

such as considering B. F. Skinner an evolutionary psychologist. The senior author was a commentator in the *BBS* special issue on the canonical papers of Skinner, which included two that compared natural selection and selection by consequences (Burghardt 1988). Burghardt pointed out that Skinner seemed uninterested in understanding the natural behavior of animals and that his basic comparison was anticipated by Edward L. Thorndike, who explicitly contrasted natural selection and “selection *within the individual* that is the great case of plasticity, and is of tremendous usefulness, in that it definitely enables the animal to modify his acts and so meet new varieties and modifications of environment” (Thorndike 1900, p. 91, emphasis in the original; reprinted in Burghardt 1985).

What is telling here is that Wilson et al. repeatedly invoke trial-and-error learning, what the authors term “open-ended processes of variation and selection” (target article abstract, para. 3), a process much more associated with Thorndike than Skinner, in the development and evaluation of applied interventions. In short, Thorndike and James Mark Baldwin, known for the Baldwin effect, who wanted to apply the evolution of plasticity to human social and cultural phenomena and was a pioneer of interdisciplinary efforts (e.g., Baldwin 1902), are the intellectual forerunners of the approaches noted here. Furthermore, many have noted similarities between biological and cultural evolution, as Konrad Lorenz reviewed in his Nobel Prize address (Lorenz 1974) using the work of Koenig (1970). Certainly much progress has been made, such as in gene-culture co-evolution; and although the target article cannot be expected to be historically comprehensive, it should, given the strong criticisms made of others, not deny credit to important pioneers.

Second, although the clinical and intervention examples presented by Wilson et al. to support the inclusion of evolutionary theory and principles are of excellent and successful programs, it is unclear what is evolutionary about them. More specifically, it is unclear how evolutionary theory either guided their development or anticipated their success, other than their being a product of variation and selection. For example, the Ostrom 8 design features of effective groups are based on a “what works” analysis, and to retrospectively use them as a basis for evolutionary-derived interventions seems to claim only that functional and dysfunctional behavioral systems must be a result of evolutionary processes underlying human nature.

We agree with the authors about the great potential for developing more efficacious prevention and intervention programs by integrating principles of EP into psychological treatments. However, we are disappointed that the authors did not provide more guidance into *how* evolutionary principles can best be incorporated into new or existing intervention and prevention programs. Can the authors provide robust guidelines for evaluating the myriad of current intervention programs, many of which are failures and fads? We need a framework for constructing and evaluating risky, testable, falsifiable predictions for intervention and prevention programs based on the authors’ innovative expansion of EP theory.

For instance, numerous educational programs (e.g., Drug Abuse Resistance Education [D.A.R.E.]; Bureau of Justice Assistance 1988) and “therapeutic” interventions (e.g., conversion therapy or reparative therapy; Nicolosi 1991; batterer intervention programs for domestic violence) can be viewed largely as failures, in which the programs either were ineffective or caused harm to participants (e.g., Ennett et al. 1994 [D.A.R.E.]; Jenkins & Johnston 2004 [conversion/reparative therapy]; Stuart et al. 2007 [batterer intervention]). Other psychological interventions are extremely efficacious and have helped to alleviate enormous suffering (e.g., cognitive-behavioral Panic Control Treatment; Barlow et al. 1989). It would be helpful if the authors could present guidelines that could be used to explain how their extension of interdisciplinary evolutionary theory could explain, more universally, why some treatments are helpful and others fail. Would the authors have been able to predict, on the basis of EP theory and principles,

which treatments would be efficacious and which would not? Can the authors outline specific principles for making up-front predictions regarding which newly developed psychotherapies will be successful and which will require modification or become failures? As it currently stands, one could construe that the authors are only choosing successful programs and interventions to support the incorporation of evolutionary theory, rather than undertaking the prospective analysis we need to move forward.

Perhaps the greatest need now is to provide guidance, via the provision of specific strategies, to improve existing therapeutic modalities or to develop new prevention and intervention programs, by incorporating an expanded EP theory. For example, there is some evidence to support several treatments for substance use disorders (e.g., Motivational Enhancement Therapy [MET]; Project Match Research Group 1997; Behavioral Couples Therapy; O’Farrell & Fals-Stewart 2006). However, relapse to substance use is an immense problem (Witkiewitz & Marlatt 2004). Can the authors provide guidance to intervention developers on how existing therapies that have some empirical support may be improved on the basis of evolutionary theory? Would expanded evolutionary theory provide guidance on the specific components of existing interventions that could be retained, improved, or removed, thus increasing the overall efficacy of treatment? Tensions between an integrative world view and detailed interventions are inevitable, but they need to be addressed.

Toward an integrated science and sociotecture of intentional change

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Abstract: We heartily agree with the target article and focus on how positive sociocultural change can be accelerated through the systematic use of scenario planning—what we call *sociotecture*. Scenario planning is a design process for the creation and selection of symbotypes that make a positive difference. It cuts through complexity by integrating cognitive and affective processes across multiple scales.

We wholeheartedly agree with the intention of the article by Wilson et al. to create a “science of intentional change” based on a long overdue integration of evolutionary concepts across the natural and social sciences and the humanities. We also applaud the incorporation of Elinor Ostrom’s design principles for effective governance of the commons as a key element, emphasizing the importance of cooperative rules, norms, and behaviors for cultural group selection. Here we expand on these ideas by exploring the use of scenario planning as a design tool for creating what we call a *sociotecture* of intentional change integrated with basic science.

After admirably demonstrating the power and generality of evolution to describe and solve complex problems across a range of scales, the authors conclude in the last sentence: “If improving the human condition is our goal, there is no alternative to becoming wise managers of evolutionary processes” (sect. 4, para. 14). In this comment we focus on how we might become not just wise managers but creative design agents. We agree that evolutionary science, broadly conceived to include both genetic and cultural evolution acting on multiple levels of organization, as the authors propose, can help us *understand* how

cultures change. But deciding what we want to do is a bit outside this purview. It is a uniquely human ability to bring *foresight* to the evolutionary table. By using the term *sociotecture* as opposed to *science*, we wish to emphasize the application of evolutionary theory toward both understanding and *crafting* (“-tecture”) our social future. We can, in fact, envision and design the future we want and then use our understanding of evolutionary processes to help achieve it (Beddoo et al. 2009). Doing this involves the conscious development of technical, institutional, and world view alternatives for selection to act upon, rather than waiting for random mutations. Such an approach can radically speed up the change process, as the rapid rise of *Homo sapiens* attests.

However, like other evolutionary processes, cultural evolution is susceptible to path dependence, multiple equilibria, lock-in, and traps (Arthur 1988; Costanza 1987; Costanza et al. 1993). Many historical civilizations have collapsed due to their inability to escape these processes (Costanza et al. 2007; Diamond 2005; Tainter 1988). For example, the ancient Maya developed elaborate trade networks, elites, and cities that lost resilience to recurring drought cycles and eventually collapsed (Diamond 2005; Heckbert et al., in press).

What the Maya and other collapsed civilizations lacked was the ability to envision radically different world views, institutions, and technologies—new cultural regimes—and the ability to make smooth, intentional transitions in time.

Scenario planning is one method to discuss and develop consensus about what we want. Predicting the future is impossible. But what we can do is lay out a series of plausible scenarios, which help us to better understand future possibilities and the uncertainties surrounding them. Scenario planning differs from forecasting, projecting, and predicting, in that it explores plausible rather than probable futures, and it lays out the choices facing society in whole-systems terms (DTI 2003; Peterson et al. 2003).

Scenario planning both fosters variation in symbotypes and also supports selection of the most desirable pathways for action. The inherent tension between heterogeneity and homogeneity captured in the term “Darwin machine” is, of course, as true for the social transmission of stories as it is for other evolutionary processes. The more different stories (symbotypes) we can generate, the greater likelihood that helpful symbotypes will be available for selection. But too much diversity in our stories reduces the potential for “heredity”—the transmission and sharing of a common vision for the future.

Wilson et al. point out that it is hard “to overestimate the degree to which our symbotypes organize our perception and behavior” (sect. 4, para. 9). We see scenarios as particularly potent symbotypes. By using narrative and metaphor to make sense of complexity, scenarios work both cognitively and affectively. They help direct our attention to the future but, more importantly, they help us comprehend and value different possible outcomes. Scenarios support a kind of collective “selection,” a shared story about the future that is more than the sum of individual perceptions. The whole-systems nature of scenario narratives of possible futures (rather than isolated measures of CO₂ or population, for example) perhaps accounts for their greater efficacy in organizing perception and motivating action.

Several scenario-planning exercises have been conducted in recent years at a range of spatial scales and for a range of purposes, including global futures (Costanza 2000; Gallopín 2002; Gallopín et al. 1997; MA 2005; Nakićenović & Swart 2000; Raskin et al. 2002), regional futures (Bohensky et al. 2011; European Environmental Agency 2009), corporate strategy (Shell International 2003; Wack 1985), political transition (Kahane 1992; 2004), and community-based natural resource management (Evans et al. 2006; Wollenberg et al. 2000).

Although multiple futures are possible and plausible, the goal of a *sociotecture* of intentional change would be to aid the design of futures that are both sustainable and desirable, recognizing evolutionary dynamics. The goal of a *science* of intentional change is to bring to bear an integrated understanding of cultural and

biological evolution to allow us to accelerate evolution in positive directions.

One compelling example of sociotecture is the transition in South Africa after apartheid. Adam Kahane led a scenario-planning workshop that involved leaders from both the white and black political parties (Kahane 1992; 2004). He convinced them to go beyond recriminations and to create together four possible future scenarios for the country, only one of which—the “flight of the flamingos”—envisioned a shared country with everyone rising together with truth and reconciliation. Its adoption allowed a relatively rapid and smooth transition. Not perfect, but it could have been much slower and more difficult had this important consensus about a vision for the country not been reached. Scenario planning can thus act as a critical catalyst for making change faster and easier.

So, we need not only a *science* of intentional change, but also a *sociotecture* integrated with it to develop and test alternative models and visions of the world we want and to help us get there.

Does evolving the future preclude learning from it?

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Abstract: Despite its considerable length, this article proposes a theory of human behavioral science that eschews half the evidence. There is irony in the title “Evolving the Future” when the featured examples of intentional change represent procedures that build slowly on the past. Has an opportunity been missed, or is an evolutionary perspective simply incompatible with learning from the future?

This article offers an intriguing promise in its title giving reference to the *future* and *intentional change*. A detailed reading reveals a score of 2 out of 4: unidirectional (not bidirectional) reference to the future, and a 1970s recognition of intentional change. This statement is not intended to be harsh, but I believe that addressing these issues, if it is possible, could make or break the chance of a real contribution to behavioral science. This article misses the opportunity to recognize the future as a source, not just a destination, of learning. “Evolving-the-future” and “learning-from-the-future” (Dowrick 2012a) are clearly opposite processes in the fourth dimension, so contrasting them is easier than linking them.

Evolution is a process of learning from or building on the past. So is operant conditioning, which is why Skinner (1981) wrote the article so much cited in Wilson et al.’s article. Skinner devoted his professional life to explaining as much behavior as he could in operant terms. But his after-hours thoughts encompassed much else, including learning from the future (though he did not call it that; B. F. Skinner, personal communications, April 10, 1983 *et seq.*). For example, in his *Notebooks* he wrote of the folly of the common practice to show batters in a slump, videos of striking out (which is feedback; learning from the past). Better, he wrote, “[that the batsman] be shown a short film of himself hitting home runs. A videotape device in the back of the dugout could have short cassettes for each player” (Epstein 1980, p. 6). Although this may look like a different selection of past behavior, more important, it is a representation of valued future behavior.

Wilson et al. make no effort to include this domain of learning in their treatise, although it represents half the discourse on learning theory. Learning from the future creates dramatic changes, in contrast to hard earned successive approximations toward a modest delta. The article does refer to modeling, self-modeling,