

Introduction: Dealing With What Is

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For a long time, we ignored the warnings. At first, even most climate scientists couldn't believe the evidence, but it kept rolling in. Gradually, more and more of them were won over and started trying to persuade the rest of us, but most of us ignored the warnings. Now, virtually all the legitimate climate scientists are convinced that the Earth is sick, and we gave it the disease.

Here are the basic facts: Climate scientists have published many peer-reviewed papers reporting evidence that the mean temperature of the planet is higher than at any time in recorded history; that it is rising at an unprecedented rate; and that the rising temperature is largely the result of human activity, primarily the burning of coal and oil to power electric generating plants and fuel our cars and trucks. These scientific findings have occasioned numerous reports that predict a variety of dire outcomes that society will face if the global emissions of heat-trapping greenhouse gases are not curbed. Beyond predictions of future calamities, there is evidence that climate change is already wreaking havoc in parts of the world. For example, one

report claimed that human-influenced climate change, mainly by increasing flooding and draught, is causing more than 300,000 deaths and \$125 billion in economic losses each year (Whiteman, 2009). This report also claimed that climate change is seriously affecting the lives of 325 million people, a number projected to double by 2030, and that more than 90% of the human and economic losses from climate change are occurring in poor countries. Although the report has been criticized for its methods and its author acknowledges that the numbers are rough estimates, he contends that "the suffering documented in this report is only the beginning" (p. 1).

Despite the steady stream of scientific facts and scary warnings, many people remain unmoved. Disbelief in global warming is a common reason for inaction and is usually the product of one of the following perspectives: "How could anything we tiny humans do affect a system so vast as the Earth's climate?" or "I understand there's a great deal of disagreement among scientists on whether global warming is real." A commonly voiced reason for inaction among people who accept the fact of global warming yet are making no changes in their behavior to reduce their contribution to it is: "I realize that if rate of greenhouse gas emissions is left unchecked, it will lead to terrible consequences. But I'm confident that scientists will come up with a solution in time to save us."

Technological breakthroughs have saved us in the past (e.g., pasteuriza-

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tion, polio vaccine), and they might save us from climate change. Many ideas are on the table (catching carbon before it is released, recapturing it afterwards and storing it, and discovering and harnessing totally new forms of nonpolluting energy), but no technological solutions to global warming are available now and none are on the horizon. A good example is nuclear fusion: It has been “nearly there” since the 1970s, and we are no closer to adding fusion to the energy grid today than we were 40 years ago. Everyone hopes that technological research and development will bear fruit in time, but we cannot count on it, and dare not wait.

Changing the behavior of people around the world in ways that significantly reduce carbon dioxide (CO₂) emissions is the only thing that might buy enough time for the scientists and engineers to come up with an effective solution.

The good news is that many members of the general public, government leaders, and business owners are concerned about climate change and want to know what they can do to combat it. We agree with Kazdin (2009) that the psychological sciences can and should help in creating and maintaining a sustainable environment. One discipline within the psychological sciences that is especially well suited to help is behavior analysis.

THE ROLE AND RESPONSIBILITY OF BEHAVIOR ANALYSIS

Behavior analysis, the science of behavior change, can and must help society combat climate change. The very purpose of applied behavior analysis is to develop a reliable technology for improving socially significant behavior (Cooper, Heron, & Heward, 2007; Morris & Smith, 2003). Is there any behavior more socially significant than behavior that could save civilization?

Applied behavior analysis has developed at least partial solutions to many problems faced by society, including the prevention of AIDS (DeVries, Burnette, & Redmon, 1991), helping people to achieve healthier lifestyles (McKenzie et al., 1991), enhancing the quality of life for people with autism and other developmental disabilities (Eikeseth, 2009; Maurice, Green, & Foxx, 2001), improving education (Heward et al., 2005; Johnson & Layng, 1994), making the workplace and highways safer (Fox, Hopkins, & Anger, 1987; Sulzer-Azaroff, 1998), treating drug addiction (Silverman, Roll, & Higgins, 2008), increasing employee productivity (Daniels & Daniels, 1999), but the field has paid relatively little attention to the effects of behavior on the environment. This is curious because behavior analysis is, in many ways, an environmental science. The independent variables of primary importance to behavior analysts are changes in the environment, that is, antecedent events that elicit, evoke, and cue behavior, and consequent events that select and maintain it. The environment also provides the context by which the function or “meaning” of behavior is determined.

A promising spate of applied research on environmental problems did appear in the *Journal of Applied Behavior Analysis* from the 1970s to the mid-1980s. The authors of these pioneering studies demonstrated practical interventions in several ecological domains: litter and pollution control (e.g., Bacon-Prue, Blount, Pickering, & Drabman, 1980; Clark, Burgess, & Hendee, 1972; Geller, Farris, & Post, 1973; Hayes, Johnson, & Cone, 1975; Powers, Osborne, & Anderson, 1973), recycling (e.g., Jacobs, Bailey, & Crews, 1984; Keller, 1991/2010; Witmer & Geller, 1976), and energy conservation (e.g., Winett et al., 1982). However, with some notable exceptions (e.g., Brothers, Krantz, & McClannahan, 1994; Geller, 1990; Schroeder, Hovell, Kol-

ody, & Elder, 2004), interest in research on protecting the environment waned after the 1980s.

Like the rest of society, behavior analysis has been slow to respond to climate change. There are signs, however, that this is changing: symposia and papers at recent annual conventions of the Association for Behavior Analysis International (ABAI) by ecologists and climate change scientists (e.g., Thompson, 2009; Wagner, 2009) and sessions on the responsibilities and opportunities for behavior analysts to help society respond to global warming (e.g., Acuirre, 2010; Biglan, 2009); a movement to establish a special interest group within ABAI on sustainability (Julia Fiebig, personal communication, June 19, 2010); the development of academic programs integrating behavior analysis and environmental science (Mark Alavosius, personal communication, August 5, 2010); and the use of behavior analysis to reduce energy consumption on college campuses (Jeanine Stratton, personal communication, June 30, 2010). This special section is an effort to fuel that burgeoning interest by showing those inside and outside the field how behavior analysis can help combat climate change.

CONTENTS OF THE SPECIAL SECTION

The Science of Climate Change

In “Climate Change: The Evidence and Our Options,” Lonnie Thompson explains how the findings from ice core paleoclimatology (the use of physical evidence trapped in ice to understand Earth’s climate system and the variables that influence it) and data from related climate sciences yield a preponderance of evidence that our planet’s temperature is rising, that global warming is occurring at an accelerating rate, and that the only plausible explanation for it is human activity, chiefly the burning of fossil fuels.

Thompson has led 56 expeditions to remote ice caps atop the world’s

highest mountains, and has spent nearly four years of his life above 18,000 feet, more time than any person in history. His findings have resulted in major advances in our understanding of climate change by demonstrating how tropical regions have undergone significant climate variability, countering the earlier view that higher latitudes dominate climate change. Thompson’s research has been featured in hundreds of publications, including *National Geographic* and *National Geographic Adventure* magazines, in the book *Thin Ice* (Bowen, 2006), and is highlighted in Al Gore’s documentary film on global warming, *An Inconvenient Truth*. One of *Time* magazine’s 2008 Heroes of the Environment, Thompson was identified as one of six scientists and innovators whose work is key to addressing global climate change. An elected member of the National Academy of Sciences, Thompson’s numerous honors and awards include the Tyler World Prize for Environmental Achievement (2005), the environmental sciences equivalent of a Nobel Prize; the Einstein Lecturer Award from the Chinese Academy of Sciences; and the National Medal of Science (2007), the highest honor the United States bestows on American scientists.

Like many climate scientists, Thompson was initially skeptical of global warming, but the overwhelming consistency of the physical evidence he has discovered (bubbles of CO₂, methane, and nitrous oxide trapped in ice) combined with the findings of other climate scientists has convinced him. “When you can see the heartbeat of the Earth’s climate system in the rise and fall of CO₂ over 800,000 years—long before humans played any role—that’s why you become concerned about where we are in today’s world. There’s no analogue in that entire history to the levels of CO₂ in the atmosphere today” (West Virginia Public Broadcasting, 2010).

What does Thompson say to skeptics who contend that the recent rise in Earth's temperature is due to natural variations in cycles and that man-made global warming is an unproven theory that hurts jobs and businesses? He predicts that by 2020, there will be no global warming skeptics.

At the end of the day, *you have to deal with what is*. Not what you believe or wish was the case. In the end, we will deal with this issue because we will have no choice but to do so. ... I understand the importance of jobs, being able to go to work and feed your family. But on the other hand, we live on a planet with limited resources, and if we continue on this path, there are a lot of families that aren't going to make it going forward in time. That is the hardest part: short-term gain versus long-term well-being. (West Virginia Public Broadcasting, 2010)¹

Thompson sees no "technological quick fixes for global warming" on the horizon and concludes that "our only hope is to change our behavior" (2010, p. 168). His article is the best introduction to the science behind climate change that we have seen, and we think it will be difficult for anyone to read it and not be convinced that global warming is real and is the result of human activity.

Ideas from Behavior Analysts

We e-mailed more than 50 behavior analysts in the U.S. and 10 other countries describing our plans for the special section and inviting them to submit ideas for essays on ways of using behavioral principles to combat global warming. We were encouraged by the positive reactions. Many of those we contacted submitted an essay proposal or offered to serve as reviewers for the essays.

¹To hear Thompson and his wife, Ellen Mosley-Thompson, who has led 15 ice drilling expeditions to Greenland and Antarctica, talk about their research and perspectives on climate change, and to see how ice cores are harvested, transported, and data extracted from them, go to <http://www.youtube.com/watch?v=eNmYLvvE7iQ>

Several people wanted to write conceptual papers on the behavioral principles that underlie our excessive use of energy. We said no; we did not want analyses of the problem, we wanted proposals for solving it. We asked for new ideas about how to change behavior and reduce global warming. And we wanted them to do it in about 1,000 words, in plain language that educated laypeople could understand. We had two goals: stir interest among behavior analysts, especially those beginning their careers, and get people outside of behavior analysis (politicians, environmentalists, business owners) to implement or build on the proposals. We wanted the essays themselves to change behavior.

To say that this was not an easy assignment would be gross understatement. We received many proposals that would have made the basis for fine scholarly treatises analyzing the problem but failed the test for this special section. We commissioned authors of the proposals with the most promise to prepare essays for peer review. The process yielded six essays—six brilliant essays in our opinion—that propose new ideas for changing behavior in ways that will reduce greenhouse gas emissions.

Given the central role children will play in creating a greener world, we go back to the future to preface the special section's six original essays with a reprint of "The Recycling Solution: How I Increased Recycling on Dilworth Road" by Jacob Keller (1991/2010). The grandson of Fred Keller, one of the founders of behavior analysis, Jacob was 10 years old when he conducted the project for his elementary school science fair. We recently contacted Jacob to learn more about his project. He told us the inspiration came from a class field trip to the county recycling center, which included seeing video footage of landfills. "Those depressing images of the seemingly infinite oceans of trash inspired me more than anything to want to be proactive

about recycling and get more people involved” (Jacob Keller, personal communication, August 12, 2010). When asked if his experience with the recycling project has affected his behavior as an adult, he said, “I recycle every week and am probably more eco-conscious as an adult having done the project. I drive a car that gets 41 mpg on the highway!”

In “Buying Green,” Joe Layng recognizes that, like all choices we make, our decisions as consumers are more likely to be influenced by their short-term consequences for us as individuals (price, quality) than they are by their long-term consequences for society (environmental impact). He believes that the equation can be tilted in favor of greener choices by giving consumers immediate access to reliable information about a product’s environmental impact at the point of purchase and proposes a way to do just that.

In the provocatively titled “I’ll Save the World from Global Warming—Tomorrow,” Dick Malott says that although we all want to do the right thing to help the environment, whether it’s buying and installing compact fluorescent lightbulbs (CFLs) or replacing an energy-guzzling appliance with a more efficient one, we put it off because there’s no penalty for delay. He proposes a practical way in which the Web can put our feet to the fire.

In “Helping for Change,” Allen Neuringer and Kathryn Oleson describe another strategy that individuals can use to achieve their green goals. You might ask, “How can helping someone else help me change when I’m in the habit of not fulfilling my own promises?” The authors answer that question by explaining how the social reinforcement in a helping relationship keeps us on task and builds correspondence between what we say and what we do.

Carbon dioxide from automobiles is a major contributor to global climate change. In “Virtual Rewards

for Driving Green,” Josh Pritchard proposes a computer application that will enable fuel-efficient drivers to earn “green” dollars with which to buy digital merchandise on the Web. Can getting items that exist only in cyberspace actually change a person’s driving behavior? Pritchard, who notes that people are spending billions of real dollars on virtual items each year, is currently developing an app called Green Wheels to find out.

In “The Power of Cooperation,” Tony Nevin tells how the townspeople of Martha’s Vineyard, Massachusetts, are attempting to replicate a successful alternative-energy project in Samsø, Denmark, where thinking about ways to reduce fossil-fuel use “became a kind of sport.” Nevin says that thinking and acting locally helps people to identify and pursue small-scale cooperative energy projects, celebrate their successes, and “take pride in the fact that they are ameliorating rather than exacerbating global warming” (p. 191).

Whatever adults might accomplish on the green behavior change front, any sustained success in combating climate change will require the help of the world’s more than 2.2 billion children. In “TerraKids,” Janet Twyman describes a possible Web site where kids learn about their family’s carbon footprint and what they can do to help reduce it. TerraKids establishes the child as an agent for changing the green behaviors of other family members. A virtual community within TerraKids encourages kids to team up with other “CarbonBusters” to help create and sustain a greener world.

The Challenge

In “Climate Change: Meeting the Challenge,” we conclude the special section by assuming that you have been persuaded by Thompson’s paper or other evidence that global warming is real and poses a threat that must be dealt with, and that for now the only way to deal with it is by

changing behavior. Then we ask what you, as behavior analysts, can do (aside from replacing your incandescent bulbs with CFLs like everybody else), and we remind you that you have special skills in behavior change and therefore a special responsibility to help meet this challenge.

We go on to suggest a different perspective for dealing with this problem: Instead of dwelling on how discounting and weak reinforcement schedules and the side effects of punishment incline people to consume and waste too much, think about how these tendencies can be used to change behavior in desirable ways. We then give examples of interventions this kind of thinking can produce. One such intervention, called Carrotmobbing, is already being done. It starts with the fact that people are typically motivated by self-interest, and uses that fact to get them to go green. Then we go on to suggest a number of proposals of our own for doing the same sort of thing, using behavior principles to work for us rather than against us.

Our final proposal for restoring the health of our planet is to move toward a sustainable society. To do that we must reach a stable world population and do a better job of husbanding the earth's limited resources. This is a very long-term project and is not likely to be pain free, but many experts believe it can be done without accepting a markedly lower standard of living. Behavior analysts need to get involved in this project and help to work toward sustainability.

A good way to begin your effort to save our environment is by reading Lonnie Thompson's article. If you do, we think you will understand why he is convinced that there will be no global warming deniers by 2020. After all, you have to deal with what is.

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