

## *In Response*

### Can We Consume Our Way Out of Climate Change? A Call for Analysis

Lyle K. Grant  
Athabasca University

The problem of climate change is analyzed as a manifestation of economic growth, and the steady-state economy of ecological economics is proposed as a system-wide solution. Four classes of more specific solutions are described. In the absence of analysis, cultural inertia will bias solutions in favor of green consumption as a generalized solution strategy. By itself, green consumption is a flawed solution to climate change because it perpetuates or even accelerates economic growth that is incompatible with a sustainable culture. Addressing climate change requires an integration of regulatory, energy efficiency, skill-based, and dissemination solutions. Behavioral scientists are encouraged to work with others in ecological economics and other social sciences who recognize cultural reinvention as a means of achieving sustainability.

*Key words:* global warming, climate change, sustainability, steady-state economy, economic growth, consumption, consumerism

---

*The Behavior Analyst* published a special section in its Fall 2010 issue in which the editors took the initiative to seek solutions to the problem of climate change. Invited contributors were instructed to avoid analyzing the nature of the problem and instead provide concise 1,000-word solutions (Heward & Chance, 2010). Placing a priority on solutions rather than analysis reflects a sincere impulse to solve a recognized problem without further delay, as well as recognition that behavior analysis has historically been a rich source of solutions to environmental problems. However, this relative priority might imply that analysis serves only to delay solutions rather than to inspire them. Discounting the value of analysis is also a point of departure from the contemporary practice in behavior analysis of conducting a functional analysis to identify existing functional relations prior to treatment selection.

Much of the value of analysis is to understand and define problems in a

way that facilitates solutions. Numerous analyses have led to the conclusion that excessive and growing consumption, exacerbated by an expanding world population, contributes to global climate change and other problems of sustainability (Leggett, 2005; McKibben, 2007, 2010; Nevin, 2005; Schor, 2010; Skinner, 1987; Swim et al., 2010). Recognizing the underlying problem as one of overconsumption has several consequences including the realization that climate change is driven by larger cultural factors or metacontingencies (Glenn, 1986, 1991) that elevate economic growth over the longer term well-being of the planet and its inhabitants. Nevin (2005) analyzed this larger cultural issue from a behavioral perspective and concluded that the rich reinforcement of affluent societies has made their consumption resistant to change, leaving us with a problem that has self-perpetuating features.

Although the contributors to the special section offered many imaginative solutions, the solutions were disproportionately focused on reducing carbon emissions through green consumption and were mainly con-

---

Address correspondence to Lyle K. Grant, Centre for Psychology, Athabasca University, Athabasca, Alberta, Canada (e-mail: lyle@athabascau.ca).

cerned with making energy use more efficient. The notion that green consumption is an unambiguous and singularly effective solution to climate change is in some respects more of a manifestation of the problem of cultural inertia than it is a solution. As a unitary solution, green buying has been critically analyzed as an approach that (a) is a weak and convenient business-as-usual method designed more to maintain resource-intensive economic growth than to solve environmental problems (Rogers, 2010; Yanarella, Levine, & Lancaster, 2009); (b) ignores the longer term rebound effects of energy efficiency improvements in increasing energy use (Grant, 2010; Owen, 2010; Sorrell, 2007); (c) fosters the illusion that buyers have done their part to solve climate change merely through purchases (Begley, 2010); (d) reflects a dogma of consumer sovereignty that shifts responsibility for environmental problems to individuals who act in a free market rather than to corporate interests that motivate consumption and profit from it (Maniates, 2002); (e) neglects opportunities to cease endless economic growth and make a transition to a sustainable steady-state economy with a more equitable distribution of wealth (Daly, 1996); and (f) overlooks possibilities for cultural reinvention based on a transition from an economic age to a cultural age (Csikszentmihalyi, 1999; Grant, 2010; Mill, 1848; Schafer, 2008; Scitovsky, 1989; Skinner, 1976).

The purpose of the present article is to analyze the cultural basis for the problems of climate change and sustainability. The need for analysis as a prerequisite to formulating solutions is described. Climate change is framed as one manifestation of a culture-wide problem of rapacious economic growth, a solution to which is the steady-state economy of ecological economics. Four classes of more specific solutions are described: consumption-based, culture-based,

regulatory, and dissemination solutions. In the absence of analysis, consumption-based solutions will be favored because they entail business-as-usual behavior patterns that are strongly propelled by the inertia of affluence (Nevin, 2005). The disadvantages of an exclusive reliance on consumption-based solutions are described. Culture-based solutions are desirable because they offer possibilities for an improved quality of life during and after a transition to a sustainable steady-state economy of less material consumption. It is concluded that climate change must be addressed through all four types of solutions and that the behavioral sciences have a crucial role to play in solving the problem because of the psychological nature of neglected culture-based solutions.

### THE NEED FOR ANALYSIS

Behavior analysts have come to rely on analyses, both experimental and conceptual, as a means of understanding and solving behavior problems (e.g., Skinner, 1953). For larger scale societal problems, the analyses are normally conceptual due to the difficulties in conducting experiments that isolate the effects of specific factors at those levels. The size and complexity of modern developed economies, for example, do not permit precise experimental analysis, but when they work with larger scale problems, behavior analysts have used plausible conceptual analysis as a basis for generating and selecting solutions (e.g., Skinner, 1953, 1976, 1987). Analyzing causal influences prior to proposing solutions is also a cardinal recommendation in organizational behavior management (OBM), a field accustomed to solving larger scale problems, as seen in Gilbert's (2007) performance audits and Brethower's (2007) use of pre-intervention systems analyses.

Conceptual analyses are strengthened by making use of all forms of

data, including correlational data when experimental findings are lacking. The issue is paralleled in climate-change science: Experimental evidence cannot be obtained to prove that climate change is due to human activity, so climate scientists make use of historical correlational data to make plausible inferences that climate change is due to human behavior (e.g., Intergovernmental Panel on Climate Change, 2007; Thompson, 2010). Scientific work proceeds using an iterative process of evidence-based confirmation and disconfirmation, combining this with inferential reasoning and peer interchanges to arrive at working premises and conclusions.

#### **THE SYSTEM-WIDE PROBLEM AND THE STEADY- STATE SOLUTION**

Analysis is helpful in assessing the generality of a behavior problem. Climate change is often seen as a discrete problem that can be solved through piecemeal solutions such as carbon sequestration, consisting of pumping CO<sub>2</sub> underground and even magnetically levitating CO<sub>2</sub> into outer space (The Economist, 2007). It is, however, increasingly apparent that excess levels of atmospheric CO<sub>2</sub> are one sign of an unsustainable economic system that fails to recognize that the Earth's resources are finite (Daly, 1996; Hardin, 1993; Meadows, Randers, & Meadows, 2004; Schumacher, 1989; Speth, 2008). Climate change represents a finite capacity of the Earth's atmosphere to absorb CO<sub>2</sub> and still maintain historical temperature ranges, but there are other indications of finite capacities that are also being exceeded. Addressing climate change therefore requires analyzing the problem from a larger system-wide perspective such that proposed solutions are also system-wide in scope.

Even aside from the harm due to climate change, there is considerable

evidence that multiple limits for safe planetary operation are being exceeded (Rockström et al., 2009). I recently summarized these problems (Grant, 2010) and will reiterate them here. Much of the world's population has become dependent on oil as an energy source, yet the worldwide discoveries of oil peaked during the 1960s (Energy Bulletin, 2011) and a production peak is likely to occur within the next decade (Deffeyes, 2006; Farzad, 2008; Grant, 2007; Leggett, 2005; Rubin, 2009). Our dependency on coal, which has contributed to climate change, has brought us to a point at which coal supply limits are in sight. Much of the cited abundant world reserves of coal are economically unrecoverable (National Research Council, 2007). Laherrère (2007) has predicted a peak in coal production by 2050. Limits in the food supply are looming. Worm et al. (2006) have forecast a collapse in the world's fish population by 2050 if current practices continue. Food production has come to depend on fossil fuels for power and fertilizers (Heinberg, 2003). Fully 40% of the U.S. corn crop is now diverted into ethanol production for motor vehicles, which contributed to a 53% increase in corn prices during 2010 (Walsh, 2011). Diversion of the food supply to fuel motor vehicles has the greatest impact on the world's poor, because such a large percentage of their income is needed to purchase food (Searchinger, 2011). The supply of many important industrial metals cannot be sustained at their current rates of production (Bardi, 2008; Bardi & Pagani, 2007). Limits in the supply of fresh water are being exceeded. UNESCO (2009) has predicted that two thirds of the entire population of the world will live under water-stressed conditions by 2025. World population growth, which has a multiplier effect on the draw on limited resources (Hardin, 1993), continues unabated after having increased over 3.6 times during

the 20th century (United Nations, 1999).

In addition to the direct environmental consequences of excessive consumption, depletion of nonrenewable resources (notably oil) has led to resource wars that continue to kill and maim civilians living in oil-rich countries. Klare's (2004) prediction of a continuing series of wars over increasingly scarce oil supplies has been realized in a series of armed invasions of countries with oil wealth. Greenspan (2007) and Phillips (2006) each maintained that the 2003 invasion of Iraq, for example, was motivated by that country's oil reserves.

Seen from the broader perspective of multiple resource limits and finite capacities, the fundamental underlying problem is an economic model of continuous and endless growth that demands an ever-increasing supply of resources (Daly, 1996; Daly & Cobb, 1994; Hubbert, 1981; McKibben, 2007, 2010; Schor, 2010). Ecological economists have proposed a solution to this problem: replacing the growth economy with a steady-state economy in which *throughput*, defined as "the flow of natural resources from the environment, through the economy, and back to the environment as waste" (Daly & Farley, 2004, p. 6), is held at a constant level that can be maintained across future generations. In behavioral terms, a steady-state economy consists of a constant supply of natural-resource reinforcer inputs that maintain a correspondingly constant rate of economic behavior (Grant, 2010). This steady-state model of sustainable equilibrium contrasts sharply with our growth economy in which the supply of natural resources and production expands until the economy ceases to function due to the exhaustion of natural-resource reinforcer inputs or due to exceeding the environment's capacities to absorb waste products. Such a collapse has the potential to include a die-off of a large proportion of the human population (Catton,

1982). Because of the potential for catastrophic consequences, Hubbert (1981) cast the issue as the major problem of our time: "Perhaps the foremost problem facing mankind at present is that of how to make the transition for the present exponential-growth phase to the near steady state of the future in as noncatastrophic a progression as possible" (p. 1007).

#### FOUR CLASSES OF SOLUTIONS

Although macroeconomic system-wide analysts such as Hubbert, Daly, and other ecological economists have advocated a steady-state economy as a general solution to the problem of limits, more specific implementation solutions are also necessary. Analysis is helpful in identifying different types of solutions, assessing their relative merits, and determining how they might work in concert to address the problem. Four approaches to addressing climate change and sustainability are described below.

##### *Consumption-Based Solutions*

Consumption-based solutions, emphasized in the special section of *The Behavior Analyst* as well as in the solutions section of the American Psychological Association (APA) climate change report (Swim et al., 2010, Section 6), are ones that involve the purchase of capital goods and consumer products that are presumed to reduce global warming. The idea behind consumption-based solutions is that investment in products will pay off later in reduced use of fossil fuels. Purchases of fluorescent lightbulbs and energy-efficient appliances are examples of consumption-based solutions. A large-scale example is a proposal to build solar electric generation stations on 46,000 square miles of land in the southwestern U.S. (Zwibel, Mason, & Fthenakis, 2008). According to advocates, by 2050 this investment would meet all the electricity needs

of the U.S. Other examples of consumption-based solutions cited in the APA report include energy-efficient vehicles, mass transit, and low-energy buildings. James Hansen (2009), a prominent climate scientist, has endorsed pilot development of nuclear breeder reactors as a consumption-based solution. Consumption-based solutions can be either large-scale investments that require institutional funding or small-scale individual actions (e.g., purchase of a vehicle or appliance that is more efficient than that which it replaces).

### *Culture-Based Solutions*

Culture-based solutions emphasize cultural reinvention to improve the quality of life and shift the maintenance of behavior from energy-intensive economic reinforcers to noneconomic reinforcers that are relatively underconsumed (Grant, 2010). For example, Scitovsky (1977) and Skinner (1976) called for arts education to create reinforcers in the literary, visual, and performing arts as a means of conserving natural resources and moving from a culture of work-to-consume to one more centered on aesthetic challenges and pleasures. Local participant and spectator sports, conversation, chess, bridge, crafts, gardening, sailing, canoeing, hiking, and reading are also free-time activities that have engaged people prior to the fossil-fuel era and continue to be appealing alternatives to lives of work-to-consume. Open-source computing (Feller, Fitzgerald, Hissam, & Lakhani, 2005) is an example of a modern use of free time that likewise provides fulfilling challenges and pleasures at the same time that it makes it unnecessary to work in order to purchase software.

Culture-based solutions have emerged out of analyses in ecological economics and other social sciences that have related behaviors responsible for economic growth to environmental

problems. These behaviors include status competition (Frank, 1999), faulty abstractive practices (Daly, 1980; Grant, in press), inappropriate cultural goal setting (Anielski, 2007), excessive work time (Hayden, 1999; Hunnicutt, 1988; Schor, 2010), commercial advertising (Schor, 1998), and a lack of noneconomic reinforcers (Schafer, 2008) and aesthetic reinforcers (de Botton, 2004; Scitovsky, 1977, 1992) in people's lives.

An example of an omnibus culture-based solution is the work-time reduction movement (Hayden, 1999; Reid, 1995), which seeks to reallocate work time to free time, trading material wealth for time wealth (Schor, 2010). Work-time reduction is an omnibus solution because it frees time to be spent on activities that are both challenging and pleasurable but do not entail burning fossil fuels or consuming substantial nonrenewable resources. Work-time reductions do help to solve the problem of climate change. Rosnick and Weisbrot (2006) found that the U.S. could have met its proposed CO<sub>2</sub> reduction specified in the failed 1997 Kyoto agreement merely by reducing its yearly hours of work to full-time European levels. Work-time reductions have the potential to enable workers to engage in sustainable leisure-time pursuits that would improve social capital (Putnam, 2000), political participation, and the creative use of leisure time (Hayden, 1999; Reid, 1995; Schor, 2010). In his study of the Kellogg cereal company's 6-hr workday from the 1930s until the 1960s, Hunnicutt (1992, 1996) found that many of the Kellogg employees realized these benefits. For example, the program was especially popular among female employees because it enabled them to balance work and child care.

### *Regulatory Solutions*

Regulatory solutions, also highlighted in the APA report (Swim et

al., 2010), seek to limit carbon emissions through carbon taxes, cap-and-trade systems, consumption taxes (Frank, 1999), alternative-energy tax credits, restrictive licensing of new fossil-fuel generators, fossil-fuel rationing, and so on. Regulatory solutions can be used to encourage the other three types of solutions or can be used alone to curtail fossil-fuel use directly, as in the case of carbon taxes or rationing. Legislation to award tax credits for alternative energy devices and home insulation are examples of regulatory solutions designed to facilitate consumption-based solutions. Government funding of environmental education and laws requiring energy-efficiency information stickers on appliances are examples of regulation in service of dissemination solutions.

Regulatory solutions sometimes enable culture-based solutions inadvertently. Policies to fund arts education and other forms of nonvocational education, as Scitovsky (1977, 1989) advocated, contribute to sustainability by diverting people from the materialistic to the aesthetic. Similarly, in 1933 the U.S. Congress came close to passing legislation to mandate a 30-hr workweek, but the rationale for this was to distribute available employment more widely during the depression (Hunnicut, 1988) rather than to reduce consumption.

Publicly funded health care is another example of a regulatory solution that contributes to sustainability. Health-care insurance removes incentives to engage in resource-intensive work to gain wealth needed to pay for expensive catastrophic health care. Without government-provided catastrophic health care, such as that which exists in Canada and in most European Union countries, people are compelled to increase their incomes beyond any likely future health-care expenditure because of the possibility that they will have to cover unlikely expenses. Governments that provide their citi-

zens with social safety nets, therefore, also contribute indirectly to a potential solution to climate change and other problems of sustainability. Likewise, government policies that impair collective bargaining rights contribute to economic inequality and make it necessary for many wage earners to work in full-time jobs to survive in an unsustainable culture.

### *Dissemination Solutions*

Dissemination solutions are concerned with building support for consumption-based, culture-based, and regulatory solutions through education and persuasive communication. Three articles in the special section addressed these (i.e., Neuringer & Oleson, 2010; Nevin, 2010; Twyman, 2010). Dissemination-based solutions are especially important because scientists and academic researchers do not traditionally see large-scale public persuasion as their job. Although education, cooperation, and coalition building are essential to success, scientists and researchers have few professional incentives to pursue dissemination initiatives.

An important problem is that those opposed to climate-change mitigation are waging well-funded disinformation campaigns. Disinformation campaigns have substantially reduced the public perception that human-caused climate change exists (Jacques, Dunlap, & Freeman, 2008; Thompson, 2010). In 2009, of the 2,340 Washington lobbyists who registered to work in the area of climate change, 85% of these were there to impede climate-change legislation (McKibben, 2010). It is important that corporate leaders, many of whom have strong backgrounds in science and engineering, be brought to understand the issues of sustainability. A single corporate initiative (e.g., Kellogg's 6-hr day; Hunnicutt, 1992, 1996) can have a huge impact as a model and tipping point for

altering cultural practices. As it is, many corporations see sustainability as merely a public relations issue and pursue only greenwashing initiatives in which they publicize the environmental benefits of some relatively trivial business practice and fail to address environmentally harmful practices.

### **CULTURAL INERTIA AND THE BIAS TOWARD CONSUMPTION-BASED SOLUTIONS**

The special section of *The Behavior Analyst* emphasized consumption-based solutions to such an extent that none of the articles cited Skinner's (1976) culture-based solutions set forth in *Walden Two*. In its section on solutions, the APA report on climate change (Swim et al., 2010) likewise emphasized consumption-based solutions along with regulatory and dissemination solutions. Maniates (2002) found that mainstream environmentalists, as well as the political left, have marginalized the voluntary simplicity movement, which consists of individuals who have independently implemented culture-based solutions in their lives, creating Thoreauvian enclaves within the larger culture of material excess. How is it that consumption-based solutions are so predominant among so many different constituencies?

A general problem in modern Western culture is what Nevin (2005) has described as the inertia of affluence, the resistance of richly reinforced behavior to change. The verbal behavior of U.S. leaders illustrates this generalized recalcitrance to abandon a culture of overconsumption. In response to demands from other nations calling for the U.S. to reduce its carbon emissions at the 1992 Rio Summit, former President George H. W. Bush declared, "The American way of life is not negotiable" (quoted in Wheeler, 2004, para. 1). In his inaugural address, President Obama (2009, para. 21) stated, "We

will not apologize for our way of life, nor will we waver in its defense."

Corporate economic interests favor consumption-based solutions because they retain a profitable work-to-consume culture merely by shuffling product lines. Redefining the problem in larger terms, as ecological economists have done by proposing a steady-state economy, is resisted even by many mainstream environmentalists. Naomi Klein has called for a deeper level of analysis:

But what I see is that the green groups, a lot of the big green groups, are also in a kind of denial, because they want to pretend that this isn't about politics and economics, and say, "Well, you can just change your lightbulb. And no, it won't really disrupt. You can have green capitalism." And they're not really wrestling with the fact that this is about economic growth. This is about an economic model that needs constant and infinite growth on a finite planet. So we really are talking about some deep transformations of our economy if we're going to deal with climate change. And we need to talk about it. (Goodman, 2011, para. 12)

In her book, *Green Gone Wrong*, Heather Rogers (2010) makes a similar point:

I shop my conscience when I can afford it, and I believe that doing so can make a positive impact. But these consumer-based actions lack the ability to reach the goals we're aiming for. Convincing ourselves that we're solving our environmental problems when we aren't is a catastrophic game of denial; the problems run deep and so must the solutions. (p. 180)

Consumption-based solutions offer the promise of extending the consumer society into the future and solving environmental problems at the same time, making them politically popular and safe from any criticism that "our way of life" might be in jeopardy. Secretary of Energy Steven Chu, an eminent Nobel-prize winning scientist, has made energy-efficient consumption solutions a major focus of the Obama administration's climate-change policy (The White House, 2011). Advocating increased efficiency carries few polit-

ical risks because it boosts the growth economy through additional consumption and leaves consumers with good feelings that they have done something for the planet as they enjoy their new efficient cars and appliances. Energy-efficient consumption solutions originate in the physical sciences and engineering, giving them a prestige derived from a long history of modern technological advancement. Unfortunately, this prestige is another factor that serves to restrict the range of potential solutions.

Cultural inertia is seen in the way the forces of economic growth feed us a steady stream of commercial advertising that induces us, through behavior-change techniques, to conclude that the solution to each small and large problem we face in life is additional consumption (Schor, 1998). The use of a behavior-control technology like advertising to maintain fossil-fuel-intensive work-to-consume behavior patterns is an important problem (Grant, 2010). Instead of confronting this problem, many psychologists have contributed to it by lending their expertise to the product branding, marketing, and advertising industries (Kreshel, 1990; Saletan, 2010). Critiques of the exploitation of psychology by advertisers often begin and end with J. B. Watson's early contributions to advertising, but contemporary applications have advanced well beyond Watson's work, as illustrated in recent articles in, for example, the *Journal of Consumer Research*.

Because of the way that use of fossil fuels is now built into developed economies through a web of interlocking practices (Glenn, 1991; Sanne, 2002), virtually all material consumption carries a fossil-fuel component (Heinberg, 2003). Thus, doing without products is often more beneficial than buying products, even when they carry some type of environmental certification that elevates them over competitive products. Ad-

vocates of consumption-based solutions sometimes fail to recognize this. Consider the Carrot Mob initiative, which organizes local consumers to shop only at the most environmentally conscious retailers (Chance & Heward, 2010). An article on a prominent environmentalist Web page discussing the Carrot Mob asks, "But what if everything each of us bought helped the planet?" (Dunn, 2008, para. 1). This type of question removes our focus from the cultural problem of overconsumption and deceptively transforms consumption into a generalized solution strategy.

### SHOULD WE RELY EXCLUSIVELY ON CONSUMPTION-BASED SOLUTIONS?

Consumption-based solutions, especially those oriented toward energy efficiency, are likely to play an important role in addressing the problems of sustainability. Under the right conditions, consumption-based solutions can, for example, contribute to culture-based solutions by giving us time to make a cultural transition. However, as just described, an important problem with consumption-based solutions is that we turn to them too quickly and easily due to cultural inertia, resulting in the relative neglect of regulatory and culture-based solutions. Two other problems with consumption-based solutions are that they are potentially compromised by rebound effects that result from more efficient energy consumption; also, they raise problems of relativity.

#### *Rebound Effects*

According to Jevons' paradox, increases in the efficiency of fossil-fuel use act in the short term to reduce energy consumption but function over the long term to increase it (Brookes, 2000; Grant, 2010; Owen, 2010; Sorrell, 2007). Owen illustrated the problem using the example of refrigeration technologies, in which



substantial improvements in efficiency have led to increases in electricity use. A 28% increase in air conditioning efficiency from 1993 to 2005 was accompanied by a 37% increase in electricity consumption in the average U.S. household. According to Cox (2010), the current use of electricity for air conditioning in the U.S. is about equal to its total electricity consumption in 1955. In the short term, supposedly green purchases of efficient air conditioners result in desirable energy savings, less fossil-fuel use, and reduced carbon emissions. However, over the long term, the purchases had what is called a *rebound effect*: Being able to cool buildings more cheaply gives people an incentive to expand their existing use of air conditioning and makes the technology accessible to those who could not previously afford it.

Another way to conceive of rebound effects is in the way that increases in energy efficiency support higher prices, which in turn differentially reinforce exploitation of high-cost energy sources. On the consumer side, increased machine efficiency reduces the response requirement per reinforcer unit, providing more reinforcers for the same response requirement. This makes more travel affordable to existing drivers and makes driving possible for those who could not previously afford it, increasing oil demand. On the production side, the resulting increases in the price of gas due to increased demand in turn differentially reinforce exploitation of previously unaffordable hard-to-extract energy sources (Vernon, 2011). This contingency is especially important in the context of increasingly scarce fossil fuels (Grant, 2007), which creates an overall supply-and-demand bias toward higher prices.

Controversy remains concerning the nature and extent of the rebound effect (Brookes, 2000; Owen, 2010; Schor, 2010). Some dismiss rebound effects as too small to be of impor-

tance, whereas others claim that they are difficult to measure but are potentially significant. Sorrell (2007) advises that rebound effects need to be reappraised, taken into account in energy policy recommendations, and “mitigated through carbon/energy pricing” (p. 93), a regulatory solution.

Purchasing efficient machines is a target behavior that has apparent social validity (Wolf, 1978), but this is an unusual case in which social validity, the opinion-poll selection of a popular target behavior, fails us. The problem is that the reinforcing short-term consequences of supposedly green consumption are opposed by weaker longer term consequences, increased risk of environmental damage through the rebound effect, the relative neglect of alternative classes of solutions, and the failure to address the problem on a system-wide basis by implementing a steady-state economy. In this respect, temporal discounting (Critchfield & Kollins, 2001) works in favor of consumption-based solutions relative to other alternatives.

#### *The Relativity of Consumption-Based Solutions*

Determining what is and what is not a consumption-based solution depends on whether the initial investment, which typically requires fossil fuels, really does pay off with a later reduction of fossil-fuel (and other resources) use. As previously discussed, this criterion can be met by a steady-state economy on a system-wide basis, but individual instances of consumption are often misclassified as consumption solutions. Purchase of an environmentally friendly car like a Toyota Prius is widely seen as a consumption solution in the developed world because it reduces fossil-fuel use, but in a society with little history of car ownership the same purchase would increase fossil-fuel use and could do so on a vastly larger scale. The difficulty is that what

constitutes a consumption-based solution must be evaluated relative to a prior baseline of fossil-fuel consumption rather than solely on the occurrence of the behavior itself. The Prius is a solution for the wealthy North American who is replacing an SUV, but is a climate-change problem for a Chinese or Indian family that has never owned a car.

Consumption-based solutions are relative, and the reasoning behind them has been used to institutionalize economic inequality. The logic of consumption-based solutions leads to reasoning that only the wealthy may employ them because only for them do the expenditures pay off with a net reduction in fossil-fuel use. Maintaining that the Prius purchase is good or permissible only for those who already drive less efficient vehicles is an argument that those already well off are permanently privileged and exceptional; as a result, this type of issue has dominated the failed climate-change summits (Roberts & Parks, 2007). Because consumption and CO<sub>2</sub> emissions occur worldwide, it is necessary that regulatory agreements be international in scope.

The relativity of consumption-based solutions also enters into the misclassification of what constitutes an environmentally friendly product and an environmentally friendly vendor. Products labeled as environmentally friendly may have less environmental impact than competing products, but this labeling deceptively conceals the superior alternative of not using the products at all. Recognizing this problem, Norway has banned ads that claim that certain green cars are environmentally friendly. In supporting the ban, Bente Oeverli, a government ombuds office official, stated that "Cars cannot do anything good for the environment except less damage than others" (Doyle, 2007, para. 2). The superior no-consumption alternative does not carry any reinforcing sticker to certify that it is environmentally friendly,

leading us to drive more efficient motor vehicles rather than to cease using them entirely, a solution that leads to the walkable and bikeable environments people enjoyed at the beginning of the 20th century (Sova-cool, 2009). Over time, wealthy societies have gone through a habituation or habituation-like process in which consumption necessities have continually expanded (Grant, 2010; Schor, 1998). The percentage of U.S. residents who considered a second car as a necessity nearly doubled from 20% in 1973 to 37% in 1996 (Schor, 1998). People who forgo motor vehicle use and instead walk and bicycle are today depicted in trend-setting Hollywood films as low-status outcasts and losers (Vanderbilt, 2010).

#### **TURNING TO CULTURE-BASED SOLUTIONS: TRADITIONS IN BEHAVIOR ANALYSIS**

Many in developed nations are like Frazier, the misanthropic antihero of *Walden Two*, who was paradoxically incapable of enjoying the appealing world he had created because he was not a product of it. It is difficult and perhaps even impossible for many who know only a materialistic world to even conceive of an alternative. Making a nonmaterialistic world appealing is a matter of establishing and maintaining the effectiveness of reinforcers for behaviors that do not depend on fossil fuels and other limited resources. In technical terms, this involves the use of motivating operations (Laraway, Snyckerski, Michael, & Poling, 2003) to increase the effectiveness of nonmaterial reinforcers relative to material reinforcers and to do so in a way that is durable over time. Historically, this has successfully occurred, at least for a time, within bohemian subcultures, the voluntarily simplicity movement, and certain religious groups (Grant, 2010; Shi, 1985). Maniates (2002) challenged the behavioral sciences by asking key questions about people

in one of these subcultures, the voluntary simplicity movement:

What (to put it bluntly) is with these people? What, in other words, accounts for their ability to step back and ask tough questions about consumption and personal satisfaction? What has inoculated them against luxury fever and imbued them with a certain “consumptive resistance”? Are they just better people, or maybe just better off? Or has some combination of cultural, political, and social forces come together in their lives to extricate them from the tyranny of expectations? And could this combination conceivably be fostered, and even recreated, for a significant portion of industrial and overconsuming North America? (p. 211)

These issues, crucial for human survival, are all matters of human behavior. If those in the behavioral sciences can rise to the challenge of answering these questions and pursuing the solutions that emerge, life as we know it has a fighting chance. At least in principle, behavior analysis has an important role to play because it has conceptual apparatus and a technology for altering reinforcer effectiveness, not just behavior. In this respect, behavior analysis stands in sharp contrast to most economic approaches and many psychological perspectives, which see the motivation to accumulate material possessions as an invariant feature of consumers and their hard-wired brains.

A key overall advantage of culture-based solutions is that they offer the promise of an improved way of life. Mill (1848), Thoreau (1854/1995), Skinner (1976), Scitovsky (1989, 1992), and Schafer (2008) have all conceived of desirable sustainable societies. Each provided attractive visions rather than using appeals to guilt or ones that “frighten people rather than offer them a world to which they will turn because of the reinforcing consequences of doing so” (Skinner, 1978, p. 13).

Briefly considered here are four specific types of culture-based solutions, each of which was central to the design of *Walden Two*: goal

setting, work-time reduction, abolishing commercial advertising, and establishing the effectiveness of cultural reinforcers.

### *Goal Setting*

Societal success is currently defined though aggregate measures of material consumption, such as gross domestic product (GDP), which orient entire political, economic, and educational systems toward boosting GDP independently of any effect this has on the well-being and satisfaction that people experience in their daily lives. Increasing consumption and GDP is currently our collective goal, yet doing so contributes to increasing CO<sub>2</sub> emissions, depletion of natural resources, and climate change.

Much of the problem is that increasing GDP has become so culturally ingrained that we use it without reflecting on alternative goals. In *Walden Two*, the good life had been consciously reconsidered. Key goals became ceasing the institutional creation of dissatisfaction as a motivational technique, providing the time and opportunities to “exercise talents and abilities,” promoting the “unnecessary and pleasurable selective exploration of nature,” developing “intimate and satisfying personal contacts,” and providing “relaxation and rest” (Skinner, 1976, p. 148). Economists and other social scientists have taken up this same theme, recognizing the deficiencies of measures like GDP and proposing alternatives that include indicators that measure, in addition to consumption, individual happiness, health, connectedness with family and friends, personal and national indebtedness, leisure time, poverty levels, violent crime, economic inequality, and physical and mental health. The genuine progress indicator (GPI; Anielski, 2007) is one such alternative measure that was developed in part to address environmental problems such as climate change and peak oil.

*Work-Time Reduction*

In a paper entitled "Economic Possibilities for Our Grandchildren," John Maynard Keynes (1930) envisioned a 3-hr workday and a 15-hr workweek for the grandchildren of his generation. Keynes anticipated that increases in economic productivity would allow people to work less for the same purchasing power and in turn give them more time for enjoyable leisure pursuits. Since 1930, U.S. per capita inflation-adjusted GDP has increased 5.9 times (Bureau of Economic Analysis, 2011), true to Keynes' projections, yet we are clearly far from realizing his leisure society.

There are many reasons for this failure, including increasing economic inequality and a set of interlocking practices that give people the options of full-time work, poorly paid part-time work, or unemployment (Hayden, 1999; Hunnicutt, 1988; Schor, 2010). Part of the problem is a culture of working to consume that trades leisure time for material wealth. Status competition is an unfortunate motivator: Instead of comparing ourselves to the people of 1930 and having a sense of well-being that we have an economic standard of living nearly six times greater than they did, we compare ourselves to wealthier people in our current generation (Frank, 2008; Schor, 1992). Frank has attributed this to the importance of local context: In behavioral terms, people are very sensitive to social reinforcers that accrue from even small changes in our positional status relative to peers in our local setting (Vukelich & Hake, 1974). Behavioral work in social comparison (e.g., Hake, Vukelich, & Kaplan, 1973), especially how to diminish the reinforcing effectiveness of social comparison, therefore assumes considerable environmental importance (Biglan, 2009). Shi (1985) described how peer pressure has been harnessed to reduce superfluous status con-

sumption through censure of excessive material consumption and praise for simple modes of living. Rosenberg (2011) has described how peer pressure has led to a wide variety of advances in human health and well-being. Peer influence is also seen in bohemian subcultures in which bourgeois aspirations are discouraged as distractions from intellectual and artistic creation, providing an alternative means of defining success and failure (de Botton, 2004). Reinvention of our conceptions of success and failure is a part of many culture-based solutions, including work-time reduction.

Hayden (1999) and Schor (2010) have portrayed trading leisure for work as a bad bargain for the environment: Both work and the consumption that results deplete nonrenewable resources and maintain carbon emissions at levels that have precipitated the climate-change crisis. A trend toward shorter work hours took place during the entire 100-year period that ended with World War II (Hunnicutt, 1988). Had that trend continued until the present, fossil-fuel emissions and resource depletion would today be much more manageable problems than they are now.

*Commercial Advertising*

On the Walden Radio Network, advertising was banned. Skinner (1976) recognized the behavior-controlling potential of ads to increase wasteful consumption and derail people from developing and expanding their interests in the arts, athletics, social relationships, and so on. The most effective forms of behavior control operate largely without people's awareness or suspicion, and this is precisely what modern advertising does. Through nearly constant exposure and various conditioning mechanisms, advertising boosts material consumption through operant and Pavlovian processes (Grant,

2010). People misperceive these methods as benign and easily defeated through the exercise of conscious will power (Wilson, 2002). They depend on introspective perceptions to conclude that advertising is no match for conscious will power, a mistake caused by inherent defects in introspection as a method to identify functional relations (Skinner, 1974).

Paradoxically, the effectiveness of material reinforcers in advertising is accomplished by differentially associating them with nonmarket reinforcers that people seek: love, friendships, sensuality, joyful emotional experiences, family gatherings, pleasant music, or humor, none of which comes with a price tag attached. Most advertising is therefore implicitly deceitful, carrying the message that the good things in life are intrinsically connected to material consumption (Jhally, 2002). This mistaken connection becomes partially self-fulfilling, because when people are compelled to work full time for material reinforcers, their contact with nonmaterial reinforcers is restricted, especially those that require time to become fully effective. In this way, people are prevented from seeing their lives as rich in experiential choices beyond the narrow realm of materialism (Waide, 1987), and often develop impoverished self-concepts based on identification with commercial products (Barber, 2007; Cushman, 1990).

As a discipline centrally concerned with the issues and implications of behavior control, behavior analysis is, in principle, well positioned to address the environmental problems that advertising creates through research and application. For example, following up on research examining the use of aversive contingencies in advertising (e.g., Richins, 1991) would be useful, as would research on reverse advertising to discourage consumption (Bordwell, 2002). Behavior analysts can also apply their

knowledge of conditioning processes to support banning ads, especially those directed at young children. Some evidence suggests that for very young children, awareness of the persuasive intent of ads increases the reinforcing effectiveness of the advertised products (Rozendaal, Buijzen, & Valkenburg, 2009). Norway and Sweden have banned the broadcast of children's ads, and the Canadian province of Quebec has banned all ads directed at children by any medium (Media Awareness Network, 2010). U.S.-based groups are seeking similar bans (e.g., Campaign for a Commercial-Free Childhood, 2011). Monbiot (2009) has called for newspapers to ban ads for cars and air travel as a means of addressing climate change.

An appealing prospect is a one-for-one ad policy that would reclaim the public ownership of the airwaves and require broadcasters to match all ad time with an equal time for public-service announcements (PSAs) that criticize consumption and promote desirable alternatives. Adbusters' (2011) satirical counter-consumption ads are designed to diminish the reinforcing effectiveness of advertised products, for example by differentially associating the product with unpleasant imagery or by casting passive ad viewers unflatteringly as products themselves. The Mormon Church's (Mormon.org, 2005) PSAs are designed to increase the reinforcing effectiveness of wholesome and pleasurable family activities that are desirable alternatives to material consumption. Potential PSAs could include encouraging critical thinking about commercial persuasion methods, voting in elections, civic engagement, language learning, sports participation, healthy eating, alternatives to violence, civility, participation in the arts, and so on. These would all foster desirable alternatives to the work-to-consume behaviors encouraged by advertising.

*Establishing the Effectiveness of Cultural Reinforcers*

Economist Tibor Scitovsky (1989, 1992) described the problem of over-consumption as a lack of *skilled* consumption, which in technical terms refers to a process in which aesthetic conditioned reinforcers are established, riveting fortunate individuals in the pursuit of artistic, musical, intellectual, and other cultural reinforcers. We tend to think of consumption as only material consumption, but Scitovsky's skilled consumption refers to the consumption of learned aesthetic and cultural reinforcers that do not draw substantially on fossil fuels. Much of the effectiveness of these reinforcers is their infinite mutability into a variety novel forms, an "endogenous source of change and novelty" (Bianchi, 2003, p. 204) and a central feature of aesthetic appeal (Hineline, 2005; Scitovsky, 1992). Acquiring fluent skills is initially time consuming and can be stressful. Tasks such as playing a musical instrument are difficult and challenge the learner's abilities (Csikszentmihalyi, 1990; Scitovsky, 1992). Once they are acquired, however, artistic and intellectual consumption skills produce a beneficial emergent multiplier effect: As greater levels of fluency are achieved, reinforcement rate and magnitude progressively increase. Reading is an example of this process. Basic reading instruction opens up a vast set of new reinforcers and, as advanced literary skills are acquired along with historical and contextual knowledge, more reinforcers are progressively forthcoming over time.

Although Scitovsky (1992) generally favored skilled consumption in the fine arts, he acknowledged that skilled consumption also could encompass a larger range of activities including the culinary arts, athletics, games requiring skill, politics, and science. Schafer (2008) and Solow

(2008) have also argued for this broadened concept of culture.

Questions about the sustainable use of leisure time rise high on the agenda once working-to-consume is seen as a problem, yet relatively little firm data point the way. We do encounter people who care little for status consumption and are wrapped up in worlds of athletics, yoga, probing conversation, open-source computing, reading, and the arts. The existence of these people suggests that Scitovsky and other arts advocates are correct that there is a higher plane of skill with richer and varied forms of novel reinforcement, but the nature of the plane and what is needed to get anyone there are not well understood. In the absence of data, Scitovsky (1992) asked us to reflect on examples like kindergarten children who are entranced by art experiences that never become the foundation of more advanced skills because they are displaced by the teaching of behaviors useful to the growth economy.

I have suggested that Scitovsky's consumption skills are broadly interpretable as a chained schedule of reinforcement in which the initial link has a high response requirement and a low reinforcement rate, but the terminal link has a high and long-lasting reinforcement rate (Grant, 2010). Bianchi (2003) suggested that these and similar contingencies produce suboptimal reinforcement due to two behavioral processes, hyperbolic discounting and melioration, that prevent people from discovering the underlying reinforcers at all, let alone any multiplier effect. These barriers to learning consumption skills also exemplify Koger and Winter's (2010) notion of a reinforcement dilemma. With lots of time and properly designed instruction, these barriers can be overcome. Mill (1848) firmly believed that consumption skills are within the reach of everyone. Consumption skills might be widely learned but for our education-

al system's bias in favor of economic production skills rather than aesthetic reinforcement (Scitovsky, 1989). For Scitovsky, a tragedy of our age is that most people fail to acquire the skills that permit the emergent multiplier effect to kick in, condemning them to lives of superficial materialism, easily accessible forms of entertainment, and work-to-consume routines that require intensive use of fossil fuels and other limited resources.

There are clearly many obstacles to a successful transition to a cultural age, and Scitovsky (1989) acknowledged that it would require generations. Bianchi (2008), Glenn (1986), and Linder (1970) cited modern time scarcity as an impeding factor, a problem solvable through work-time reduction initiatives. Early and continuing arts education, local organized athletics, libraries, and education in open-source computing are only a few examples of initiatives that may lead to cultural tipping points.

#### **WHAT CAN BEHAVIOR ANALYSTS DO?**

Behavior analysts can apply their expertise using all four types of the solutions outlined here, but the foregoing considerations heighten the importance of multipronged approaches that include regulatory solutions and the dissemination solutions that contribute to regulatory reforms. Collective action by individuals can best effect the regulatory reforms needed to challenge economic growth and income inequality. Legislation and agreements that provide guaranteed vacations; antiadvertising, profamily, and proleisure PSAs; fair-trade practices; a 30-hr workweek; job sharing; steeply progressive income taxes; carbon and consumption taxes; removal of road, highway, and airport subsidies; part-time jobs that carry no benefit penalties; comprehensive health-care insurance; collective bargaining rights; and early retirement are ex-

amples of methods to address climate change. Many of these proposals need to be broadly recognized as sustainability issues only coincidentally related to their historical status in traditional political ideologies, which evolved in eras in which social justice was a recognized issue but sustainability was not. Dissemination solutions are an important key to building the coalitions necessary to implement regulatory reforms, underscoring the use of behavioral principles to foster cooperation and social collaboration (Geller, 1989; McKenzie-Mohr, 2000; Neuringer & Oleson, 2010; Nevin, 2010) and environmental education (Blumstein & Saylan, 2007).

Labor unions have historically been a key driver for both reducing work hours and economic inequality (Hunnicut, 1988) and remain a force for sustainability (Hayden, 1999). Behavior analysts, who have had a significant impact in applying behavioral principles in the workplace on the side of management, could also apply their expertise on the side of labor to achieve environmental objectives such as a reduced work hours that become possible with gains in real wages and income equality. There are several practical problems in achieving these outcomes, including the inertia of affluence that has co-opted labor into work-to-consume behavior patterns and the marginalized status of unions in representing an increasingly smaller group of narrowly self-interested workers. While recognizing these problems, Hayden (1999) nonetheless sees possibilities for labor unions to resume their historical push toward work-time reduction. Labor leader Andy Stern (2010) has endorsed job sharing, a form of work-time reduction, as a remedy for the current unemployment problem.

Behavior analysts can apply generalized culture-based solutions. Geller's (1995) active caring for people and the environment and Biglan's

(2009) psychological flexibility are both generalized culture-based solutions that are capable of strengthening alternatives to material consumption. Educational programs and treatment packages that provide students with diverse, flexible, nonmaterial, and skill-based means of redefining success and failure (de Botton, 2004; Grant, 2010) are also generalized solutions that have the potential to address longstanding problems with existing standards (Sandage, 2005; Weiss, 1969). Behavior analysts might also consider using behavioral assessment and validation methods to better understand the impact of time allocation on well-being and then using these data to construct a behavioral index of societal sustainability, augmenting the work of economists in this area (e.g., Anielski, 2007).

Specific interventions can be aimed at the functional assessment and alteration of people's allocation of time from resource-intensive work to resource-light free-time activities. Treatment packages can be aimed at, for example, encouraging voluntary simplicity practices (e.g., Elgin, 1993), alternative community living (Altus & Morris, 2004; Lloyd, 2010), artistic appreciation and performance (e.g., Hetland, Winner, Veenema, & Sheridan, 2007), music appreciation (e.g., Madsen, Brittin, & Capperella-Sheldon, 1993), local exercise and sports programs (e.g., Ward & Barrett, 2002), games requiring consumption skills (e.g., Chess in the Schools, 2011; School Bridge League, 2011), reskilling (Foley, 2009), community-based activities (Luyben, 2009; Putnam, 2000), conversation (Miller, 2006), gardening, crafts, and so on. By creating reinforcers capable of competing with material consumption, these initiatives would facilitate a transition to a society of less resource-intensive work, but their potentially beneficial effects on sustainability would be fully realized only when accompanied by work-

time reductions. Creating the alternative reinforcers, however, is a partial means of creating demand for work-time reductions. Many of these activities today go unrecognized, even by their supporters, as environmentally significant. Arts advocates, for example, have historically had problems securing a place for the arts in school curricula and have succeeded only by arguing that the arts contribute to economic growth (Efland, 1990). Scitovsky's (1977) suggestion that the arts save resources by creating attractive time-use alternatives to resource-intensive work is currently inadmissible even as a debating point because it departs from the premise that arts education trains better workers and boosts growth.

Many other interventions can be aimed at shifting market consumption to nonconsumption or nonmarket consumption. A few examples include treatment packages to promote car-free living (e.g., Kay, 1997), returning lawns to natural landscapes (Christopher, 2011), telecommuting and distance education (Roy, Potter, Yarrow, & Smith, 2005), sharing instead of buying (e.g., Ozanne & Ballantine, 2010), open-source software (Feller et al., 2005), open-access publishing (Willinsky, 2006), and free texts produced through distributed collaboration (Ravid, Kalman, & Rafaeli, 2008).

Behavior analysts can explore methods of supplanting material reinforcers with nonmaterial reinforcers. Research in reinforcer sampling (Ayllon & Azrin, 1968) can ascertain how best to elevate the relative effectiveness of resource-light reinforcers (e.g., McBride, 1997). Research that establishes the necessary and sufficient conditions for the emergent multiplier effect that seems to occur in aesthetic skills would be valuable, thus building on existing work in fluency (e.g., Binder, 1996) and optimal experience (e.g., Csikszentmihalyi & Csikszentmihalyi,



1988). Social processes that motivate consumption (Frank, 1999; Schor, 1992, 1998), can be better understood and altered through work in social comparison (e.g., Chao & Schor, 1998). Research in antiadvertising PSAs and media literacy (e.g., Pechmann & Shih, 1999; Rozendaal et al., 2009; Wakefield, Flay, Nichter, & Giovino, 2003) might determine to what extent children and adults can learn to reject advertising appeals to consume. Research in evaluative conditioning (e.g., Hoffmann, De Houwer, Perugini, Baeyens, & Crombez, 2010; Shimp, Stuart, & Engle, 1991) might determine how to enhance the effectiveness of PSAs that encourage culture-based alternatives to work and material consumption.

Finally, behavior analysts can acquire direct experience with the nature and challenges of the solutions through self-experimentation (Neuringer, 1981) and self-directed interventions (Watson & Tharp, 2002). Direct experience and personal reinvention through culture-based solutions are prerequisites to authentic cultural reinvention. Personal application and experimentation with culture-based methods can provide a sense of individual empowerment over dominant and oppressive cultural forces. In addition, these methods yield direct personal benefits such as improved fitness, artistic and musical accomplishments, intellectual growth, and other recreational pleasures.

### CONCLUSION: INTEGRATING SOLUTIONS

Climate change is a multifaceted problem (Swim et al., 2010) that strikes both broadly and deeply into the economic and cultural fabric of the developed world; therefore, solutions must be equally broad and deep. Climate change is a problem of a growth economy that requires an endless supply of resources in a world in which those resources are finite.

Use of a steady-state economy is a general solution to the problem, which insures that resource inputs and waste-product outputs are maintained at sustainable levels. In the absence of a steady-state economy, cultural inertia and the associated metacontingencies that support economic growth are likely to override the effects of any solution. Consumption-based solutions risk increasing growth by making the economy more efficient and boosting consumption with a new mix of products deceptively marketed as environmentally desirable.

Four types of solutions will help make a cultural transition to a sustainable economy: consumption-based, culture-based, regulatory, and dissemination solutions. Culture-based solutions need special attention because they generally involve reduced material consumption and are therefore not supported by cultural inertia and growth-economy metacontingencies. Culture-based solutions are distinctly psychological solutions that tap the expertise of those in the behavioral sciences, especially behavior analysts who can deal with the fundamental problems of altering reinforcer effectiveness and thereby make a transition from an economic age to a cultural age (Schafer, 2008). Relatively small groups of behavioral scientists cannot, however, assume that mere advocacy of either consumption-based or culture-based solutions will solve the problem: A broad consensus must be reached to implement regulatory solutions that effectively support consumption-based and culture-based solutions on a sufficiently large scale. Behavior analysts, a group that has traditionally seen external influences as either distractive or corruptive, should recognize the nature of the challenge as one of political coalition building. Fortunately, ecological economists have a growing influence, and the relatively well-known individuals cited herein are championing worth-

while initiatives, including Walden Two's culture-based solutions. Working with these people offers the potential of building a critical mass sufficient to achieve cultural tipping points.

We clearly have a long way to go, but doing what we are currently doing—advocating and implementing only those solutions that do not alter the inertia of affluence and growth-economy metacontingencies—is complacency in environmentalist garb. The world's best days may be ahead of us, but getting there demands that we pause and reflect on what our best days can be.

## REFERENCES

- Adbusters. (2011). *Videos: Adbusters*. Retrieved from <http://www.adbusters.org/abtv/adbusters>
- Altus, D. E., & Morris, E. K. (2004). B. F. Skinner's utopian vision: Behind and beyond *Walden Two*. *Contemporary Justice Review*, 7, 267–286.
- Anielski, M. (2007). *The economics of happiness: Building genuine wealth*. Gabriola Island, British Columbia: New Society Publishers.
- Ayllon, T., & Azrin, N. H. (1968). Reinforcer sampling: A technique for increasing the behavior of mental patients. *Journal of Applied Behavior Analysis*, 1, 13–20.
- Barber, B. R. (2007). *Consumed: How markets corrupt children, infantilize adults, and swallow citizens whole*. New York: Norton.
- Bardi, U. (2008). *The universal mining machine*. Retrieved from <http://europe.theoil drum.com/node/3451>
- Bardi, U., & Pagani, M. (2007). *Peak minerals*. Retrieved from <http://europe.theoil drum.com/node/3086>
- Begley, S. (2010). *On the 40th anniversary of Earth Day, let's ... go shopping! Buying green and changing personal behavior won't save the planet*. Retrieved from <http://www.newsweek.com/2010/04/20/on-the-40th-anniversary-of-earth-day-let-s-go-shopping.html>
- Bianchi, M. (2003). A questioning economist: Tibor Scitovsky's attempt to bring joy into economics. *Journal of Economic Psychology*, 24, 391–407.
- Bianchi, M. (2008). Time and preferences in cultural consumption. In M. Hutter & D. Throsby (Eds.), *Value and valuation in art and culture* (pp. 236–260). Cambridge, UK: Cambridge University Press. Retrieved from <http://areadocenti.eco.unicas.it/mbianchi/cv.html>
- Biglan, A. (2009). Increasing psychological flexibility to influence cultural evolution. *Behavior and Social Issues*, 18, 15–24.
- Binder, C. (1996). Behavioral fluency: Evolution of a new paradigm. *The Behavior Analyst*, 19, 163–197.
- Blumstein, D. T., & Saylan, C. (2007). The failure of environmental education (and how we can fix it). *Plos Biology*, 5, 973–977.
- Bordwell, M. (2002). Jamming culture: Adbusters' hip media campaign against consumerism. In T. Princen, M. Maniates, & K. Conca (Eds.), *Confronting consumption* (pp. 237–253). Cambridge, MA: MIT Press.
- Brethower, D. (2007). *Performance analysis: Knowing what to do and how*. Amherst, MA: HRD Press.
- Brookes, L. (2000). Energy efficiency fallacies revisited. *Energy Policy*, 28, 355–366.
- Bureau of Economic Analysis. (2011). *Table 7.1. Selected per capita product and income series in current and chained dollars*. Retrieved from <http://www.bea.gov/national/nipaweb/TableView.asp?SelectedTable=264&ViewSeries=NO&Java=no&Request3Place=N&3Place=N&FromView=YES&Freq=Year&FirstYear=1930&LastYear=2009&3Place=N&Update=Update&JavaBox=no#Mid>
- Campaign for a Commercial-Free Childhood. (2011). *About CCFC*. Retrieved from <http://www.commercialfreechildhood.org/aboutus.htm>
- Catton, W. (1982). *Overshoot: The ecological basis of revolutionary change*. Urbana: University of Illinois Press.
- Chance, P., & Heward, W. L. (2010). Climate change: Meeting the challenge. *The Behavior Analyst*, 33, 197–206.
- Chao, A., & Schor, J. B. (1998). Empirical tests of status consumption: Evidence from women's cosmetics. *Journal of Economic Psychology*, 19, 107–131.
- Chess in the Schools. (2011). *Why chess?* Retrieved from <http://www.chessintheschools.org/s/index.cfm?SSID=3>
- Christopher, T. (Ed.). (2011). *The new American landscape: Leading voices on the future of sustainable gardening*. Portland, OR: Timber Press.
- Cox, S. (2010). *Losing our cool: Uncomfortable truths about our air-conditioned world (and finding new ways to get through the summer)*. New York: The New Press.
- Critchfield, T. S., & Kollins, S. H. (2001). Temporal discounting: Basic research and the analysis of socially important behavior. *Journal of Applied Behavior Analysis*, 34, 101–122.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.
- Csikszentmihalyi, M. (1999). If we are so rich, why aren't we happy? *American Psychologist*, 54, 821–827.

- Csikszentmihalyi, M., & Csikszentmihalyi, I. S. (Eds.). (1988). *Optimal experience: Psychological studies of flow in consciousness*. Cambridge, UK: Cambridge University Press.
- Cushman, P. (1990). Why the self is empty: Toward a historically situated psychology. *American Psychologist*, 45, 599–611.
- Daly, H. E. (1980). Growth economics and the fallacy of misplaced concreteness. *American Behavioral Scientist*, 24, 79–105.
- Daly, H. E. (1996). *Beyond growth: The economics of sustainable development*. Boston: Beacon.
- Daly, H. E., & Cobb, J. B., Jr. (1994). *For the common good: Redirecting the economy toward community, the environment, and a sustainable future* (2nd ed.). Boston: Beacon.
- Daly, H. E., & Farley, J. (2004). *Ecological economics: Principles and applications*. Washington DC: Island Press.
- de Botton, A. (2004). *Status anxiety*. New York: Pantheon.
- Deffeyes, K. S. (2006). *Join us as we watch the crisis unfolding*. Retrieved from <http://www.princeton.edu/hubbert/current-events-06-02.html>
- Doyle, A. (2007). *Norway says cars neither "green" nor "clean."* Retrieved from <http://uk.reuters.com/article/2007/09/06/environment-cars-dc-idUKL0671323420070906>
- Dunn, C. (2008). *Can conspicuous consumption be good for the planet?* Retrieved from <http://www.treehugger.com/files/2008/04/conspicuous-consumption-good-for-the-planet.php>
- The Economist. (2007). *A stairway to heaven?* Retrieved from [http://www.economist.com/node/9253976?story\\_id=9253976](http://www.economist.com/node/9253976?story_id=9253976)
- Efland, A. D. (1990). *A history of art education: Intellectual and social currents in teaching the visual arts*. New York: Teachers College Press.
- Elgin, D. (1993). *Voluntary simplicity: Toward a way of life that is outwardly simple, inwardly rich*. New York: Morrow.
- Energy Bulletin. (2011). *Peak oil primer*. Retrieved from <http://www.energybulletin.net/primer.php>
- Farzad, R. (2008). *The oracle of oil speaks: Charles Maxwell, the world's wisest energy analyst, says the crunch will only get worse*. Retrieved from [http://www.businessweek.com/magazine/content/08\\_27/b4091075505012.htm](http://www.businessweek.com/magazine/content/08_27/b4091075505012.htm)
- Feller, J., Fitzgerald, B., Hissam, S., & Lakhani, K. R. (Eds.). (2005). *Perspectives on free and open-source software*. Cambridge, MA: MIT Press.
- Foley, M. (2009). The great reskilling. Retrieved from <http://campfire.theoil drum.com/node/5226>
- Frank, R. H. (1999). *Luxury fever: Money and happiness in an era of excess*. Princeton, NJ: Princeton University Press.
- Frank, R. H. (2008). Context is more important than Keynes realized. In L. Pecchi & G. Piga (Eds.), *Revisiting Keynes: Economic possibilities for our grandchildren* (pp. 143–150). Cambridge, MA: MIT Press.
- Geller, E. S. (1989). Applied behavior analysis and social marketing: An integration to preserve the environment. *Journal of Social Issues*, 45, 17–36.
- Geller, E. S. (1995). Actively caring for the environment: An integration of behaviorism and humanism. *Environment and Behavior*, 27, 184–195.
- Gilbert, T. F. (2007). *Human competence: Engineering worthy performance* (tribute ed.). San Francisco: Pfeiffer.
- Glenn, S. S. (1986). Metacontingencies in *Walden Two*. *Behavior Analysis and Social Action*, 5, 2–8.
- Glenn, S. S. (1991). Contingencies and metacontingencies: Relations among behavior, cultural, and biological evolution. In P. A. Lamal (Ed.), *Behavioral analysis of societies and cultural practices* (pp. 39–73). New York: Hemisphere.
- Goodman, A. (2011). *Naomi Klein: Why climate change is so threatening to right-wing ideologues*. Retrieved from [http://www.alternet.org/story/150180/naomi\\_klein\\_why\\_climate\\_change\\_is\\_so\\_threatening\\_to\\_right-wing\\_ideologues?page=entire](http://www.alternet.org/story/150180/naomi_klein_why_climate_change_is_so_threatening_to_right-wing_ideologues?page=entire)
- Grant, L. K. (2007). Peak oil as a behavioral problem. *Behavior and Social Issues*, 16, 65–88.
- Grant, L. K. (2010). Sustainability: From excess to aesthetics. *Behavior and Social Issues*, 19, 5–45.
- Grant, L. K. (in press). Does abstracting threaten a sustainable future? *The Psychological Record*.
- Greenspan, A. (2007). *The age of turbulence: Adventures in a new world*. New York: Penguin.
- Hake, D. F., Vukelich, R., & Kaplan, S. J. (1973). Audit responses: Responses maintained by access to existing self or coactor scores during non-social, parallel work, and cooperation procedures. *Journal of the Experimental Analysis of Behavior*, 19, 409–423.
- Hansen, J. (2009). *Storms of my grandchildren: The truth about the coming climate catastrophe and our last chance to save humanity*. New York: Bloomsbury.
- Hardin, G. (1993). *Living within limits: Ecology, economics and population taboos*. New York: Oxford University Press.
- Hayden, A. (1999). *Sharing the work, sparing the planet: Work time, consumption, & ecology*. Toronto, Ontario: Between the Lines.
- Heinberg, R. (2003). *The party's over: Oil, war and the fate of industrial societies*. Gabriola Island, British Columbia: New Society Publishers.

- Hetland, L., Winner, E., Veenema, S., & Sheridan, K. M. (2007). *Studio thinking: The real benefits of arts education*. New York: Teachers College Press.
- Heward, W. L., & Chance, P. (2010). Introduction: Dealing with what is. *The Behavior Analyst*, 33, 145–151.
- Hineline, P. N. (2005). The aesthetics of behavioral arrangements. *The Behavior Analyst*, 28, 15–28.
- Hoffmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: A meta-analysis. *Psychological Bulletin*, 136, 390–421.
- Hubbert, M. K. (1981). The world's evolving energy system. *American Journal of Physics*, 49, 1007–1029.
- Hunnicut, B. K. (1988). *Work without end: Abandoning shorter hours for the right to work*. Philadelphia: Temple University Press.
- Hunnicut, B. K. (1992). Kellogg's six-hour day: A capitalist vision of liberation through managed work reduction. *Business History Review*, 66, 475–522.
- Hunnicut, B. K. (1996). *Kellogg's six-hour day*. Philadelphia: Temple University Press.
- Intergovernmental Panel on Climate Change. (2007). *Climate change 2007. The physical science basis*. Retrieved from [http://www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_wg1\\_report\\_the\\_physical\\_science\\_basis.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm)
- Jacques, P. J., Dunlap, R. E., & Freeman, M. (2008). The organisation of denial: Conservative think tanks and environmental skepticism. *Environmental Politics*, 17, 349–385.
- Jhally, S. (2002). *Advertising & the end of the world* [Motion Picture]. Northampton, MA: Media Education Foundation.
- Kay, J. H. (1997). *Asphalt nation: How the automobile took over America and how we can take it back*. Berkeley: University of California Press.
- Keynes, J. M. (1930). *Economic possibilities for our grandchildren*. Retrieved from [www.econ.yale.edu/smith/econ116a/keynes1.pdf](http://www.econ.yale.edu/smith/econ116a/keynes1.pdf)
- Klare, M. T. (2004). *Blood and oil: The dangers and consequences of America's growing dependency on imported petroleum*. New York: Metropolitan Books.
- Koger, S. M., & Winter, D. D. (2010). *The psychology of environmental problems* (3rd ed.). New York: Taylor & Francis.
- Kreshel, P. (1990). John B. Watson at J. Walter Thompson: The legitimization of "science" in advertising. *Journal of Advertising*, 19, 49–59.
- Laherrère, J. (2007). *Interview with Jean Laherrère*. Retrieved from [http://www.hubbartpeak.com/laherrere/TheOilDrum\\_Interview\\_JeanLaherr%C3%A8re.pdf](http://www.hubbartpeak.com/laherrere/TheOilDrum_Interview_JeanLaherr%C3%A8re.pdf)
- Laraway, S., Snyckerski, S., Michael, J., & Poling, A. (2003). Motivating operations and terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis*, 36, 407–414.
- Leggett, J. (2005). *The empty tank: Oil, gas, hot air, and the coming global financial catastrophe*. New York: Random House.
- Linder, S. B. (1970). *The hurried leisure class*. New York: Columbia University Press.
- Lloyd, R. (2010). *Neo-bohemia: Art and commerce in the postindustrial city*. New York: Routledge.
- Luyben, P. D. (2009). Applied behavior analysis: Understanding and changing behavior in the community—A representative review. *Journal of Prevention and Intervention in the Community*, 37, 230–253.
- Madsen, C. K., Brittin, R. V., & Capperella-Sheldon, D. A. (1993). An empirical method for measuring the aesthetic experience to music. *Journal of Research in Music Education*, 41, 57–69.
- Maniates, M. (2002). In search of consumptive resistance: The voluntary simplicity movement. In T. Princen, M. Maniates, & K. Conca (Eds.), *Confronting consumption* (pp. 199–235). Cambridge, MA: MIT Press.
- McBride, T. (1997). *Frugal luxuries: Simple pleasures to enhance your life and comfort your soul*. New York: Bantam.
- McKenzie-Mohr, D. (2000). Fostering sustainable behavior through community-based social marketing. *American Psychologist*, 55, 531–537.
- McKibben, B. (2007). *Deep economy: The wealth of communities and the durable future*. New York: Times Books.
- McKibben, B. (2010). *Eaarth: Making a life on a tough new planet*. Toronto, Ontario: Knopf Canada.
- Meadows, D., Randers, J., & Meadows, D. (2004). *Limits to growth: The 30-year update*. White River Junction, VT: Chelsea Green.
- Media Awareness Network. (2010). *Marketing and consumerism: Special issues for young children*. Retrieved from [http://www.media-awareness.ca/english/parents/marketing/issues\\_kids\\_marketing.cfm](http://www.media-awareness.ca/english/parents/marketing/issues_kids_marketing.cfm)
- Mill, J. S. (1848). *Of the stationary state*. Retrieved from <http://www.panarchy.org/mill/stationary.1848.html>
- Miller, S. (2006). *Conversation: A history of a declining art*. New Haven, CT: Yale University Press.
- Monbiot, G. (2009). *Newspapers must stop taking advertising from environmental villains*. Retrieved from <http://www.guardian.co.uk/environment/georgemonbiot/2009/jun/05/climate-change-corporatesocialresponsibility>
- Mormon.org. (2005). *Television and radio messages for families*. Retrieved from <http://www.mormon.org/homefront/0,15902,3865-1,00.html>
- National Research Council. (2007). *Coal: Research and development to support national energy policy*. Washington, DC: National

- Academies Press. Retrieved from [http://www.nap.edu/openbook.php?record\\_id=11977](http://www.nap.edu/openbook.php?record_id=11977)
- Neuringer, A. (1981). Self-experimentation: A call for change. *Behaviorism*, 9, 79–94.
- Neuringer, A., & Oleson, K. C. (2010). Helping for change. *The Behavior Analyst*, 33, 181–184.
- Nevin, J. (2005). The inertia of affluence. *Behavior and Social Issues*, 14, 7–20.
- Nevin, J. (2010). The power of cooperation. *The Behavior Analyst*, 33, 189–191.
- Obama, B. H. (2009). *Inaugural address*. Retrieved from <http://www.whitehouse.gov/blog/inaugural-address/>
- Owen, D. (2010, December 20 & 27). The efficiency dilemma: If our machines use less energy, will we just use more? *The New Yorker Digital Edition*.
- Ozanne, L. K., & Ballantine, P. W. (2010). Sharing as a form of anti-consumption? An examination of toy library users. *Journal of Consumer Behavior*, 9, 485–498.
- Pechmann, C., & Shih, C. F. (1999). Smoking scenes in movies and antismoking advertisements before movies: Effects on youth. *Journal of Marketing*, 63, 1–13.
- Phillips, K. (2006). *American theocracy: The peril and politics of radical religion, oil, and borrowed money in the 21st century*. New York: Viking.
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon and Schuster.
- Ravid, G., Kalman, Y. M., & Rafaeli, S. (2008). Wikibooks in higher education: Empowerment through online distributed collaboration. *Computers in Human Behavior*, 24, 1913–1928.
- Reid, D. G. (1995). *Work and leisure in the 21st century: From production to citizenship*. Toronto, Ontario: Wall & Emerson.
- Richins, M. L. (1991). Social comparison and the idealized images of advertising. *Journal of Consumer Research*, 18, 71–83.
- Roberts, J. T., & Parks, B. C. (2007). *A climate of injustice: Global inequality, North-South politics, and climate policy*. Cambridge, MA: MIT Press.
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., III, Lambin, E. F., et al. (2009). A safe operating space for humanity. *Nature*, 461, 472–475.
- Rogers, H. (2010). *Green gone wrong: How the economy is undermining the environmental revolution*. New York: Scribner.
- Rosenberg, T. (2011). *Join the club: How peer pressure can transform the world*. New York: Norton.
- Rosnick, D., & Weisbrot, M. (2006). *Are shorter work hours good for the environment? A comparison of U.S. and European energy consumption* (CEPR Reports and Issue Briefs, 2006-32). Washington, DC: Center for Economic and Policy Research (CEPR). Retrieved from <http://ideas.repec.org/p/epo/papers/2006-32.html>
- Roy, R., Potter, S., Yarrow, K., & Smith, M. (2005). *Towards sustainable higher education: Environmental impacts of campus-based and distance higher education systems*. Retrieved from [http://www3.open.ac.uk/events/3/2005331\\_47403\\_o1.pdf](http://www3.open.ac.uk/events/3/2005331_47403_o1.pdf)
- Rozendaal, E., Buijzen, M., & Valkenburg, P. (2009). Do children's cognitive advertising defenses reduce their desire for advertised products? *Communications*, 34, 287–303.
- Rubin, J. (2009). *Why your world is about to get a whole lot smaller: Oil and the end of globalization*. Toronto, Ontario: Random House Canada.
- Saletan, W. (2010). *Truth or consequences: Exploiting psychology in law and advertising*. Retrieved from <http://www.slate.com/id/2251884/>
- Sandage, S. A. (2005). *Born losers: A history of failure in America*. Cambridge, MA: Harvard University Press.
- Sanne, C. (2002). Willing consumers—Or locked-in? Policies for a sustainable consumption. *Ecological Economics*, 42, 273–287.
- Schafer, D. P. (2008). *Revolution or renaissance: Making the transition from an economic age to a cultural age*. Ottawa, Ontario: Ottawa University Press.
- School Bridge League. (2011). *A case for bridge in schools*. Retrieved from <http://www.schoolbridgeleague.org/case-for-bridge-in-school.aspx>
- Schor, J. B. (1992). *The overworked American: The unexpected decline of leisure*. New York: Basic Books.
- Schor, J. B. (1998). *The overspent American: Why we want what we don't need*. New York: Harper-Collins.
- Schor, J. B. (2010). *Plenitude: The new economics of true wealth*. New York: Penguin.
- Schumacher, E. F. (1989). *Small is beautiful: Economics as if people mattered* (reissued ed.). New York: Harper Perennial.
- Scitovsky, T. (1977). Can changing consumer tastes save resources? *Journal of Cultural Economics*, 1(2), 1–12.
- Scitovsky, T. (1989). *Human desire and economic satisfaction*. New York: New York University Press.
- Scitovsky, T. (1992). *The joyless economy: The psychology of human satisfaction* (rev. ed.). New York: Oxford University Press.
- Searchinger, T. (2011). *How biofuels contribute to the food crisis*. Retrieved from [http://www.washingtonpost.com/opinions/how-biofuels-contribute-to-the-food-crisis/2011/02/10/ABGiRQ\\_story.html](http://www.washingtonpost.com/opinions/how-biofuels-contribute-to-the-food-crisis/2011/02/10/ABGiRQ_story.html)
- Shi, D. E. (1985). *The simple life: Plain living and high thinking in American culture*. New York: Oxford University Press.
- Shimp, T. A., Stuart, E. W., & Engle, R. W. (1991). A program of classical conditioning

- experiments testing variations in the conditioned stimulus and context. *Journal of Consumer Research*, 18, 1–12.
- Skinner, B. F. (1953). *Science and human behavior*. New York: Macmillan.
- Skinner, B. F. (1974). *About behaviorism*. New York: Knopf.
- Skinner, B. F. (1976). *Walden two* (reissued ed.). New York: Macmillan.
- Skinner, B. F. (1978). Are we free to have a future? In B. F. Skinner, *Reflections on behaviorism and society* (pp. 16–32). Englewood Cliffs, NJ: Prentice Hall.
- Skinner, B. F. (1987). Why we are not acting to save the world. In B. F. Skinner, *Upon further reflection* (pp. 1–14). Englewood Cliffs, NJ: Prentice Hall.
- Solow, R. (2008). Whose grandchildren? In L. Pecchi & G. Piga (Eds.), *Revisiting Keynes: Economic possibilities for our grandchildren* (pp. 87–93). Cambridge, MA: MIT Press.
- Sorrell, S. (2007). *The rebound effect: An assessment of the evidence for economy-wide energy savings from improved energy efficiency*. London: UK Energy Research Centre.
- Sovacool, B. K. (2009). Early modes of transport in the United States: Lessons for modern energy policymakers. *Policy and Society*, 27, 411–427.
- Speth, J. G. (2008). *The bridge at the end of the world: Capitalism, the environment, and crossing from crisis to sustainability*. New Haven, CT: Yale University Press.
- Stern, A. (2010). *It's time to put America back to work*. Retrieved from [http://voices.washingtonpost.com/ezra-klein/2010/09/forum\\_andy\\_sterns\\_plan\\_to\\_crea.html](http://voices.washingtonpost.com/ezra-klein/2010/09/forum_andy_sterns_plan_to_crea.html)
- Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G., Reser, J., et al. (2010). *Psychology and global climate change: Addressing a multi-faceted phenomenon and set of challenges*. Retrieved from <http://www.apa.org/science/about/publications/climate-change.aspx>
- Thompson, L. G. (2010). Climate change: The evidence and our options. *The Behavior Analyst*, 33, 153–170.
- Thoreau, H. D. (1995). *Walden; or, life in the woods*. New York: Dover. (Original work published 1854)
- Twyman, J. S. (2010). TerraKids: An interactive Web site where kids learn about saving the environment. *The Behavior Analyst*, 33, 193–196.
- UNESCO. (2009). *The 3rd United Nations world water development report: Water in a changing world*. Paris: UNESCO Publishing. Retrieved from <http://www.unesco.org/water/wwap/wwdr/wwdr3/>
- United Nations. (1999). *The world at six billion*. Retrieved from <http://www.un.org/esa/population/publications/sixbillion/sixbilpart1.pdf>
- Vanderbilt, T. (2010). *Dude, where's your car? How not having a car became Hollywood shorthand for loser*. Retrieved from <http://www.slate.com/id/2262214/>
- Vernon, C. (2011). *Energy efficiency leads to higher CO<sub>2</sub> emissions?* Retrieved from <http://www.theoil Drum.com/node/7411>
- Vukelich, R., & Hake, D. F. Effects of the difference between self and coactor scores upon the audit responses that allow access to these scores. *Journal of the Experimental Analysis of Behavior*, 22, 61–71.
- Waide, J. (1987). The making of self and world in advertising. *Journal of Business Ethics*, 6, 73–79.
- Wakefield, M., Flay, B., Nichter, M., & Giovino, G. (2003). Role of the media in influencing trajectories of youth smoking. *Addiction*, 98(S1), 79–103.
- Walsh, B. (2011). *Why biofuels help push up world food prices*. Retrieved from <http://www.time.com/time/health/article/0,8599,2048885,00.html>
- Ward, P., & Barrett, T. (2002). A review of behavior analysis research in physical education. *Journal of Teaching in Physical Education*, 21, 242–266.
- Watson, D. L., & Tharp, R. G. (2002). *Self-directed behavior: Self-modification for personal adjustment*. Belmont, CA: Wadsworth.
- Weiss, R. (1969). *The American myth of success: From Horatio Alger to Norman Vincent Peale*. New York: Basic Books.
- Wheeler, T. (2004). *It's the end of the world as we know it*. Retrieved from <http://www.baltimorechronicle.com/080304ThomasWheeler.shtml>
- The White House. (2011). *Energy & environment*. Retrieved from [http://www.whitehouse.gov/issues/energy\\_and\\_environment/](http://www.whitehouse.gov/issues/energy_and_environment/)
- Willinsky, J. (2006). *The access principle: The case for open access to research and scholarship*. Cambridge, MA: MIT Press.
- Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Belnap/Harvard University Press.
- Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis*, 11, 203–214.
- Worm, B., Barbier, E. B., Beaumont, N., Duffy, J. E., Folke, C., Halpern, B. S., et al. (2006). Impacts of biodiversity loss on ocean ecosystem services. *Science*, 314, 787–790.
- Yanarella, E. J., Levine, R. S., & Lancaster, R. W. (2009). Green versus sustainability: From semantics to enlightenment. *Sustainability: The Journal of Record*, 2, 296–302.
- Zwibel, K., Mason, J., & Fthenakis, V. (2008). A solar grand plan. *Scientific American*, 298(1), 64–73.