The Belief in Free Will as a Biological Adaptation: Thinking Inside and Outside the Behavior Analytic Box

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In general, people tenaciously believe they possess free will despite the overwhelming scientific consensus that all human behavior is determined by environmental stimuli. Skinner in particular has consistently, forcefully, and persuasively argued that the belief in free will is an artifact of human behavior – in his view, a now-dysfunctional product of the "literature of freedom and dignity." Drawing on both scientific and nonscientific sources, I examine this paradox between subjective experience and objective analysis and suggest that the almost-universal "belief in free will" is a product of evolution and thereby an adaptive human characteristic. From this perspective, I discuss the wisdom of adhering to the dominant behavior analytic understanding of free will; contrary to Skinner's contention, the pervasive human belief in free will, even if scientifically "wrong," may well contribute to social progress rather than impede it.

"...from the human standpoint, the important thing is less that man's will should be free than that man should think that it is free." (Sherrington, 1940, p. 199)

"...this sense of freedom of will is as surely a part of man's nature as is the fact that he does not have it." (London, 1964, p. 170)

Humans believe they have free will in the classical sense that a competent person is the genuine author of his or her actions. This libertarian notion of human agency is the fundamental philosophical, religious, and legal tenet upon which modern Western culture and social organization rests (cf., Dilman, 1999; Kane, 2002a,b; Pollock, 2000; Watson, 2003) -- "The Core Conception" from which our ideas of justice and moral responsibility stem (Smilansky, 2002). Yet while many philosophers of science recognize that this belief is, ultimately, an illusion (Crick, 1994; Smilansky, 2000, 2002; Wegner, 2002), legions of "compatibalists" continue to propose creative scenarios as to how determinism can co-exist with human freedom and moral responsibility (cf., Honderich, 2002; Kane, 2002b; Smilansky, 2000).

In contrast, Skinner articulated a straightforward and uncompromising incompatibalist view: "I deny that freedom exists at all" (1948, p. 245); "autonomous man serves to explain only the things we are not yet able to explain in other ways. His existence depends on our ignorance..." (1971, p. 12). He contended that the classical notions of freedom and moral responsibility have been instilled in us through the "literature of freedom" that developed in response to aversive social control schemes (1971, p. 27). He argued further that the acceptance of human agency impedes cultural progress by directing attention to mythological sources of human problems instead of to the real causes and by devaluing the potency of positive reinforcement to promote socially desirable behavior. Skinner's dismissal of

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concepts deeply ingrained in the cultural legacy of most humans elicits broad, scathing derision and ire (cf., Bethlehem, 1987) -- if his views are even considered at all.

Behavior analysts, of course, generally find Skinner's arguments persuasive and embrace determinism as an accurate reflection of reality that also offers the most humanistic way to eliminate the use of aversive behavior control strategies, advance a harmonious and socially just world, and in general maximize human potential. Freedom is reframed as response competency: the more behavioral alternatives with the potential to achieve reinforcement an individual can emit in a given situation, the more freedom is present. But expanded behavioral options enhance environmental control only if the individual is skilled at choosing. Well-refined choice behavior is typically a chain of overt and covert responses that acquires information, recognizes motivations and desired outcomes, articulates values and social conventions, assesses specific situational variables, generates a range of potential responses, and predicts likely short- and long-term consequences of alternative actions. Naturally, the prominence of the different response components varies situationally.

The covert component of human choice behavior almost invariably includes salient cognitive responses of which persons are directly aware. It is the "consciousness" inherent to decision making that gives humans the immediate, pervasive, and unshakable sense of agency. Conscious thought is the foundation upon which the illusion of free will rests (Wegner, 2002).

A biological perspective

Why do people so naturally internalize a libertarian notion of free will and accord it the status of a given that needs no empirical confirmation? The traditional behavior analytic answer is that the belief in agency is an omnipresent cultural phenomenon (Skinner, 1971; Waller, 1999).

There is a very different possibility, not cultural but biological: the human *belief* in free will may be a biologically evolved adaptation. This isn't a strikingly new idea. Years ago, Sherrington suggested the human embrace of free will "serve(s) to activate and sustain his zest-for-life. This last, if he have it not, he is a biological failure and will die out" (1940, p. 199). Skinner argued that only behavior can be selected by the environment; for example, he observed that "the contingencies of survival responsible for man's genetic endowment would produce tendencies to *act* aggressively, not feelings of aggression" (1971, p. 12). Skinner would contend that evolution produces tendencies to *act* freely -- that is, to choose -- but not to have feelings of freedom. The sense of freedom is a consequence of choice behavior that is reinforced.

But perhaps the human experience of agency is a product of evolution. This "sense" need not be objectively "true" to be functionally adaptive, much like a contingent consequence need not be subjectively "pleasant" to functionally strengthen the response that produces it. In fact, Trivers (2000) hypothesized that humans possess an evolved generalized skill at self-deception that serves a range of socially adaptive functions. In the case of free will, agency is the positive illusion and, as I will discuss shortly, enhanced self-regulation is the adaptive benefit.

Psychological adaptations should increase reproductive fitness and demonstrate design specificity (Schmitt & Pilcher, 2004). Adaptations that enhance fitness will be expressed as functional behaviors that address predictable environmental challenges, and are universal in the species, activated with exposure to certain environmental stimuli, complex, and efficient. While it is not yet possible to provide convincing evidence that the belief in free will is selected by the contingencies of survival rather than by behavioral and cultural contingencies, data from clinical, social, and neuropsychology are consistent with this perspective and provide it with a solid measure of evidentiary breadth and depth (cf., Schmitt & Pilcher, 2004)[2].

Clinical research and practice document that the deeply ingrained belief in human volition is a foundation of behavioral adaptation. Stable response generalization and maintenance is only achieved in therapy when the client identifies,

[2] A theoretical psychological adaptation will develop construct validity by accumulating evidence from a variety of sources: anthropological (cross-cultural, trans-historical), phylogenetic, genetic, psychological, medical, and physiological (Schmitt & Pilcher, 2004).

labels, and internalizes the source of behavior change as the self (Deci & Ryan, 1987, Kanfer & Gaelick-Buys, 1991, Kanfer & Grimm, 1980, Kopel & Arkowitz, 1975). Kanfer asserted that "When people believe that they have responsibility for some action...that the behavior is voluntary and not controlled by external threats or rewards, they tend to learn more easily, to be more highly motivated, and to report more positive feelings than when operating under perceived external pressures" (Kanfer & Gaelick-Buys, 1991, p. 319). Thus, he recommended that "in the last phase of therapy the clinician should...reemphasize that the client was responsible for accomplishing the goals of therapy" (Kanfer and Grimm, 1980, p. 437). Self-regulation training, in particular, teaches clients to internalize the sense of control and internal agency (Kanfer & Gaelick-Buys, 1991), as is done, for example, with self-statements in stress inoculation training, which teach the client to emit verbalizations that reflect internal control over reactions to an external stressor (Meichenbaum, 1985). Self-statements to prepare for a stressor include "What do I have to do?," "I can handle the situation," "I am in control," "I can meet the challenge," and "Just think about what I have to do." Each of these statements informs the client that she has behavioral choice – and, by implication, free will. After successful coping, clients are taught to emit reinforcing statements such as "I did it," "I handled that one pretty well," and "I knew I could do it," which strengthen the adaptive behavior as well as the sense of internal agency. These clinical recommendations are supported by emerging neuroscientific data suggesting that a belief in agency is necessary for the acquisition of effective decision making skills; in Churchland's words, "the default presumption that agent's are responsible for their actions is empirically necessary to an agent's learning, both emotionally and cognitively, how to evaluate consequences of certain events and the price of taking risks" (2002, p. 236).

The enormous social psychological "locus of control" literature is provocative as well. When people have, or believe they have, personal control in a situation, their systemic release of stress-related cortisol is low and suppressed compared to situations in which an external locus of control is adopted (Zillman and Zillman, 1996). Perceived control is associated with a wide variety of adaptive coping responses and positive physical (Brannon & Feist, 2000) and mental (Avison and Cairney, 2003) health outcomes. In fact, many scholars argue that the effort to exert personal control is an anthropological constant across time, culture, and even species (Heckhausen, 2000, 2003). "Striving for primary control [over the external environment] is the engine that powers [mammalian] behavior" (Schulz, Wrosch, & Heckhausen, 2003, p. 235), "with humans possessing the unique ability to perceive personal control, which affords an additional "motivational resource for active control attempts" (Heckhausen, 2000, p. 1023).[3] Further, when people believe they have control in a situation, and recognize that their behavior is inconsistent with an existing attitude, they infer that they are responsible for choosing to perform that response and reinterpret the original attitude to make it compatible with the act. "I decided to join the protest rally, so I must believe the war is wrong." The agency illusion mandates that cognitive dissonance be eliminated (cf., Festinger, 1957).

Brain research in the past 20 years provides compelling indications that volitional behavior is a product of biological adaptation rather than of free will. Three examples will be noted. First, a range of research suggests that the anterior cingulate, a part of the frontal cortex, is particularly important for volition, as it is involved in such mental functions as relating emotion to cognition and making decisions (Walter, 2001). Its role in motivation is demonstrated by the consequences of lesions, such as alien-hand syndrome, in which a hand behaves independently of conscious control (Churchland, 2002), and akinetic mutism, in which conversations are understood but few verbalizations are produced, because one has "nothing to say" due to an "empty mind" (Walter, 2001). This latter phenomenon led Francis Crick to proclaim "that the seat of the Will had been

[3] Other scholars argue that the Western notion of free will is a social construction (e.g., McCrone, 1999). In Asian culture, the social goals are achieved not by individually willed action but by passivity, as the individual strives to release all sense of willed action and allow the self to dissolve back into the universal consciousness (p. 250). Note however, that to strive for passivity and Auniversal consciousness is simply another modality through which presumed human agency is enacted. Common to both Eastern and Western perspectives is the belief that one can direct the action.

discovered! It is at or near the anterior cingulate" (Crick, 1994, p. 268).

Second, recent research has determined that two separate neural systems guide human choice behavior (McClure, Laibson, Loewenstein, & Cohen (2004). Portions of the limbic system related to midbrain dopamine release are differentially activated when a decision involves immediate reinforcement. This neural system is closely associated with the experience of emotion. On the other hand, portions of the lateral prefrontal cortex and the posterior parietal cortex, which are involved with conscious analysis and abstract reasoning, are energized when the decision involves delayed reinforcement. The extent of the delay appears to matter little in terms of cortical activation. Further, McClure et al. found that the pattern of neural activation was related to the decision made when a concurrent schedule of reinforcement was in effect: greater activity in the cortex than in the limbic system occurred when the delayed reinforcer was selected but equivalent activity in the two brain regions was found when the immediate reinforcer was chosen. Thus, a key category of volitional behavior -- self-management – relies on a different and more complex neural system than do hedonistic responses. As one of the study's authors observed, humans "have different neural systems that evolved to solve different problems and our behavior is dictated by the competition or cooperation between them" (EurekAlert!, 2004)

Third, sophisticated experiments by Libet and colleagues demonstrated that the motor-premotor cortical area of the brain generates a specific electrical charge, called the readiness potential or RP, approximately 550 milliseconds prior to emission of a voluntary action lacking pre-planning (Libet, Gleason, Wright, & Pearl, 1983). An involuntary movement such as a tic or reflex does not produce an RP (Wegner, 2002). The RP begins 350-400 milliseconds before there is the conscious awareness to act, which occurs approximately 150 -- 200 ms before the act itself. While many scientists view these data as compelling evidence that voluntary behavior is not freely caused by conscious thought (Churchland, 2002; Walter, 2001), Libet (1999) himself hedged, observing that conscious thought can still exert a "veto" function in the 200 ms "awareness" period. Reluctantly, he concluded that free will is a controller -- but not an initiator -- of action.

The dilemma for scientists

The data and logic of science argue that empiricists accept determinism. Yet this is difficult or impossible for many scientists to do. Some have developed intricate theories to make the random motion of subatomic particles in quantum mechanics (e.g., Hodgson, 2002; Penrose & Hameroff, 1995; Stapp, 1999), or the unpredictability in chaos theory, the basis for "naturalistic" support for free will, despite the thoroughly deterministic operation of these theories on a macro level (Churchland, 2002; Walter, 2001). Others resolutely sidestep or dismiss the data, and adopt denial.

For example, Libet (1999), struggling with his own RP data, declared that "the almost universal experience that we can act with a free, independent choice provides a kind of *prima facie* evidence" for conscious control and that "the intuitive feelings about the phenomenon of free will form a fundamental basis for views of our human nature, and great care should be taken not to believe allegedly scientific conclusions about them which actually depend on *ad hoc* assumptions. A theory that simply interprets the phenomenon of free will as illusory and denies the validity of this phenomenal fact is less attractive than a theory that accepts or accommodates the phenomenal fact" (p. 56).

Gomes (1999) also objected to hasty conclusions: Libet's work, "whatever its intrinsic value, does not give us back the intuition that the *initiation* of the act itself is free...what about what we are conscious of as being a free decision that really *initiates* the voluntary action? What about the intuition we have that our actions are really *initiated*, and not only controlled by ourselves, and not by something else?..." (p. 64-65).

And Stapp (1999) contended that if the observer is entwined within the interactive system Adherence to the quantum principles yields a dynamical theory of the mind/brain/body system that is in close accord with our intuitive idea of what we are" (p. 143).

Intuition, emotion, and free will

What exactly is it about this *intuition* that makes it so powerful and unmalleable even when confronted with evidence of determinism?

One possibility is that volitional behavior has a fundamental emotional component that is inseparable from conscious, rational thought (Churchland, 2002; Walter, 2001).[4] Hume had this insight almost 300 years ago: the will is "nothing but the internal impression we feel and are conscious of, when we knowingly give rise to any new motion of our body, or new perception of our mind" (1739, p. 399). According to Wegner (2002), "To label events as our personal actions, conscious will must be an experience that is similar to an emotion. It is a feeling of doing. Unlike a cold thought or rational calculation of the mind alone, will somehow happens both in body and mind" (p. 325). It is the "authorship emotion" (Wegner, 2002). For Walter (2001), the emotional component provides "authenticity" for the actor -- allowing her to identify with and "own" the action. A purely rational assessment can be externalized: "I held off because my boss would not appreciate the criticism." Here, restraint is controlled by fear of external negative consequences. An emotionally involved situation changes the context: "I held off because my boss deserves to hear my criticism in private." In this case, restraint is governed by a consequence that incorporates cultural values. From this perspective, humans only emit volitional controlling behavior when they are emotionally involved to some extent in the outcome of the behavior. Studies of brain-damaged individuals demonstrate that cognitively intact persons make poor decisions when the injury suppresses or eliminates affective responding (Churchland, 2002; Walter, 2001). Feelings inform us of the importance of various consequences of behavior. When "caring" about an outcome is absent, behavior is mechanical, unfocused, hesitant, or indecisive. But when caring leads to a decision that is emotionally meaningful, thoughtful, and judged to be sound (Walter, 2001), we not only accept responsibility for our actions, but responsibility for *choosing* our actions. This is a major difference from the Skinnerian view that one is accountable though not responsible for one's behavior.

Free will as a motivating operation

The emotional component to the belief in free will may be why the idea seems so "intuitive" -- perhaps biological -- to so many. The sense of agency appears to be an unconditioned cognitive and emotional response to an inconspicuously controlled environment that offers multiple response options.[5] It functions as an unconditioned motivating operation (MO, Laraway, Snycerski, Michael, & Poling, 2003), providing the "meaning and purpose" to intentional behavior. As an MO, the belief has several impacts. It is an establishing operation that increases the effectiveness of at least two classes of consequences: delayed, probabalistic -- often verbal or nonmaterial -- reinforcers and self-statements related to personal control, responsibility, and cultural values. It is an abolishing operation that decreases the effectiveness of other consequences: immediate, predictable, tangible reinforcers and self-statements related to what observers might call "selfish" or "immoral" behavior. Finally, it evokes the problem-solving, decision-making, and rule generation responses that comprise self-regulation. Without the agency MO, the justification for conscious choice behavior resides solely in external reasons, thus weakening internal attributions of control and limiting the scope of self-controlled behavior.

The belief in free will may be such a powerful MO because of the physiological nature of conscious responses. Most fundamentally, the initiation of a volitional act (the RP) is not accessible to conscious awareness. But even if the RP was discernible, the one third of a second between it and the subsequent awareness of the act is too

[4] Behaviorists typically have conceptualized cognitive responses as the sole core component of volitional behavior (e.g., Rachlin, 1995; Waller, 1999). McClure et al's. (2004) work suggests that, at least for volitional responses that produce delay of gratification, the limbic system contributes some level of dopamine system activation that could account for the experience of the emotional component.

[5] From this perspective, the unconditioned belief in free will is not elicited by environments that present pervasive aversive control that eliminates all options except direct resistance. When persons in such situations invoke notions of free will to explain or understand their counter-responses, they are utilizing the generalized cultural legacy of the "literature of freedom" that evolved from the unconditioned response to subtly controlled environments.

brief for humans to perceive physically distinct responses. Humans only perceive the second response in the chain and, unaware of subtle environmental influences, infer that they *initiated* the conscious choice response. To the actor, correlation in this situation does imply causation.

The belief in the free will MO evolved in response to the natural operation of contingencies of reinforcement. While behavior is controlled most strongly by immediate, consistent, and potent consequences (Kazdin, 2001), the myriad of competing desires that characterize complex societies mandates that delayed, partial, sporadic, or nonmaterial gratification must occur regularly and frequently. Human self-regulation requires an environment that is engineered to support behavioral restraint (Watson & Tharp, 2002), perhaps by activating the parts of the cortex involved with delay of gratification (cf., McClure et al., 2004). As the human social environment grew in complexity, the conditions that automatically promoted self-regulation were present only sporadically. Language capabilities, however, allow humans to generate contingency rules that increase the potency of delayed, probabalistic, socially beneficial consequences. It is the belief in the free will MO that leads to the rule-governed behavior that constrains "selfish" responses without the imposition of punishment. We label this rule-governed behavior as "morality" and reinforce or punish it through the cultural forces of religion, education, and law in the unending effort to shape a viable, growing society.

The agency illusion and progressive social change

Skinner and other determinists argue that the human mind, like the planet Earth and the human body, is part of the natural scientific continuum, but convincing the average person that this is true will be the hardest of the three great scientific realignments to accomplish. The (pseudo)phenomenon of human agency is accessible and present to each competent person in a way that differs markedly from our awareness of the planet or the body: it is active, immediate, repeated, and functional. Thus, humans believe they can be, should be, and usually are the author of their actions. In essence, amid the complexities of the multiple determinants of behavior, humans gain a measure of comfort from a belief in free will that appears to bring some order to a bewildering environment.

Nevertheless, Skinner (1971) argued that our cultures have advanced sufficiently to discard the agency illusion, and that in fact we must do so if we are to make significant social progress. He stands alone among determinists in contending that the illusion is a destructive delusion that needs to be reconditioned.[6] However, if the belief in free will is essentially an evolved adaptation, can it be modified or even eliminated? Theoretical analysis does not provide reasons for optimism. First, the interactional nature of an adaptation – that is, the fact that it is expressed only in specific environmental circumstances – means that the belief in free will is strongest in precisely those situations that possess subtle, difficult-to-discriminate environmental determinants. Because persons in reinforcer-rich, non-aversive environments always will have to select among behavioral options and their contingent consequences, the belief in free will will be activated naturally and regularly (and perhaps more frequently and strongly) even if inhumane social and political conditions are eliminated. Second, the conditioning phenomena of preparedness and instinctive drift suggest that reconditioning the belief will be very difficult. If the UCS of a choice situation -- defined as a situation with non-obvious environmental control and multiple response options -- elicits the UCR of agency-sensation, then humans very likely are contraprepared to respond to a choice stimulus with verbal representations of determinism, such as behavior analytic philosophy. If attempts are made to instrumentally condition non-agency verbalizations in a choice situation, people may engage in behavior that is analogous to the "instinctive drift" that Breland and Breland (1961) found for pigs' "rooting" and racoons' "rubbing" of coins. Humans, contraprepared to learn the association between choice and non-agency, will "manipulate" non-volitional self-statements in re-

[6] Pereboom's (2002) "hard incompatibalist" approach is probably the closest to Skinner's view. Other leading scientific philosophers argue that the illusion has significant social benefits (e.g., Dennet, 2003; Honderich, 2002; Smilansky, 2000, 2002; Walter, 2001; Wegner, 2002).

sponse to the choice situation and "drift" toward the more natural, prepared response of agency-based verbalizations. Because the drift would be expected to become more pronounced as the number of trials increases (Breland & Breland, 1961), "instinctive drift" may help us understand why so many scientists, in their repeated struggle to come to terms with determinism, wind up generating free will or compatibalist schemes. Finally, even if deterministic verbalizations could be conditioned under highly structured and potent environmental circumstances, it is questionable whether such responses would generalize to less tightly controlled settings. College students, for example, endorsed scientific propositions to explain the existence of animals and inanimate objects in a forced choice experimental paradigm but reverted to teleological theistic explanations when the evaluative context was removed (Keleman (2004).

The difficulty in reconditioning a biologically evolved belief in free will is compounded by the cultural reinforcement the idea receives. Today, the "literature of freedom" is only a part of the geopolitical and cultural domination of the West, with its Weltanschauung of democracy based in free will. The West's influence will continue to increase through technological and cultural exchanges, economic interactions, and military escapades. Even with the remarkable scientific advances that will surely be made in the years ahead, we are decades if not centuries from convincing people that they lack the free will they experience dozens of times a day. Neither rational argument nor empirical demonstrations are likely to modify a genetically-based and culturally supported belief in free will that is widely, intimately, and repeatedly experienced and that produces highly adaptive outcomes. In this context, Skinnerian determinism will be of little use in designing a more just world, and may even impede progressive social change by diverting discussion from the material to the metaphysical realm.

Why might this be so? It is probably not an exaggeration to state that individual moral responsibility, based in the belief in free will, is a theme that links various American, and in some cases Western, conservative ideologies on social and economic issues such as gun ownership, tax policies, health care, welfare and social services, affirmative action, education decisions, religious expression, etc. (Klinghoffer, 2004). The promotion of an alternative progressive social agenda will require the widespread adoption of a competing ethos of community responsibility. However, this is unlikely to be accomplished through strident advocacy of determinism, or even a milder diminution of the centrality of human agency, both of which confront people with an aversive and arrogant challenge to their most cherished and intimate belief about themselves and their world. Rather than coercing or shaping people into accepting the behavioral world view, we should emulate effective clinicians by engineering desirable socially-relevant behavior changes that the affected people attribute to their own volition.

To achieve this impact -- dare I say "control" -- behavior analysts must become part of the *background* cultural environment, promoting change so naturally that our role is unperceived -- thereby leaving the belief in free will intact. We still know the "truth" -- Skinner is of course correct. But whereas a cultural adaptation might effectively be modified through gradual "cultural shaping," the manipulation of a biological adaptation is likely to require a different strategy. If we are to use our behavior analytic knowledge to wield power, our strategy must be to respect, first, the human capacity to self-deceive, and second, the specific deception of free will.

This shouldn't be difficult for behavior analysts, since our approach derives a great deal of its potency through its functional pragmatism. Yet on the issue of free will, we adhere dogmatically to a perspective that is fervently, even if ignorantly, dismissed by the vast majority of people as utter nonsense. In this context, where behaviorists are accused of reducing the richness of human experience to mechanistic abstractions, it seems questionable to issue "a call to arms," such as Staddon's (2004) recent plea for behavior analysts to "speak -- and shoot -- ...at the wide world outside" the behavioral community to ensure "that truth...will prevail" (p. 118).

Behavior analysts long have lamented our modest impact on dubious social and cultural practices, despite some notable achievements.

This frustration should prompt us to examine closely the functional relationships between our social intervention efforts and their consequences: it is possible that we, rather than people in general, are the ones who need to be reconditioned. Skinner, as he has done so many times in other contexts, may again prove prescient: "It would be remarkable if any conception of man did not occasionally need revision" (1964, p. 485). This reasonable observation actually constitutes a challenge to behavior analysts: are we ready to entertain a fundamental revision in our efforts to wrestle with the free will issue? Free will is unquestionably illusory, but the belief in it may well be an inherent, core component of human behavior -- of what it means to be human. We therefore need to deal with the free will issue on that basis if we hope to save – or, more modestly, improve – the world.

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