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Acting in Light of the Future: How Do Future-Oriented Cultural Practices Evolve and How Can We Accelerate Their Evolution?

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Abstract

Despite extensive knowledge of how to prevent or ameliorate serious diseases, natural disasters, environmental degradation, and a wide range of other problems, we often fail to take action that that would prevent or mitigate these problematic outcomes. In short, although we may have sound scientific knowledge about threats to future wellbeing, we appear to have limited insight into how to benefit from this knowledge. With this paper, we argue that our current scientific understanding of how to act in light of the future is limited, but we offer a theoretical analysis of future-oriented behavior at both individual and organizational levels. Specifically, the paper draws on a functional contextualist account of human language and cognition, Relational Frame Theory (RFT), and its integrated therapeutic approach, Acceptance and Commitment Therapy (ACT), and extends this framework to analyzing the evolution of the practices of groups and organizations. This framework can provide an understanding of how human behavior may be modified in the present to serve improving human wellbeing in the future at individual, organizational, and even national levels.

Keywords

Societies are not as effective as they could be in anticipating, preparing for, and preventing a wide range of future problems. Consider public health. Despite extensive knowledge of modifiable risk factors for cancer and heart disease, we continue to be broadly unsuccessful at their prevention (McGinnis & Foege, 1993). Similarly, although progress has been made in the prevention of infectious diseases (Rothman & Greenland, 1998), we remain poorly prepared for new epidemics (Conan, 2005).

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We can predict many natural disasters and environmental problems, but often do not act effectively on our predictions. The impact of a large hurricane on New Orleans was predicted (Cohen, 2002), but steps were not taken that would have prevented the widespread and protracted devastation that Hurricane Katrina cause. A scientific consensus exists about the effects of climate change (Intergovernmental Panel on Climate Change [IPCC], 2013), but actions to prevent further warming remain minimal. Population growth outstrips the carrying capacity of our environment (Diamond, 2004; Harris, 1989; Ory, Forrest, & Lincoln, 1983), yet organized efforts to reduce growth are lacking. The 2007 financial meltdown was widely predicted (Lewis, 2010) and yet regulatory agencies failed to act (McLean & Nocera, 2011).

Scientific analysis could improve our ability to deal with future problems. However, a scientific understanding of the context that influences individuals and organizations to act in light of the future is quite limited. For this reason, we offer a contextual analysis of the future-oriented behavior of individuals as well as the future-oriented practices of organizations. Our hope is that analyzing the contextual influences on taking action will guide the evolution of a culture that becomes more effective at preventing future problems. The current analysis does not however address other facets of the problem of taking effective future action, such as our ability to make accurate predictions of future events. Silver (2012) provides an extensive discussion of this issue across problems ranging from the weather to the economy.

Analysis of Future-Oriented Behavior of Individuals

Among nonhumans, behavior is shaped and maintained primarily by immediate consequences. Hence, even behavior with long-term negative consequences may be established and maintained simply because it achieves immediate reinforcers. Nonhuman organisms remain blissfully unaware of unfortunate future probabilities.

The same phenomenon appears to guide many forms of human behavior, including eating, drinking, and procreating. For example, high-fat and high-calorie foods provide instant reinforcement but risk obesity and cardiovascular disease when overeaten (McGinnis & Foege, 1993). Alcohol is gratifying but has many potential negative long-term consequences, such as cirrhosis of the liver. Uncontrolled sexual gratification may lead to unwanted pregnancy and sexually transmitted diseases.

Unlike nonhumans, however, humans can and often do act in light of long-term consequences (Suddendorf & Busby, 2005). For example, we choose low-fat foods to control our weight; we work for years to earn college degrees and secure a stable income later; and we save for retirement. Groups, organizations, and nations engage in similar actions. Groups of friends plan a social event months in advance. A company develops a five-year strategic plan to improve its ability to develop new products and services. A nation implements policies to reduce youth tobacco use in order to reduce the rate of cancer far in the future. These examples illustrate many areas in which we take coordinated action in the present and knowingly delay or avoid gratification to predict and prepare for long-term future events. Scientific research that clarified how such future-oriented behavior is

established and how it might be increased could be one of the most important developments guiding the further beneficial evolution of human societies.

There is a sizable literature on behavior involved in acting in light of the future (e.g., Aspinwall, 2005). However, the primary focus of existing research is on the correlations between cognitive and affective states and traits and the likelihood of taking future-oriented action. For example, there are studies showing that positive mood is associated with people being more open to consider personal liabilities that are relevant to their future planning (Aspinwall & Brunhart, 1996, 2000). Similarly, there are studies distinguishing between hope and optimism as orientations toward future events (Bruininks & Malle, 2005) as well as studies showing that setting goals and planning ahead predict better future psychological outcomes than worrying about the future (Aspinwall, 2005).

The functional contextualist perspective that organizes contextual behavioral science focuses on prediction and influence of phenomena. From this perspective, the existing literature is limited because it fails to examine the environmental context that establishes relationships between cognitive and affective states and future-oriented behavior. Indeed, the literature cited here makes a rather limited contribution to our ability to create environments that would nurture effective future-oriented behavior. In the next section, we describe a functional contextualist framework for analyzing the environmental context that shapes not only future-oriented behavior, but the relationship between current cognitive and affective states and future-oriented behavior.

A Relational Frame Theory Account of Future-Oriented Behavior

In this section, we describe how Relational Frame Theory provides an account of the development of future-oriented behavior among humans. We believe that this account has the potential to improve our ability to establish and maintain future-oriented behavior. The account goes beyond an account simply in terms of contingency-shaped behavior by providing an analysis of the verbal processes that enable humans to act in light of long delayed consequences.

Consider a college student working towards her degree in chemistry in the hope of becoming an organic chemistry researcher. She knows very little about the desired job and has never known anyone in that position; she has conducted only a few experiments in her school's chemistry lab. In short, she has no history of reinforcement for her current behavior and cannot even be sure that it will lead to the reinforcers she desires several years away (e.g., she may not earn grades good enough to become a chemist despite her best efforts).

Of course, she may have a history of reinforcement for similar types of behavior that previously led to desired reinforcers. For example, her grades were good enough to get into college in the first place. However, if her current behavior is only an extension of what she has learned before, there is likely little reinforcement in childhood for behavioral units that extend across such a long period of time. Thus, if such a limited history of contingencies was the only basis of her behavior, it is hard to see how she would maintain such behavior. For example, current distractions will regularly challenge her motivation to study. Indeed, to earn good grades, she cannot go out with her friends each time they ask because immediate

access to those reinforcers may compromise her access to the imagined future. Although she may gain some momentum and reinforcement for small steps that approximate her desired outcome, these may be both small and infrequent. In other words, she cannot access the future goal along the way. So, how does she stay on track? We suggest that Relational Frame Theory accounts for the behavior of our steadfast young student, despite her limited history of direct reinforcement for her studious behavior.

Relational Frame Theory (RFT) is a well-established and empirically supported functional, contextual, and behavioral account of human language and cognition. (For book-length summaries, see Hayes, Barnes-Holmes, & Roche, 2001 and Dymond & Roche, 2013.) In short, RFT proposes that the ability to relate events arbitrarily is a uniquely human and core set of complex verbal abilities. RFT and its empirical base have identified a number of *relational frames* or families of relations that include coordination, distinction, opposition, comparison, hierarchy, causality, and perspective-taking (also called deictic relations). This paper focuses particularly on RFT's causality and perspective-taking relations as they are central to the theory's approach to future behavior. Detailed descriptions of the other types of relations are available elsewhere (e.g., Hayes et al., 2001).

Temporal NOW-THEN deictic relations—RFT research has repeatedly demonstrated three sets of relations that are central to human perspective-taking, including I vs. YOU, HERE vs. THERE, and NOW vs. THEN. The findings overall suggest that children learn to respond in accordance with I vs. YOU first. These abilities expand with the emergence of the spatial HERE-THERE relations and finally the temporal NOW-THEN relations (Barnes-Holmes, 2001). In a nutshell, learning to respond in these ways facilitates development of the sense of self or perspective from which one operates in the world. Temporal relations are particularly difficult to learn because unlike I-YOU and HERE-THERE, there are no formal properties to learn from. That is, time is an abstract concept: *now* at one time is very different from *now* at another time and *nows* never repeat. Evidence from the broader developmental literature lends support to this trajectory in the development of a sense of self (Howlin, Baron-Cohen, & Hadwin, 1999).

The temporal relations likely play a strong role in future thinking for verbally sophisticated individuals because they allow us to bring the future psychologically into the present so that it can control current actions to serve future outcomes. In other words, a very strong and rich relationship exists between NOW and THEN, and the nature of this relationship may change on an on-going basis. For instance, if the young student from the example above receives a bad grade and feels low about it, she may coordinate NOW with THEN and derive that she will never achieve her degree. That is, if THEN is the same as NOW, the student will continue to receive poor grades and will not realize her dream. In contrast, imagine that she recognizes that the current low grade is unusual and does not match her normal high performances. Hence, she may derive a comparison (rather than coordination) relation between NOW and THEN and thus assume that her next grade will be better (i.e., good NOW, better THEN). These examples illustrate that the relationship between the present and the future is not fixed but is very fluid in a *relational* sense. Specifically, at different times the present and the future can appear equal, different, oppositional, or comparative and some

times the future can be seen to contain the present in a hierarchical way. These perceptions are not based on reality, but are often arbitrary and derived.

Our temporal perspective-taking relations allow us to coordinate our present and future in such a rich way that it is often hard to separate what is now and what is then. For example, our student may daydream from her dormitory of having an office on campus and her own lab or of presenting a paper at a prestigious conference. The somatic and emotional functions of these future events, if coordinated with the present, will transform from THEN to NOW and she may even begin to feel powerful, respected, satisfied, and complete. She might even get butterflies in her tummy with excitement. All of these emotional events will likely serve to keep her motivation in the present high. As a result, this rich experiential contact with the future (but in the present) may serve to keep her going in the desired direction and compensate for the loss of immediate reinforcers. It is as if we can make regular contact with the reinforcer in the future simply by imagining it in the present. This is exactly what temporal relations do.

IF-THEN relations—For RFT, future thinking also involves causal or IF-THEN relations. In short, if I do X now, I will get Y later. IF-THEN relations allow us to calculate the extent to which our current actions influence future outcomes. We need to be able to do this with some accuracy in order to sow the seeds of the future we desire. Clearly, the temporal and causal relations are very similar because they both specify a relationship between now and a later point. However, the difference between them is that, while temporal relations specify the relationship between the two points in time and this relationship may have a number of forms, the causal relations specify that this relationship is more causal in the sense that something that happens in the present influences or causes something that is likely to happen in the future. This is why we suggest that both types of relational responding are necessary for future planning and guidance for future action.

Children receive extensive training in contingencies with others that likely facilitate very sophisticated patterns of IF-THEN responding. For example, the statement, "If you pick up your dirty clothes, you can watch TV" presumably makes the aversive act of picking up the clothes reinforcing in the present because it will lead to the pleasant act of watching TV later. If there was no connection between now and then, or if TV-watching did not in practice follow picking up clothes, this behavior would make little sense. Once again, RFT would argue that a child's history of training in contingencies directly facilitates this type of behavior, but contingencies alone are not enough. We need to be able to make psychological contact with the future in the present moment (temporal relations) and we need to be able to calculate reliably the probability that certain actions now will result in certain outcomes later (causal relations).

IF-THEN relations may have a particularly strong influence on current and future behavior because they allow us to create a context in which we are willing to forego reinforcers in the present. This is not only a largely verbal and human phenomenon, but is also critical to exercising control over one's future. Indeed, such training appears to be vital for social, academic, and work success. For example, there is evidence that the ability to forgo immediate rewards in the interest of obtaining a larger reward later is more likely to be

found among middle class children than among families with fewer financial resources and is associated with greater academic success (Mischel, Ebbesen, & Raskoff-Zeiss, 1972) and a lower likelihood of drug abuse (Bickel & Marsch, 2001).

Note that we are not arguing that relational framing is the only process through which humans avoid delayed negative outcomes and achieve positive ones. Some behavior patterns may have long-term benefits even if they were established solely for immediate reinforcement. Parents may set up contingencies requiring brushing teeth, which may prevent future cavities. Children who brush their teeth only because their parents require it will likely develop this habit even if they do not verbally relate brushing teeth to avoiding cavities later. Thus, it may be possible to create immediate consequences that foster behavior leading to long-run benefits to the individual, even if the individual does not make present contact with the future benefits. For example, Thaler and Sunstein (2008) advocate retirement saving policies that automatically enter people into the maximum savings but allow them to reduce the amount. They indicate that this strategy has led to greater savings than a system in which people opt in to maximize their savings.

To summarize, individuals act in light of the future (1) through basic training in concepts of time and in framing relations between current behavior and later outcomes; and (2) by establishing behavioral routines with long-term benefits, even though the person does not frame relations between current behavior and later outcomes (at least initially). The distinction between this type of contingency-based behavior and verbal relational behavior opens the way to precisely delineating influences on behavior with delayed benefits or harm and to improving humans' self-management capacities. However, other types of verbal behavior may also influence actions conducted in the present that are in the service of the future.

Rule-governed behavior—Hayes, Zettle, and Rosenfarb (1989) distinguished among three units of rule following. *Pliance* is defined as "rule-governed behavior under the control of apparent socially mediated consequences for a correspondence between the rule and relevant behavior." In pliance, we do things because of the social consequences for the correspondence between our behavior and the rule. Presumably our college student's tendency to follow through on assignments is in part a function of a history in which teachers' approval or achieving good grades reinforce completion of assignments (i.e., following the rules).

The second unit of rule following is called *tracking*. It is "under the control of the apparent correspondence between the rule and the way the world is arranged." We follow the rule because it works to do so. Our successful college student has undoubtedly learned that when told to study a certain section of a textbook, it helps her get a good grade if she does so.

The third unit is *augmenting*. Augmenting the functional effects of a rule is due to the participation of the rule in a relational network. For example, our college student may be particularly motivated to do an extra-credit assignment because she knows it will add five points to her grade. Knowledge of the link between the assignment, the points, and the grade has altered the functional effect of doing the assignment.

All three of these functions may support any given future-oriented behavior. The child who is learning to brush her teeth may do so because her parents require it (pliance), because brushing as she has been advised to do led to fewer painful cavities (tracking), and because she has learned to relate brushing to a pleasing smile and pleasant breath.

The implications of this analysis for building strong, effective future-oriented repertoires is that future-oriented behavior can be strengthened by providing a lot of social reinforcement for following rules about expected future behavior, by providing plenty of occasions when following rules about the world enable people to achieve valued outcomes, and by embedding desirable future behavior in extensive networks that link the behavior to many other valued outcomes. We currently know little, however, about the relative value of these three strategies for enhancing future oriented behavior. Empirical research that compared them and their relative capability to influence future behavior would be valuable in increasing our ability to build effective future-oriented behavior.

Influence of the past on future behavior—Just as the future can be brought into the present, so can the past. This can have positive benefits when we take action to avoid future problems that our past alerts us to. For example, our chemistry student may do poorly on a test because she partied more than she studied. But as her next test approaches, her memories of her past poor performance may motivate her to study rather than party, leading to a better future outcome. There is growing evidence that *avoidance of* distress associated with past experience contributes to psychological suffering (e.g., Hayes, Strosahl, & Wilson, 2012). Hence, if our chemistry student is unwilling to think about her previously poor grade (or examine her feedback) because it is too painful, she may avoid studying because it reminds her of her past failure. In sum, making contact with the past in the present may motivate effective preparation for the future and avoiding the past may undermine future-oriented behavior. Research that clarifies what influences us to react to our past experience either with avoidance or with changes in our behavior that is of benefit to us in the future would be useful.

Saving for retirement is a good example of the kind of future-oriented behavior that we would do well to increase. People typically do not save enough. In the US, estimates indicate more than 50% of households will not have enough money to maintain their income in retirement (Munnell, Webb, & Golub-Sass, 2012). The current analysis suggests some principles that might strengthen this behavior. The RFT analysis suggests that people are more likely to save for retirement if they frame relationships between saving and investing currently and the quality of their life even 40 years later. Presumably the value of saving now will be enhanced when a person frames saving as causally related to later financial comfort (and all the benefits associated with it) and as oppositional to future financial distress. Indeed, there is some evidence from decision research indicating that future behavior is more greatly affected by the expectation of losses than by expectation of an equivalent gain (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001); that is, losses loom larger than gains. In RFT terms this would suggest that we are more likely to influence people to save for retirement by emphasizing the problems they will have if they don't (i.e., not saving in an if-then relation with later loss) than by depicting the comfort they will experience if they do (i.e., saving in an if-then relation with later gain).

Suggested Empirical Research

Although growing evidence supports an RFT analysis of verbal behavior as relational, research is limited on specific processes hypothesized to be involved in future-oriented behavior (see publication list at http://contextualscience.org/publications). One line of research to address this gap would involve studies that determine whether consequential functions of neutral stimuli are transformed as a result of relating them to stimuli that have already established consequential functions. Indeed, Whelan and Barnes-Holmes (2004) have shown that neutral stimuli become reinforcing or punishing when adult participants learn to relate them to stimuli with established punishing or reinforcing functions. Specifically, a stimulus placed in a SAME relationship with an established punisher came to function as a punisher and a stimulus placed in an OPPOSITE relationship with a punishing stimulus became a reinforcer, even though neither was a directly established reinforcer or punisher. Hayes, Kohlenberg, and Hayes (1991) also found that relational training can transform consequential functions. This type of research would help to explain how perceived consequences for novel behavior are derived from consequences for previous behavior, making that novel behavior more likely.

A second line of research would analyze whether multiple exemplar training can establish future-oriented behavior as a functional response class. That is, do multiple and diverse experiences of being reinforced for deriving a relationship between a behavior and a future consequence increase a child's ability to derive such relationships for previously untrained behavior-future consequence relationships? And does such training increase the probability that children will engage in behavior that they have learned to associate with future consequences? Or is it also necessary to be sure that they have actually attained those future consequences? As Baer, Peterson, and Sherman (1967) demonstrated, regarding the creation of an imitative response class, it may be necessary for at least a portion of the behavior-consequence frames to result in attaining the consequence in order for the framing and engagement in the behavior to occur.

A third line of research would explore how children learn to analyze and predict likely future consequences and desired future outcomes and ways in which (e.g., by rules) they construct plans for achieving those outcomes. This type of research might assist us in enhancing motivation to act currently in ways that will deliver reinforcers in the future (even if current consequences are aversive). This pertains to the common concept of resilience.

Recent research in clinical psychology provides an example of this way to articulate possible future consequences. Acceptance and Commitment Therapy (ACT) is a therapeutic strategy for helping people with diverse problems. Randomized controlled trials have shown ACT's efficacy in affecting depression, substance abuse, psychosis, smoking, worksite stress, serious health issues, and a host of other problems (Hayes et al., 2004; Hayes Luoma, Bond, Masuda, & Lillis, 2006). ACT's efficacy is relevant to this discussion because a prominent feature of ACT involves helping people clarify their values and commit to action to pursue those values. This is a counterweight to people's tendencies to lock into struggles with distressing events because they believe they must overcome the distress before proceeding. ACT helps people elaborate and enrich their thinking about what they most value in each major area of their lives (e.g., work, family relations, education, recreation). They then learn

to develop concrete goals and activities to move them in those directions. The results of ACT research provides further evidence that strengthening the link between current behavior and future outcomes has an important influence on current functioning.

The ACT research also has implications for existing research on future-oriented behavior (e.g., Aspinwall, 2005). As noted above, this research documents the relationship between positive mood and willingness to consider personal liabilities relevant to future planning (Aspinwall & Brunhart, 1996, 2000). The ACT research suggests that such relationships are not immutable but rather a function of the context. For example, ACT interventions create contexts in which people become able to have negative moods and still consider personal liabilities.

A fourth line of research would focus on augmenting the current value of delayed consequences. Distant consequences may not affect current behavior for two reasons. First, consequences may only probabilistically relate to current behavior (e.g., smokers have a high risk of heart attacks and cancers, but not all smokers are affected). Second, even when a delayed consequence is certain, its value may not suffice to affect current behavior. It is important to delineate factors augmenting current judgments about the value of future consequences. Slovic and colleagues (e.g., Slovic, Peters, Finucane, & MacGregor, 2005) describe the affect heuristic, in which one's reactions to emotionally evocative stimuli influences judgments about the value of those stimuli. For example, adolescents know smoking risks quite well, but many start smoking anyway because cigarette marketing associates smoking with images of positive affective states, such as peer acceptance (Slovic, 2001).

Future-Oriented Practices of Groups, Organizations, and Nations

The analysis thus far has focused on the future-oriented behavior of individuals. However, in order for societies to take effective action in light of future problems, it is necessary for us to influence *collective* action. Some of the most significant challenges to our future wellbeing, such as climate change and terrorism, require massive, coordinated efforts among organizations and nations. Our understanding of the future-oriented behavior of individuals is vital to understanding and affecting collective action. However, we also need an effective analysis at the level of actions of groups, organizations, and even nations. As a start, we present a theoretical analysis of organizational practices that involve explicit efforts to anticipate future outcomes and achieve advantageous ones or prevent deleterious ones. As with the future-oriented behavior of individuals, the goal is to identify variables that predict *and influence* these practices (Biglan & Hayes, 1996).

In some cases, a group activity may result in later benefits even though no one was aware of or sought to achieve those outcomes. For example, agricultural systems enabled population expansion into new territories, even though those who adopted the systems probably did not adopt them *in order* to expand (Diamond, 1999; Harris, 1979).

However, once humans developed the ability to frame relations between current actions and future outcomes it became possible to greatly improve the ability of human groups to act in light of the future. Examples of such future-oriented group or organizational practices

include (a) planting in the spring to achieve a harvest in the fall; (b) lobbying efforts designed to gain beneficial policies; (c) research and development to provide a competitive advantage; (d) research in the physical, biological, and behavioral sciences intended to improve societal wellbeing over time; and (e) government planning to prepare for future developments.

Generic Features of Future-Oriented Practices

The very act of tacting future-oriented practices as a functionally important class of behaviors is important for strengthening these practices. Systematic, extensive, and influential practices for predicting and dealing with future problems have evolved in numerous fields including epidemiology (Rothman & Greenland, 1998), prevention science (Kellam, Koretz, & Moscicki, 1999), economics (Moynihan, 1996; Orphanides, 2001), civil engineering (American Society of Civil Engineers, 2001), and weather forecasting (Hooke & Pielke, 2000; Silver, 2012). However, despite the sophistication of practices in these areas, their commonalities, generic features, and functions in preventing deleterious outcomes remain unrecognized. Recognizing this class of practices may be the first step in developing a science of future-oriented behavior that strengthens our ability to predict and prevent or mitigate future problems.

Effective future-oriented practices of organizations have at least five features: (a) an empirically sound causal or actuarial model of the predictors of future outcomes and the factors to modify in order to prevent or mitigate deleterious outcomes; (b) a surveillance system to monitor the outcomes of concern and the factors that influence them; (c) a set of practices thought to influence the outcomes; (d) evaluation of whether or not those practices are achieving the desired outcomes; and (e) a governance system that coordinates and regulates the actions of relevant players.

Causal or actuarial modeling—Foreseeing problems requires a model of the factors that predict and influence future events. Even if we cannot modify factors that influence the outcome, we can use information about predictors to prepare for and mitigate harmful outcomes. Such modeling exists for many significant societal problems (Silver, 2012).

Economists have identified a set of leading economic indicators and economic policies that affect economic functioning. Figure 1, adapted from Moynihan (1996), shows the changes in the U.S. gross domestic product from 1890 to 1993. Economic policies adopted after 1946 reduced the severity of recessions and moderated inflation cycles (Moynihan, 1996) until the recent severe economic recession. The causes of that recession are beyond the scope of this paper, but a number of analysts have suggested that it resulted from the gradual abandonment (over the past 40 years) of practices developed during the great depression (e.g., McLean & Nocera, 2011).

In public health, factors that influence infectious and chronic diseases are clear. With respect to youth problem behavior, the specification of risk and protective factors (e.g., Hawkins, Catalano, & Miller, 1992) has begun to guide more-effective efforts to modify those factors in order to prevent problem behaviors (e.g., Biglan, Brennan, Foster, & Holder, 2004).

An effective analysis of the factors predicting and influencing terrorism may help to predict or prevent the formation of terrorist groups and their attacks. Dixon, Dymond, Rehfeldt, Roche, and Zlomke (2003) have provided an RFT account of the development of terrorism. However, we are a long way from being able to translate this framework into effective ways to predict or influence the formation of terrorists groups or the actions they may take.

With respect to the environment, science has developed increasingly accurate models for predicting weather (Sarewitz, Byerly, & Pielke, 2000; Silver, 2012). The models cannot change the probability or severity of these events, but they have saved lives. It is also clear that emissions of greenhouse gases increase climate change (IPCC, 2001). Research has helped to specify practices that could mitigate climate change effects and reduce further warming (Heward & Chance, 2010; IPCC, 2001; Newsome & Alavosius, 2011; Thompson, 2010).

In sum, science has improved our ability to predict diverse problems and, for many problems, delineated factors that influence their occurrence (Silver, 2012). The models enable human societies to predict and prepare for problems, to mitigate their consequences, and often, to prevent them. However, we lack general standards to evaluate models for predicting future outcomes. Most importantly, large gaps remain between our ability to predict problems and our ability to influence human groups to prevent or mitigate deleterious outcomes.

Surveillance—Surveillance systems monitor the occurrence of outcomes and the variables that predict and influence those outcomes. For example, in economically developed countries, systems monitor economic performance. As just noted, these systems track changes in key measures of economic performance and guide economic policymaking. Most industrial nations have surveillance systems to monitor and control infectious or chronic diseases (Buehler, 1998) and increasingly they track youth problem behaviors and risk factors influencing them (Bachman, Johnston, & O'Malley, 2001; Kelder, Maibach, Worden, Biglan, & Levitt, 2000). Weather forecasting relies on systems that track weather patterns to predict later events (e.g., Hooke & Pielke, 2000; Silver, 2012). Further development of effective surveillance systems for anticipating future events are vital for taking effective action in light of the future as well as for evaluating the effectiveness of measures we take to prevent deleterious outcomes.

Intervention—Organizations act to prevent or mitigate harmful outcomes. Interventions influencing future economics include alterations in interest rates, the tax structure, and business regulation. Public health interventions include quarantines, inoculations, regulations (e.g., restricting cigarette marketing), and campaigns to influence health-related behavior (Glasgow, Vogt, & Boles, 1999). With respect to youth problem behavior, interventions may alter family, peer, school, media, and community risk factors (Biglan, 2015). No empirically evaluated strategies for preventing terrorism currently exist. Military action against known terrorist organizations presumably has value, but less attention has been paid to factors that motivate the formation of terrorist organizations. (In particular, our strategies for dealing with terrorism appear to be uninformed by the impact of collateral damage on the motivation of people to become terrorists.) Evidence indicates we can slow

climate change by reducing greenhouse gas emissions, and experts have specified ways of doing so. Yet we do not know how to mobilize political support for policies to reduce those emissions.

Empirical evaluation of prevention practices—A fourth, less common, feature of future-oriented practices is systematic empirical evaluation of the effects of prevention practices. In areas such as prevention of psychological and behavior disorders, many randomized trials have evaluated well-specified programs (National Research Council & Institute of Medicine, 2009). The impact of preventive policies (e.g., taxation of cigarettes and alcohol) has been evaluated in interrupted times-series designs (Biglan, Ary, & Wagenaar, 2000) as has the effect of monetary policy on inflation (e.g., Orphanides, 2001). However, many practices remain largely unevaluated, including military practices, law enforcement practices, and efforts to prevent climate change (Coalition for Evidence-Based Policy, 2003; Luke & Alavosius, 2012; Manzi, 2012; Sawhill & Baron, 2010).

Governance—Ostrom (1998, 2009) has identified a set of principles associated with the success of groups and organizations in maintaining common pool resources such as fisheries, forests, and irrigation systems. Groups that have evolved practices to sustain their resources are characterized by (1) a strong group identity and sense of purpose, (2) fair distribution of costs and benefits, (3) fair and inclusive decision-making, (4) monitoring of agreed-upon behaviors, (5) graduated sanctions for misbehaviors, (6) fast and fair conflict resolution, (7) the authority to self-govern, and (8) effective relations with other groups. Wilson, Ostrom, and Cox (2013) demonstrated how these principles relate to the success of other groups.

These five features of future-oriented practices are inter-related. Causal models specify events to measure and the influences on outcomes that need targeting through interventions. As interventions are developed and tested, it contributes to the improvement of causal models. Evaluating interventions in real world settings depends on the surveillance systems and analyzing the data in surveillance systems permits the refinement of causal models. An effective governance system is vital to all of these practices being implemented and sustained.

The Evolution of Future-Oriented Practices

Once we tact the generic class of future-oriented practices, we can begin to study how we might influence the further evolution of these practices (Biglan & Embry, 2013; Wilson, Hayes, Biglan, & Embry, 2014). Here we draw on existing contextualist analyses of factors influencing the evolution of practices of groups, organizations, and societies in order to identify variables that might influence the adoption, implementation, and maintenance of future-oriented actions.

Selectionist analyses of the evolution of cultural practices have increased in recent years (Biglan, 1995; Biglan & Glenn, 2013; Diamond, 1999; Glenn, 1986, 1988, 2003, 2004; Harris, 1979; Ponting, 1992; Wilson, Hayes, Biglan, & Embry, 2014). The framework emphasizes how practices develop through their contribution to the survival or expansion of the practice. For example, Harris (1979, 1989) and Diamond (1999) have analyzed the

evolution of cultural practices based on necessities for human survival. Groups must produce food and shelter, defend from human and other predators, and treat or prevent disease. Harris (1989) and Diamond (1999) account for the development of agriculture, warfare, and economic and governance systems in terms of the selection of practices due to their contribution to the survival of groups employing the practices. For example, Diamond analyzed development of agriculture in terms of the initial domestication of plant and animal species in locations where they happened to be available. Practices expanded due to adoption by others and because increased food supplies enabled population growth and the development of armies and hierarchical governance systems that supported expansion of agricultural societies into new areas.

Empirical analysis of societies that failed suggests the importance of its members analyzing relationships between current practices and future outcomes. Diamond (2004) described factors that influenced the collapse of societies worldwide. In each case, a salient fact is that they failed to discern the threat their practices posed to society's future wellbeing. For example, on Easter Island, archaeological analyses of early residents' diets and of pollen sediment indicate that deforestation brought on by agricultural intensification led to starvation and depopulation as lands became infertile and the means for building seaworthy canoes vanished as the trees disappeared.

Meta-contingencies—Glenn (2003, 2004) developed the concept of the meta-contingency to account for the selection of group practices by their consequences. A metacontingency describes the selection of the interlocking behavioral contingencies (IBC) of two or more people as a function of the outcome that the IBC produces. For example, a hunter and gatherer group might be more likely to survive and expand if the group developed ways of coordinating its actions through vocal and visual signals during a hunt. One could account for the behavior of each team member in terms of the contingencies for their behavior. For example, a person whose role is to beat the bushes to move game toward those with weapons might earn praise for making sure the game ran in the right direction and might be criticized for failure. At a higher level, one can also analyze the ways in which the coordinated actions of two or more hunters are selected by the success of the group in obtaining game. Presumably, groups with coordinated actions resulting in more game will be more likely to survive and expand, as will their practices. Ostrom's (2009) principles for effective group governance provide perhaps the best available analysis of the interlocking behavioral contingencies involved in enabling groups to achieve sustaining consequences.

The selection of future-oriented practices—This analysis applies to future-oriented practices. A variety of future-oriented practices would have conferred an advantage for the survival of human groups. Such practices include planning for defense against attackers, developing vaccines, adopting hygienic techniques, and building dams and levees to prevent flooding and provide irrigation. Such forward-looking action would have required coordinated actions among group members which would require that group members shared a relational network that framed the relationship between current practice and future outcome.

The future-oriented practices of for-profit corporations are particularly relevant to this analysis for two reasons. First, these organizations are particularly fine-tuned to detect and deal with future threats and opportunities. Second, their future-oriented practices—or lack of them—have a major influence on whether societies will deal effectively with future threats.

The meta-contingencies involved in the selection of corporate practices might be thought of as evolution on steroids. The precision with which profits and losses can be calculated and the immediacy of the feedback influences corporations to finely tune their practices to maximize profits. Thus, variations in practices are selected by their impact on profits (Biglan & Cody, 2013). Practices that detract from profits are abandoned and those that increase profits are more likely to survive, be expanded by the company, and be adopted by other companies. This is not to say that every unprofitable practice is immediately abandoned. As long as a company prospers, it may retain inefficient practices for quite some time, as the long history of GM's failure to deal with its bloated bureaucracy shows (Rattner, 2010).

Over the past 100 years, for-profit corporations have evolved a wide range of practices that have expanded their ability to achieve desired future outcomes and avoid problematic ones. We mentioned strategic planning above. Marketing practices affect future sales and profits and have become increasingly effective. For example, an expansion of the cigarette market in the early 20th Century occurred when, after initial failures, the American Tobacco Company was able to influence a large number of women to start smoking Lucky Strikes when it used the theme "Reach for a Lucky instead of a sweet" (Pierce & Gilpin, 1995). The success of cigarette marketing led to a huge increase in expenditures on it; in 2012 the tobacco industry spent more than $8 billion on marketing and promotion (Centers for Disease Control, 2013).

Research and development has also expanded, with annual worldwide expenditures rising from $500 billion to more than $1.2 trillion between 1996 and 2009 (National Science Foundation, 2012). These practices enable companies to create new products and services that increase the companies' chances of remaining profitable or expanding their future profitability.

Lobbying is the third practice that has expanded. By influencing government policy and expenditures, companies can improve their profitability. They may become adept at securing government contracts, such as increasingly happens with the defense industry that depends on large military expenditures for profits. Companies also organize to achieve favorable regulations and to avoid regulations that would impair their profitability. One example is the effort of the U.S. financial industry to repeal the Glass-Steagall Act of 1933, which prevented commercial banks from engaging in securities trading. The importance of lobbying for corporate profitability is suggested by the fact that the amount of money expended on lobbying in the U.S. has expanded from 1.45 billion in 1998 to $3.31 billion in 2012 (Open Secrets, 2013).

In addition to the practices of individual corporations, whole industries and the business community in general have found it useful to advocate for policies that are of general value to an industry or to business per se. Between the 1960s and today, U.S. attitudes toward

business and policies favorable to business have changed dramatically. The origin and extent of these changes and their impact on economic inequality have been well documented (Alterman, 2003; Biglan, 2015; Hacker & Pierson, 2010; McLean & Nocera, 2011; Smith, 2012; Stiglitz, 1969).

Negative Externalities and Future-Oriented Practices

The fundamental issue in evolving more effective future-oriented action is to bring long term societal consequences to bear on an existing practice. The concept of negative externalities is useful for thinking about this problem—especially as it relates to for-profit organizations. When two parties freely engage in a market transaction, it is presumed to be beneficial to both parties. However, the transaction may have harmful effects on third parties. These harms have been labeled *negative externalities* by economists (Laffont, 2008). Examples include the harm that the marketing of cigarettes to young people does to the future health of the population (Biglan, 2004), the impact of the marketing of certain foods on obesity and diabetes (Moss, 2013), and the impact on climate change of the marketing of fossil fuels.

Negative externalities provide a precise way to measure the future costs to society of market transactions. In the area of public health, as data on the extent and cost to public health of certain transactions become clear, it provides a basis for public policies that deter deleterious corporate practices (Biglan, 2011). For example, documentation of the costs to society of the marketing of cigarettes has played a major role in influencing the adoption of public policies that have curbed at least some of that marketing.

The concept of negative externalities lines up well with our contextual analysis. Companies are motivated to engage in profitable market transactions that do not incur the costs associated with externalities. Therefore, if a society wants to prevent these future costs, it must bring those costs to bear on the transaction. It can do this simply by prohibiting some transactions, such as marketing cigarettes to youth, or it can tax the transaction in a way that is proportional to the cost to society of the externality.

Lest this analysis seem to indict all practices of for-profit organizations, note that numerous future-oriented practices of for-profit corporations are highly beneficial to human wellbeing. Examples include every research and development effort that has produced an effective drug, labor-saving device, or improvement in food production. All practices are selected by consequences without regard to their long-term impact or their impact on groups and individuals who are not a party to the transaction (Biglan, 2009).

Evolving Future-Oriented Practices Relevant to Climate Change

In the preceding sections we presented a framework for analyzing the future-oriented behavior of individuals, groups, and organizations. To assess the value of this framework it may be useful to examine its implications for an important problem. There can be no better example of the need to improve human society's ability to act in light of the future than the gap between the harm that climate change is likely to do to human wellbeing and the steps that humans are taking to prevent and prepare for it. The United Nations' Intergovernmental

Panel on Climate Change (IPCC) summarized the likely effects in a series of reports from 2007. Global warming is predicted to result in:

- Increased frequency and severity of heat waves, droughts, floods, storms, and fires

- Increased coastal flooding that will affect millions throughout the world

- Increased likelihood of extinction of 20 to 30% of species on the planet

- Decreased water supply in areas that depend on glaciers and snow melt for their water supply and decreased rain in many agricultural areas (IPCC, 2007)

A recent study (Hanson & Sato, 2011) indicated that the earth's temperature is changing at a far faster rate than it has over the past 11,000 years. For most of the past 10,000 years the earth cooled by about 1.3 Fahrenheit, but it has risen this much in just the last 100 years (Thompson, 2010). According to Christopher Field, founding director of the Carnegie Institution's Department of Global Ecology at Stanford University and a member of the IPCC, the rate of warming is exceeding the rate predicted in the 2007 IPCC report, due to accelerated release of carbon dioxide and methane in the melting arctic permafrost (Romm, 2009).

Meeting the challenge of climate change will require unprecedented levels of international cooperation and action even though much the world's population is only vaguely aware of the threat, many have not yet been directly affected, and many who have been affected do not attribute the catastrophes they have experienced to climate change. The challenge is compounded by the fact that even if human emission of greenhouse gases halted completely, the earth would likely continue to warm due to phenomena such as the just-mentioned release of greenhouse gases trapped in the arctic permafrost (Romm, 2009). What then does the present framework have to offer? Here we outline what is needed at both the individual and the organizational levels.

The Individual Level

Slowing climate change requires that we increase the prevalence of people who are (a) adopting appropriate "green" behavior (Shirley, Jones, & Kammen, 2012) and (b) advocating for change. Laurent, Olsen, and Hauschild (2012) identified a set of behaviors that appear to have the greatest impact on climate change, while minimizing other harms to the environment. Ultimately, the scientific community will need to arrive at a useful composite measure to allow individuals and larger social units to gauge their impact on the environment. Such measures will undoubtedly further evolve as our causal model of climate change is refined.

At the most general level, we will change these target behaviors by changing their consequences. Doing so is a task as large and complex as the problem itself. We can alter the direct and immediate consequences of behaviors and we can alter people's relational networks relevant to the target behaviors. The behavioral principles regarding direct contingencies are clear: we need to increase the costs of behaviors that contribute to climate change and reduce the costs or increase the incentives for alternative, more "green" behaviors. For example, increase the cost of gasoline through taxation or other means, and

people will move toward other means of transportation (American Public Transportation Association, 2011).

We may also affect people's climate-relevant behavior by modifying their relational networks. We can do this by relating current behavior to future consequences but also simply by influencing people to relate targeted behaviors to things they value. For example, relating environmentally sound behavior to social acceptance will enhance the value of the behavior (Newsome & Alavosius, 2011).

More general aspects of people's relational networks also seem important. Valuing material goods is associated with greater consumerism, much of which contributes to climate change (Grant, 2010, 2011). Kasser (2009) found that countries with a greater prevalence of people with materialistic values also had a larger carbon footprint. An alternative value complex that emphasizes community wellbeing and personal growth has been shown to be negatively related to materialistic values (Kasser, 2011). Encouraging such a value orientation in the population could thus support the spread of green behavior.

The Organizational Level

Addressing looming climate change will require massive changes in the practices of organizations. Much of the emission of greenhouse gases involves the actions of organizations. Moreover, achieving mass changes in the behavior of individuals will require organizational action because organizations have a huge influence on the behavior of individuals. At the same time, changing the practices of organizations will require mass action of individuals. A co-evolution is needed between these two levels.

The metacontingencies needed to select better organizational practices—We can influence organizations to adopt more environmentally friendly policies by increasing the cost of less friendly policies and increasing incentives for adopting better policies. Raising the costs of an organizational practice that produces negative externalities through taxation or penalties is generally believed to deter the targeted practice (Wikipedia, 2014), although clear evidence on the impact of a tax on CO^2 emissions is currently lacking (Roberts, 2012).

There is also evidence that tax incentives, such as tax reductions or subsidies for adopting practices can increase the adoption of a practice (e.g., Hudon & Traca, 2011). Incentives systems may be preferable to adding to the cost of problematic practices, because they are less likely to mobilize opposition from companies that will fight costly taxes and regulations. In addition, there is some evidence that they will have a greater impact on the development of alternative "clean" technologies than will the imposition of a tax on the emission of CO^2 (Muro, 2012).

Government policies—The problem is how to influence governments to adopt such policies. Here too a contextual analysis cuts to the heart of the matter. In democracies, the policies of governments are ultimately selected by survival. Governments that adopt policies that lead to elected officials being voted out of office do not survive. This is not to suggest a naïve notion that the process involves people simply voting their consciences. At least in the

current American democracy, government policies tend to be selected that are favorable to well-organized constituencies with the resources to affect the outcomes of elections (Hacker & Pierson, 2012).

Strengthening advocacy organizations—For this reason, progress on climate change will require strengthening advocacy organizations. Organizations that stand to lose from the imposition of taxes or regulations tend to be highly organized to detect and counteract looming threats. However, the vast majority of people who stand to lose from continued emission of greenhouse gases are not nearly as organized to recognize the threats they face, much less to take concerted action to prevent deleterious outcomes. Organizations are needed to educate and mobilize support for green policies and to advocate for such policies. Their number, strength, and influence depend on the number of people who join and/or support them.

Elsewhere one of us (Biglan, 2011, 2015) has suggested creating a special class of government-chartered organizations to work on the problem of climate change. These organizations would receive government grants and would have a special tax status (beyond that for existing nonprofits) that encourages people to make charitable contributions to them. Given the magnitude of the threat to human wellbeing we face, such an arrangement is well justified. Achieving it would, however, incur the resistance of threatened industries. Yet the needed policies seem worth pursuing, as they would leverage all other efforts to address the problem.

Influencing relational networks of corporate leaders—In addition to imposing meta-contingencies that select more environmentally sound practices, it may be possible to bring about changes in the relational networks that motivate the behavior of corporate leaders. Mapping their networks would appear to be the first step. Presumably green practices need to be linked to growing profits through reduction in fuel consumption, developing new businesses, and improving the reputation of the company. Current practices need to be linked to their cost, their harm to the environment and all of its attendant consequences, and to the reputation of the company.

How might we reach and influence corporate leaders? One policy that might leverage change would simply require analyzing the costs and benefits associated with climate change of existing and alternative practices. Such a policy would impose relatively small costs on the company and would put its leadership in contact with the network of facts relevant to the value of reducing greenhouse gas emissions. Such a policy might be more easily achieved if it provided incentives for doing such an analysis rather than imposing penalties for not doing it.

In addition, efforts to publicize and recognize the efforts of companies would provide further reinforcement for the evolution of green practices, especially if they improved the reputations of green companies in ways that affected their bottom line. An example of this is the Fortune Brainstorm Green 2013 Conference. For more information, visit the Fortune Conferences website (http://www.fortuneconferences.com/brainstorm-green-2013/).

At least among leaders of corporations whose profits depend on the consumption of carbon-based fuels, achieving these changes may prove to be a tall order. However, little progress will be made on what may be the most important problem facing humanity (Hertsgaard, 2011) unless—one way or another—we influence the practices of these corporations. If an unprecedented change in the practices of societies is required to combat climate change, we had better develop an effective theoretical framework and accelerate the research and practical action needed to bring this change about.

Ultimately we will require a thoroughgoing cultural movement that encourages the widespread adoption of prosocial values—values that favor individual development, altruism (Atkins, 2014; Scaffidi Abbate, Isgrò, Wicklund, & Boca, 2006), and concerns about the common good. As noted above, these values contrast with values having to do with materialism and self-aggrandizement (Kasser, 2011) and the latter values are associated with practices that produce a bigger carbon footprint (Kasser, 2009). To the extent that communal values become more normative and seep into the culture of corporate leadership, there is a potential for influencing corporate leaders to give greater weight to the impact of their practices on the environment and less weight to profits. (One development in the United States consistent with this movement is the creation of benefit corporations [Gomez, 2012], which are chartered to provide a public benefit. Unlike other corporations, stockholders cannot sue if the corporation adopts practices that diminish their profitability.)

There is growing evidence that Acceptance and Commitment Therapy and Training can contribute to the cultural change movement that is needed. ACT encourages people to adopt prosocial values (Atkins, 2014; Atkins & Parker, 2012). As this work spreads it has the potential to contribute to a rebalancing of human priorities in ways that foster the green practices that are needed.

Empirical Research

Admittedly, it is challenging to conduct empirical research on how to influence mass behavior and organizational practices. But progress on these problems is vital to our future wellbeing. Here we sketch two examples of the kinds of research that seem feasible.

The impact of policies on organizations—Like the tobacco control movement (Biglan & Taylor, 2000), efforts to influence the environmental practices of organizations might best proceed at the local level. Communities might begin by adopting policies that simply require organizations to analyze how their practices affect the environment. As noted above such a policy would influence organizational leaders' relational networks concerning the environment, at relatively small cost and could prompt them to identify practices that reduce their costs. The impact of such a policy could be evaluated by implementing it in a series of communities, in a multiple baseline design (Biglan, Ary, & Wagenaar, 2000).

Strengthening advocacy organizations—Empirical research can also contribute to improving the effectiveness of advocacy organizations. Analyses of target audiences will help advocacy organizations develop persuasive communication to influence support for specific policies. Research can identify groups likely to support cultural change and those apt to oppose it and can identify consequences of cultural change for each group. Analyses

could clarify policies likely to be accepted and communications needed to persuade each target group.

Ultimately, the proof of the analysis would be in showing how it strengthens the ability of future-oriented organizations to gain support and to promote both future-oriented analyses and the practices those analyses identify as needed. Again, an experimental evaluation is possible. For example, a persuasive communication campaign could be evaluated by implementing it in a multiple baseline design across a series of future-oriented nonprofit organizations. Dependent variables would include the number of recruits, amount of money raised by the organization, level of their mass communication, and endorsements for advocated policies achieved by each organization.

Similarly, the ACBS effort to assist groups in adopting the Ostrom principles (e.g., see http://contextualscience.org/event/increasing_prosocial_behaviors_free_webinar) could contribute to strengthening advocacy organizations, if such organizations are included among the ones that the ACBS helps.

Conclusion

Human wellbeing has been fostered by the evolution of future-oriented behavior of individuals and practices of groups, organizations, and geopolitical entities. However, major threats to our future wellbeing are not being adequately addressed. Research on the evolution of cultural practices suggests that future-oriented practices have been selected by their contribution to the avoidance of harmful consequences and to the achievement of consequences that fostered human groups' expansion. Scientific understanding of the factors that influence future-oriented practices remains limited, however. Failure to accelerate the growth and effectiveness of such practices risks harmful or even catastrophic outcomes. A first step is to recognize the generic features of future-oriented behavior of individuals and future-oriented actions of groups.

Research on the psychological processes involved in individuals acting in light of the future could facilitate our ability to increase the effectiveness of people's behavior in preparing for and influencing their future wellbeing. RFT provides a framework for understanding how the functional effects of possible future events are brought to bear on current behavior. Research on future-oriented actions of groups and organizations could clarify the contingencies that influence organizations to adopt and maintain future-oriented actions. Especially in the case of for-profit organizations, there is no guarantee that the actions of organizations will benefit those who are not a part to the transactions of these organizations. It seems necessary to bring additional contingencies to bear that ensure that organizations' actions are in line with what is needed by the society as a whole. It is also important to understand how to strengthen the practices of advocacy organizations so that they can develop broad support for individual, organizational, and societal policies and practices that would influence individuals and organizations to prepare effectively for the future. Experimental evaluation of the effects of making consequences contingent on future-oriented practices is especially needed.

Acknowledgments

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Highlights

- Describes the ways people behave in order to achieve future outcomes

- Explains and defines the Relational Frame Theory of future-oriented behavior

- Delineates the generic features of effective future-oriented practices

- Describes the factors affecting the development and spread of cultural practices

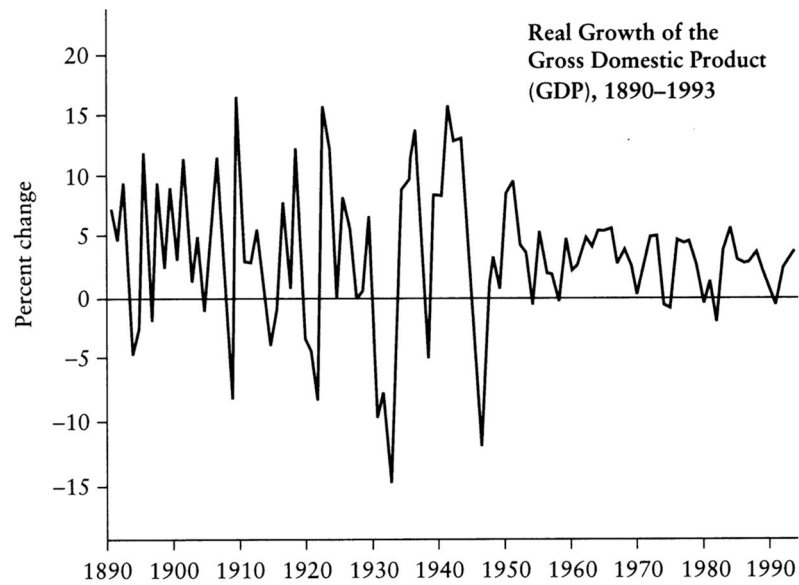- Articulates ways to utilize future-oriented practices to improve human wellbeing

Figure 1.

Real Growth in the Gross Domestic Product from 1890 to 1993

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