herzog et al. 2011).

### **Causes and Consequences of the Connection**

Perhaps some people can be connected to both self and nature, but the evidence suggests that this is not typical. Implicit connections to nature are negatively correlated with egoistic concerns (Schultz et al. 2004). When objective self-awareness is heightened in people with lower levels of environmental values, their connection to nature declines (Frantz et al. 2005). In contrast, principled moral reasoning, the most advanced level of moral development, correlates positively with ecocentrism, that is, belief in the intrinsic importance of nature (Karpiak & Baril 2008).

Not surprisingly, being psychologically connected to nature is associated with proenvironmental concern and behavior (Davis et al. 2009, Dutcher et al. 2007). Living near greenery is associated with less reported crime (Kuo & Sullivan 2001), and more social activity occurs in green spaces than in spaces that are less green (Sullivan et al. 2004).

## Nature Restores

Abundant evidence favors the straightforward proposition that nature is restorative (Kaplan 1995). Nature improves cognitive functioning, productivity, mood, vitality, connectivity with nature, and speed of recovery in hospital, and it reduces stress and anger. These trends hold for actually being in nature (e.g., Berman et al. 2008), for merely having some nature (e.g., plants) in a room (e.g., Raanaas et al. 2011), for seeing a poster image of nature in one's room or office—at least for males (Kweon et al. 2008), or even for seeing nature through one's window (Ulrich 1984). More-fatigued people report greater restoration than less-fatigued people from walking in a forest (Hartig & Staats 2006). Green spaces improve the functioning of children with attention deficit disorder (Taylor et al. 2001).

In some ways, people seem to realize these effects and to expect even more of them. When asked why they engage in nature activities, individuals report doing so for 10 reasons: They believe that nature activities will facilitate a sense of cognitive freedom, allow them to simply experience nature, enhance their ecosystem connectedness, escape from stress, offer a physical challenge, foster personal growth, provide an opportunity to guide others, heighten their sense of self-control, renew social connections, and improve their health (Gifford 2007a).

People rate murals of nature scenes as more restorative than murals of indoor scenes, particularly nature scenes that include water (Felsten 2009). At the same time, even as they report being happier after a walk in nature than after a walk indoors, they underestimate the hedonic benefit they received (Nisbet & Zelenski 2011). This suggests that support for the conservation of nature, and for spending time in it, would be greater if people realized that they benefit from it more than they think.

## Restoration Is Not Limited to Nature

However, restoration appears to be achievable in nonnatural settings, too (Scopelliti & Giuliani 2004). For example, visiting a house of worship seems to have many of the same benefits (e.g., Herzog et al. 2010), and an indoor simulation of a natural setting may have many of the same stress-reducing properties as the real thing (Kjellgren & Buhrkall 2010). The role of water is intriguing as a kind of cross-modal influence: Scenes that include water, whether in natural or built settings, elicit stronger ratings of restorativeness than do scenes without water in them (White et al. 2010).

## Nature Is Not Always Nice

Nature is far from restorative when it delivers storms, wildfires, temperature extremes, earthquakes, tsunamis, volcanic eruptions, and meteors. It is not restorative or perceived as such when it harbors potential danger, such as a possible stalker (Herzog & Rector 2009) or other threats (van den Berg & ter Heijne 2005).

Given nature's destructive side, environmental psychologists have investigated factors that influence disaster preparedness (e.g., Mishra et al. 2010); the immediate response to disasters, such as prior experience or social connections (e.g., Adeola 2009); and the longer-term consequences of disasters (e.g., Caia et al. 2010).

## PLACE ATTACHMENT AND IDENTITY

Place attachment and identity matter. Becoming bonded to a place is psychologically important in itself, but it also has implications for important external issues, including sustainability and climate

change. The psychology of place, in a variety of guises, has been a very active topic recently in environmental psychology. Some efforts have focused on defining it, some on discovering its correlates, some on its antecedents, and some on its consequences. Phenomenologist approaches emphasize the meaning of place (e.g., Seamon 2012). Theory in the area is developing but remains uncrystallized (Lewicka 2011).

Place attachment has most often been described as an emotional connection to a place (e.g., Brown et al. 2003). For the most part, it is portrayed as a multifaceted concept that characterizes the bonding between individuals and their important places (e.g., Giuliani 2003). Obviously, place attachment is rarely attained instantly; residents need to spend time in a place, to hear stories, or to be part of a spiritual quest centered there (Hay 1998). One grows attached to settings where memorable or important events occurred (Manzo 2005).

Place identity is most often defined in terms of an overlap with one's sense of self. It develops when individuals experience similarities between self and place and incorporate cognitions about the physical environment (memories, thoughts, values, preferences, and categorizations) into their self-definitions. It has been viewed as stemming from the development of three processes: congruity between self and place, fit with the environment, and self-extension (Droseltis & Vignoles 2010).

One view of the relation between place attachment and place identity is that the former evolves, with time, into the latter (Clayton 2003). Consistent with this idea, natives of a place tend to have both place attachment and place identity, but people who move to a new place tend to report more place attachment than place identity (Hernandez et al. 2007), which suggests that attachment precedes identity.

A few other constructs bear some similarity to place attachment and place identity: sense of community, place dependence, and environmental identity. Some suggest that sense of place encompasses the subconcepts of place identity, place attachment, and place dependence (e.g., Jorgensen & Stedman 2001) or that it includes ancestral ties, feeling like an insider, and a desire to stay in the place (Hay 1998).

## Person, Place, and Process

One approach to defining place attachment is to conceptualize it as having three primary dimensions: persons, places, and processes (Scannell & Gifford 2010b). In terms of persons, some researchers show that attachment to a place means attachment to the persons who live there and the social interactions that the place affords (e.g., Hidalgo & Hernández 2001).

Second, place attachment obviously is also about the physical place. The types of places that individuals find meaningful include a broad range of physical settings, from built environments such as houses, streets, buildings, and nonresidential indoor settings such as a retail store (Ng 2003), to natural environments such as lakes, parks, trails, forests, and mountains (Manzo 2003, 2005), or a place's climate (Knez 2005). Certain neighborhood forms, such as New Urbanism (characterized by narrow streets, houses close together on small lots with narrow setbacks, often with picket fences and front porches, often facing a central common green, with local amenities), seem to promote more of a sense of community than others, such as the conventional suburban form (characterized by wide streets, larger lots, and fewer porches, picket fences, or proximate amenities) (e.g., Kim & Kaplan 2004, Pendola & Gen 2008).

Place attachment can exist at multiple spatial levels. One might be attached to a chair, a room, a residence, a neighborhood, a park, a town or city, a region, a state or province, a nation, or the world. The strength of attachment differs depending on the level of analysis: Greater place attachment emerged for the home and city levels than for the middle-scale neighborhood level

(Hidalgo & Hernández 2001, Lewicka 2010). The social dimension of place attachment (feeling attached to the people in the place) may be stronger than the physical dimension (feeling attached to the built and natural elements of the place), although physical and social attachments both influenced the overall bond (Lewicka 2010).

Place attachment may be civic or natural. Civic place attachment is focused on one's community (e.g., Vorkinn & Riese 2001); natural place attachment is focused on nature (Scannell & Gifford 2010a). Civic and natural place attachments can, and do, predict outcomes differently, which reinforces the notion that they are distinct constructs (Scannell & Gifford 2010a). The identity analog of the relation to nature is environmental identity, the inclusion of nature in one's self-concept (Clayton 2003).

Other researchers focus on the meaning that a place has for a person. The meaning-mediated model of place attachment (Stedman 2003) proposes that individuals do not become directly attached to the physical features of a place but rather to the meaning that those features represent. In this view, a developed area may symbolize community or an underdeveloped area may symbolize wilderness. The physical aspects are said to constrain the possible meanings a place may adopt and, therefore, physically based place attachment rests in these symbolic meanings.

Places also become meaningful from personally important experiences, such as place-based revelations (e.g., religious epiphanies in a sacred place) or secular realizations of connectedness to nature in a wilderness, milestones (e.g., where I first met my lover), or experiences of personal growth: "[I]t is not simply the places themselves that are significant, but rather what can be called 'experience-in-place' that creates meaning" (Manzo 2005, p. 74). Place attachment seems to develop from experiences and emotional bonds first established with a place in childhood (Morgan 2010).

Place attachment can be faith based. Through religion, the meanings of certain places become elevated to the status of sacred (Mazumdar & Mazumdar 2004). Revered places such as Mecca or Jerusalem or, on a smaller scale, churches, temples, shrines, burial sites, or sacred places, are central to many religions, and their spiritual meanings are shared among worshippers.

Third, place attachment is about the processes it involves. Five processes can be distinguished: Place-related distinctiveness is about knowing one is from *A*, not *B*; place-referent continuity is about perceived similarity between one's current place and an earlier place to which one was attached, often one's childhood home; place-congruent continuity refers to the similarity of the current place's climate with that of one's childhood; place-related self-esteem is about feeling good in a place, or proud to be living there; and place-related self-efficacy occurs if the place supplies all or most of one's needs (Knez 2005).

## The Functions of Place Attachment

Presumably, place attachment develops because it serves one or more functions, but what might those be? One is to provide a sense of security (e.g., Giuliani 2003). Attachment to one's neighborhood has been associated with fewer perceived incivilities (e.g., drug dealing, gang activity, and traffic) and less fear of crime (Brown et al. 2003). A second function is to facilitate a sense of belongingness: the feeling that one is in the right place, a place where one fits in (Giuliani 2003). Third, place attachment provides a sense of continuity (Scannell & Gifford 2010a). Fourth, it fosters restoration: In studies of children's favorite places, place-visit experiences tend to have a restorative theme (Korpela et al. 2002). Restoration within a favorite place appears to improve self-regulatory processes by providing a secure, comfortable environment conducive to self-reflection, problem solving, and stress relief. Fifth, attachment facilitates the successful pursuit of one's goals (e.g., Kyle et al. 2004b).



## How Place Matters

Place attachment influences attitudes and behavior beyond itself. For example, it seems to lead to increased civic activity, at least as long as one also has neighborhood social ties (Lewicka 2005). Individuals with greater place attachment tend to be more prepared for floods (Mishra et al. 2010).

Although place attachment clearly matters, it does not always do so in supportive or positive ways (e.g., Brown et al. 2012). For example, Norwegian residents who were strongly attached to specific areas of a municipality tended to express more opposition to a proposed hydro power plant development, but those who were especially attached to the municipality as a whole tended to favor the development (Vorkinn & Riese 2001).

Place attachment may reduce climate change engagement if climate-positive actions appear to threaten existing place meanings, as demonstrated in a sample of UK residents who opposed proposals to build wind farms in their local area (Devine-Wright & Howes 2010). It can be associated with less, as well as more, proenvironmental behavior (e.g., Uzzell et al. 2002, Vaske & Kobrin 2001). Perhaps the resolution of this lies in the recent finding that natural place attachment appears to foster proenvironmental behavior, but civic place attachment does not (Scannell & Gifford 2013).

The physical aspects of a place may suffer if people cling to place meanings that are incompatible with place preservation or in cases where NIMBY (not in my backyard)-ism is retrogressive, that is, when it hinders desirable social goals or the normal evolution of architectural style, or positive forms of development that would accomplish these things. However, when planning incorporates or enhances elements that are central to the meaning of the place, it will be better received (e.g., Manzo & Perkins 2006).

Different forms of place relationships have different outcomes. Hikers with a greater sense of place identity viewed problems (such as crowding, litter, or noise) along a trail to be more important, but those with a greater sense of place dependence perceived problems to be less important (Kyle et al. 2004a), perhaps because these problems tended to be by-products of their own place use.

Emotional relationships with place usually are positive, but they can include fear, hatred, and ambivalence (Manzo 2005). For example, unhappy or traumatic experiences in a childhood home may well create what might be called negative place attachment. If place attachment did not exist, neither would homesickness—but it does; it causes problems for people who are forced by circumstance to leave a place to which they are attached, such as students who leave home for their education (e.g., Scopelliti & Tiberio 2010).

Finally, the loss of a place to which one is attached can result in grief and distress. Individuals who have been absent from their homes for an extended period of time often express a great desire to return to or visit the place, and at times, the return can involve much effort or cost.

## SOCIAL DESIGN

In many ways, social design is where environmental psychology began (e.g., Osmond 1957; Sommer 1969, 1983). Social design matters. According to a famous dictum, architectural form is supposed to follow function, but for too many buildings, it does not seem to (Nasar et al. 2005). Public participation in design is an important part of the design process (e.g., Churchman 2012). However, now that public participation has become a routine part of architectural practice—at least nominally—less effort has been expended on it in recent years by academic or science-oriented environmental psychologists.

Nevertheless, environmental psychology-oriented design research and thinking continues (e.g., Peponis et al. 2007). For example, which office design features foster creativity? Green



hues seem to facilitate creativity (Lichtenfeld et al. 2012). In one study, a positive social climate and a lack of environmental distractions predicted perceived creativity in offices (Stokols et al. 2002), but in another, perceived creativity was associated with more complexity and less use of cool colors, as well as views of natural environments and less use of manufactured or composite surface materials (McCoy & Evans 2002). Importantly, only the second of these studies compared perceptions of creativity with objective creative performance; greater creativity was found in an office with more of the attributes examined (views and less manufactured materials) than in an office with fewer of those features.

More broadly, which workplace features help to support the growing cadre of knowledge-oriented employees? The work engagement of employees is influenced by their aesthetic judgments and mood, which in turn are influenced by how they appraise the lighting in their workspace (Veitch et al. 2011). Lighting that employees are able to adjust for themselves at their own workstation is better than overhead lighting: Employees find their workstation more satisfying and pleasurable, the environment as a whole more satisfying, and their job more satisfying. They report being more committed to their organization, express less intention to change jobs, and report fewer and less intense symptoms of physical illness (Veitch et al. 2010).

Employees believe a workplace offers more support for collaboration when the distance from their workstation to a meeting space is shorter, the distance to a kitchen or coffee area is longer, and the percentage of floor space that is dedicated to shared services and amenities is larger (Hua et al. 2011). Research contradicts the common belief that open-plan designs produce more collaboration, even when the occupants judge the space favorably (Lansdale et al. 2011).

Others have examined which office forms are more satisfying or are associated with better health and job satisfaction (e.g., Danielsson & Bodin 2008). The lowest health status was found among employees in medium-sized and small open-plan offices; the best in cell offices (four-walls and window) and flex offices (shared open space with machines, no assigned workspaces). Workers in these office forms and in shared-room offices also had the highest job satisfaction. Lowest job satisfaction was in “combi” offices (in which employees have their own workstations, but more than 20% of their time is spent in teamwork away from one’s own desk), followed by medium-sized open-plan offices. Not surprisingly, open-plan office workers are more satisfied next to a window, especially if they also have reasonably tall partitions around them (Yildirim et al. 2007), but windows apparently do not guarantee better work performance (Wang & Boubekri 2010).

The effects of building elements on their users are rarely simple; they can and do interact with influences external to the building. For example, school buildings in poor condition matter for student achievement, but this interacts with student mobility (the frequency with which a school’s students change schools), so that poor condition plus mobility hinder achievement apart from either influence alone (Evans et al. 2010).

A challenge for social design is that the aesthetic preferences of architects and laypersons often diverge (e.g., Douglas & Gifford 2001). Some buildings are admired by laypersons but not architects, some by architects but not laypersons, some by both groups, and some by neither (Gifford et al. 2000). Researchers have begun to isolate the specific building features that result in these differences (e.g., Brown & Gifford 2001, Gifford et al. 2002). Fortunately, strategies are now being developed to find ways to reconcile the preferences of the two groups (e.g., Fawcett et al. 2008).

Social design as a construct might be enlarged to include broader societal benefits, such as constructing green buildings. To the extent that such buildings have technical benefits such as reduced energy or water use, they are valuable. A further reasonable assumption might be that green buildings are beneficial for their occupants (e.g., Joye 2007). However, what seems reasonable is not always the case: In one study of 15 buildings that varied in objective greenness, employee

engagement and attitudes did not increase with increasing greenness, and, in fact, employees' impressions of their offices were negatively correlated with increasing greenness (McCunn & Gifford 2012).

## HOME AND NEIGHBORHOOD

One's residence is the most important physical setting for most people. It can be inadequate, loved, threatening, satisfactory, restorative, a sanctuary, or gone (in the case of mobility, disaster, or homelessness). Its role in providing comfort, security, and pleasure is part of place attachment, as described previously. Many proenvironmental behavior choices are made in the home—from heating and cooling, to food choices and other purchasing decisions, to being the site from which commuting begins—and all these directly or indirectly influence sustainability and GHG emissions. The worldwide growth in cars and driving, in parallel to the growth of suburban living, is not sustainable and has very mixed effects on the quality of life (e.g., Gifford & Steg 2007). Therefore, home can be a behavioral wedge in the effort to improve overall sustainability (Stern 2008). Home matters.

Inadequate or poor-quality housing harms the physical and socioemotional health of children and adults (Evans et al. 2000, Gifford 2007c, Gifford & Lacombe 2006). Prolonged high indoor population density often impairs mental and physical health, task performance, child development, and social interaction (e.g., Evans & Saegert 2000). When low-income residents are moved to better housing, their psychological distress can decline. When it does, careful analyses suggest that the specific basis for this is reduced crowding (Wells & Harris 2007). Moving low-income individuals to better housing benefits them, but higher rates of mobility tend to be related to lower levels of well-being for most people (Oishi 2010).

Homes are threatened and sometimes destroyed by natural and technological forces. The psychological impacts include, for example, anxiety and depression associated with local air pollution (Marques & Lima 2011). However, residential threats and risks are not always directly related; for example, place attachment mediated the relation between proximity to a nuclear plant and perceived risk from it (Venables et al. 2012).

Communication after a disaster matters. If the communication between policy makers and the public is top-down, public understanding and support of policies and its trust of government decline; at the same time, perceived risk and noncompliance to policies increase (García Mira et al. 2006).

Home—at least urban residences—can pose threats, too. Although cities have some glorious benefits, mood and anxiety problems and the incidence of schizophrenia are more frequent in city dwellers, and recent functional magnetic resonance imaging research suggests that neural processes may mediate these problems through the processing of social stress (Lederbogen et al. 2011).

Housing satisfaction usually includes neighborhood elements such as trees and green spaces, cleanliness, distance to amenities, general appearance, and low levels of traffic and crime (e.g., Hur & Morrow-Jones 2008). Fear of crime is an important component of life in some neighborhoods, but those that are designed in accordance with defensible space principles (e.g., clearly marked residential territories and good surveillability of the street from residences as physical crime-deterrence features) usually have lower crime rates (e.g., Marzbali et al. 2012). Unfortunately, once disorder—in the form of vandalism, litter, or broken windows—begins, it tends to grow because residents begin to accept disorder as the norm (Keizer et al. 2008).

Documented interventions to improve disordered neighborhoods are relatively rare. Fortunately, quality-of-life research and methods are receiving much-needed attention (e.g., Marans & Stimson 2011). One such effort engaged residents of a low- and moderate-income neighborhood

in adding amenities such as kiosks, benches, trellises for hanging gardens, and artwork, and it resulted in many residents reporting that the neighborhood was better and a good place to live, with more social interaction and participation, and that they had an increased sense of place (Semenza & March 2009).

## VIRTUAL ENVIRONMENTS

The very world in which people in industrialized societies live has profoundly changed. Distance has disappeared. We experience far-off places and people through screens. For video gamers, reality is animated. Although the “screen revolution” has been going on since the advent of television, the difference now is that individuals have much more power to decide where to go and with whom to interact, rather than being limited to the offerings of a few major networks and receiving little opportunity to interact with the content. At the same time, physically proximate people and environments are allocated less time because of that spent on screens. The pace of technological change has greatly increased, and many people have what I call change overload disorder.

Environmental psychologists have been examining what these changes might mean (e.g., Stokols & Montero 2002) and how they might affect human functioning, behavior settings (i.e., theoretical entities that capture the essence of the relation between a standing pattern of behavior—such as the usual actions of football players, referees, and the audience—and the milieu within which it occurs, the stadium), and transactions between humans and the natural environment. Putting screens between ourselves and the actual physical and social worlds changes our connections with them in fundamental ways (e.g., Levi & Kocher 1999). The new reality will require a very different understanding of environmental transactions and new ways of thinking about how people perceive and represent the world (e.g., Heft 2001).

One challenge for an environmental psychology that matters, therefore, is to understand the import of dividing our time between the proximate and the distant and virtual worlds. For example, spatial discounting means that although individuals may be more aware of problems in distant environments through watching news stories on television or online, they may be less concerned about local problems (e.g., Gifford et al. 2009, Uzzell 2000). Will this blending of the near, the far, and the unreal lead to increased assistance for victims when disaster strikes far away, or will it cause numbness to their plight resulting from awareness of too many far-flung disasters?

Environmental psychologists are still struggling with the boundaries and definitions of the physical and social environments (Heft 1998, Kaplan & Kaplan 2009), but understanding them better, including new ways of conceptualizing the intertwined nature of the real and the virtual worlds we live in, is crucial (Stokols et al. 2009).

## BASIC PSYCHOLOGICAL PROCESSES AND THE ENVIRONMENT

All human existence is related to environmental psychology. This includes such fundamental processes as how we see the world, find our way around in it, deal with noise, manage the space between us, and engage—or not—in healthy levels of movement.

### Environmental Perception and Evaluation

Obviously, how individuals receive and process information from the everyday world matters. Environmental psychologists emphasize understanding how individuals respond to complex everyday settings and scenes. Work in the phenomenological tradition continues (e.g., Graumann 2002, Wells & Baldwin 2012). The ecological approach, which stresses that a complete understanding

of perception must include its embeddedness in a sociocultural and historical web, remains an important perspective (e.g., Heft 2012).

Recent research clarifies how people experience aspects of their world. For example, one's level of awareness, degree of adaptation, and necessary selectiveness in attending to environmental cues within complex real scenes mean that people sometimes miss important elements of a scene, resulting in negative consequences for their health or safety (e.g., Stamps 2005). For example, perceived safety in outdoor places depends in part on (greater) perceived enclosure, that is, whether the scene is experienced as having wall-like elements, which in turn depends in part on atmospheric permeability, that is, the distance that one can see (Stamps 2010). Fog—and presumably thick smog—reduces atmospheric permeability, which makes places appear more open, which implies to perceivers that they are less safe (Stamps 2012).

In interiors, warm colors are not only more attractive, but they seem to be better remembered (Hidayetoglu et al. 2012). Putting more credentials on the wall makes a therapist appear more qualified (Devlin et al. 2009), and dim lighting also seems to elicit more favorable impressions from their clients (Miwa & Hanyu 2006). Other work suggests that certain long-held assumptions may not be tenable. For example, older research reported that humans prefer savannah-like landscapes, but we may prefer forest views instead (Han 2007).

### **Spatial Cognition and Wayfinding**

What is new in the environmental psychology of finding one's way around? In keeping with the societal trends in technology, researchers have been asking whether virtual wayfinding (on a computer) produces the same results as real-world wayfinding, and some evidence suggests that it does (e.g., Jansen-Osmann & Berendt 2002).

Some findings are consistent with older research. Males often wayfind better than females, and this was recently confirmed in a virtual context. Males tend to use cartographic-like search strategies more often, whereas females tend to use local cues (Coluccia et al. 2007) and landmarks more often (Jansen-Osmann & Wiedenbauer 2004).

In complex, multifloor buildings, people might use one of three strategies to find their way: the central-point strategy employs the best-known parts of the building, the direction strategy relies on heading toward the horizontal location of the place sought, and the floor strategy focuses on heading for the floor on which the location is to be found (Hölscher et al. 2006). The latter strategy yielded the best wayfinding performance and was preferred by people with more experience in the building.

Other findings might be considered counterintuitive. For example, one might reasonably assume that Global Positioning System (GPS) devices help people wayfind, but even after being trained to use the devices, people who used the GPS system traveled longer and made more stops than did those who used traditional paper maps (Ishikawa et al. 2008). Although one might assume that individuals use proximate cues for wayfinding that have nothing to do with cartographic considerations, new evidence suggests that north is always used as the wayfinder's main and most accurate frame of reference (Frankenstein et al. 2012).

The foregoing studies show that wayfinding and the cognitive maps that people use are complex and subject to numerous immediate and antecedent influences. Beyond that, understanding these influences requires widening the picture to take into account sociocultural factors that, for example, do not always operate from within Western or industrialized cultural traditions (Heft 2013).

Wayfinding is an especially important problem for people with dementia. Not infrequently these individuals become disoriented within a building and sometimes wander outside and become lost. Those who have tried to optimize building design to reduce confusion report that interiors

(*a*) should not be monotonously uniform, (*b*) should have a series of distinct local cues and as much visual access to the destination as possible, and (*c*) should have good signage so that navigation can proceed from point to point with fewer errors (Passini et al. 2000).

## Responses to Noise

The global sound level is rising, and more people are exposed to greater sound levels. For example, the European Union estimates that 30% of its citizens are exposed to road traffic sound levels greater than those recommended by the World Health Organization. Although the normal assumption is that loud sounds are broadly detrimental, the history of noise research includes examples of null effects, and a few examples of increased performance exist (see Gifford 2007b, chapter 12). For example, somewhat loud sound may increase physiological arousal, which can speed the performance of easy, routine, or well-learned tasks.

Some results confirm the more expected outcomes. For example, louder noise is more annoying (Pierrette et al. 2012). Road traffic noise impairs children's reading speed and basic mathematics (Ljung et al. 2009). Irrelevant speech affects cognitive tasks and increases mental workload levels of open-plan office workers (Smith-Jackson & Klein 2009). Louder sound affects the memory, motivation to work, and tiredness of open-plan office workers (Jahncke et al. 2011).

Some researchers are moving toward finer-grained analyses to identify (*a*) which kinds of noise result in annoyance or detrimental effects on (*b*) which kinds of human responses in (*c*) which kinds of settings for (*d*) which sorts of persons. In one example of this approach, aircraft noise was associated with elevated hyperactivity scores in children, and road noise was associated with lower scores on a behavior problems scale, but neither type of noise was associated with a broadband measure of the children's mental health (Stansfeld et al. 2009).

Among other examples of finer-grained results, speech noise was more harmful than aircraft noise to the prose memory of adolescent students (Sörqvist 2010). Nature sounds appear to not harm memory, but when they are combined with voices or ground traffic, memory does suffer (Benfield et al. 2010). Street noise seems to harm the executive functioning of urban boys but not girls (Belojevic et al. 2012). Clearly, noise matters (Stewart et al. 2011), but much more research is needed to determine just how and when it does—and does not—have negative impacts.

## Social Space

Personal space, crowding, territoriality, and privacy clearly are important parts of everyday functioning; social space matters. However, some might argue that enough is already known about these topics or that they do not have the societal-level importance of some topics covered previously. Research on social space has slowed to a trickle as efforts on topics deemed more important have increased.

Recent work confirms some expected outcomes, such as that being forced to sit close to others on public transport results in adverse reactions (Evans & Wener 2007). People who prefer seats at the end of long tables have a greater need to define their own territory (Kaya & Burgess 2007). Children who have been abused need more personal space around them (Vranic 2003). High density in a room alters preschoolers' choice of activities and time spent on off-task activities.

However, some less-predictable outcomes have also been reported, suggesting that despite the slowdown in social space research, not everything is known about how people use social space after all. For example, one might expect that territorial intrusions would result in faster responses by men than women, but at least in one context (a very large religious gathering) the reverse was true (Ruback & Kohli 2005). Technology is changing social space usage: Headphone wearers choose

larger interpersonal distances (Lloyd et al. 2009). Finally, who would guess that spatially confined shoppers react by making more varied and unique product choices (Levav & Zhu 2009)? Social space matters.

### Physical Activity

Around the world, whether waistlines a few years ago were relatively small or relatively large, they are now expanding. Getting people to move at all, and without the aid of GHG-producing machines, is a challenge both for human health and climate change mitigation. Physical activity matters.

Efforts have been made to make neighborhoods more walkable, schoolyards more encouraging of physical activity, and stairs more enticing. Walkable neighborhoods obviously include sidewalks, shops, and amenities, natural features such as trees and parks, and high residential density (e.g., Brown et al. 2007). Less obviously, walkable neighborhoods include slopes and stairs, moderate traffic volume, and public transportation stops (Borst et al. 2008).

Drawing attention to stairs, which too often are relegated to a dark side corner of a building's lobby, helps encourage their use. For example, when text encouraging the use of stairs was placed directly on four successive stair risers at eye level, stair use increased (Eves et al. 2009).

### CONCLUSION

Scientific psychology began in the nineteenth century, but not until the middle of the twentieth century was psychology's range extended in any serious way to the physical environment. From the vantage point of the early twenty-first century, the psychology that attempted to understand persons in a physical vacuum is now revealed as woefully inadequate. Environmental psychology completes the picture by including the built and natural settings within which all humans exist. It is therefore essential not only to a complete understanding of human thought and behavior, but also for a full account of every other psychological process and for every application of psychology to the improvement of everyday life. Environmental psychology matters.

### DISCLOSURE STATEMENT

The author is not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

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