

# An Interdisciplinary Behavior-Analytic Alternative to Cognitivist Evolutionary Psychology — Advantages and Challenges

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An interdisciplinary behavioral science that places behavior analysis as the seamlessly interconnecting discipline between evolutionary biology and cultural anthropology is preferable to the current paradigm of cognitivist evolutionary psychology. Nevertheless, evolutionary psychology has some strong qualities, particularly a modular multi-adaptation perspective that emphasizes domain-specific adaptations. A synthesis between this and the domain-general emphasis on operant selection in behavior analysis is proposed. On the other hand, evolutionary psychology in its current form holds on to an implausible monopoly on creativity, by limiting acknowledgement of legitimate selection processes to natural selection alone. Natural selection initially prepares the organism for environments that resemble past environments. The mismatch hypothesis, central to evolutionary psychology, highlights this insight, but the mistake made by evolutionary psychologists is to assume that there has not been significant differential phylogenetic selection for a remedy to this initial blind spot inherent in natural selection itself. A better, much more plausible assertion is that there has been tremendously strong selection for any capacities that promote adaptation to current, novel environments, most notably learning and social, cultural learning. Interdisciplinary behavior analysis potentially refines and transforms the “mismatch” hypothesis that is prevalent in evolutionary psychology, and accounts for cultural novel adaptive complexity in a way that evolutionary psychology does not and cannot. Parallel to causal categorical distinction between proximate and ultimate causes within ontogeny, one may also distinguish between ontogenetic behavioral replicators and interactors. This distinction in turn also enables a better understanding of the relationship between domain-specific and domain-general phylogenetic behavioral adaptations.

*Keywords:* evolutionary psychology, interdisciplinary behavioral science, multi-level analysis, interactor, replicator, domain-general, domain-specific, modular, monopoly on creativity, dead man walking

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One core assumption of evolutionary psychology (EP) is that natural selection is the only known process capable of producing “psychological mechanisms” (Buss, 1995, 1999). The corresponding core assumption

in behavior analysis is that selection by consequences has been reintroduced in learning and cultural evolution by natural selection itself (Skinner, 1976, 1981, 1984).

The disagreement between evolutionary psychology and behavior analysis is not whether a phylogenetic *or* an ontogenetic functional analysis of behavior is appropriate. Everyone agrees, apart from certain social constructivists and Marxists, creationists

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and other anti-Darwinists, that a phylogenetic functional analysis of human behavior (human nature, human psychology) is essential. The question is whether this should be *extended* to ontogenetic and cultural functional analyses of behavior. The problem with many Darwinian theories of cultural evolution is that they lack a notion of a principal selecting consequence in cultural evolution; a measurement of function. They model cultural evolution after organic evolution and presume that cultural units of selection simply maximize their own inclusive fitness. On the one hand, they know they must avoid the fallacy of assuming that cultural evolution itself promotes maximization of biological fitness. On the other hand, they cannot escape the implication that culture must be an adaptation with historical reproductive value. These theories cannot find the middle ground, because the key to the middle ground lies in primary reinforcement — stimuli that have fairly stable historical reproductive value, but are less committed to releasing particular responses (Skinner, 1981). The starting point for understanding selection of cultural practices is primary reinforcement.

I will argue for an interdisciplinary behavior analysis, in terms of levels of selection and causal categories, as opposed to cognitivist evolutionary psychology, though incorporating qualities of the latter, while addressing current challenges facing the behavior analytic approach. In particular, evolutionary psychology explicitly holds a somewhat favorable and admirable multi-adaptation perspective that is not explicit enough, or perhaps even suppressed, in the behavior-analytic view. The goal is interdisciplinary synthesis, which maintains the important causal and explanatory categories that different sciences are defined by. Synthesis is preferable to eclecticism in the sense that the former is ideally a logical, seamless recombination, whereas the latter tends towards somewhat casual patch working. Though currently defined by eclecticism,

psychology should be moving towards synthesis. An important aspect of synthesis, as part of my argument is the combination of *domain-general* learning mechanisms, particularly operant conditioning, and the type of *domain-specific* phylogenetic behavioral adaptations ('psychological mechanisms') emphasized in evolutionary psychology.

While behavior analysis and its underlying philosophy of science do not promote a blank slate, I have criticized it for promoting what I refer to as a 'flat phenotype' (Vogt, 2011, 2014). By that I mean that behavior analysis does seem to downplay the role of other phylogenetic behavioral adaptations than operant conditioning. Behavior analysis does not rest on empiricism or logical empiricism. It is not positivist (it is an actual natural science of behavior; it does not try to merely mimic natural science). It is not empiricist: it does not hold that operant or Pavlovian contingencies are sensed and stored by the organism. It holds that these contingencies change and shape the organism's structure as manifested in changes in behavior. Its most significant external philosophical foundation is rather the classical American pragmatism of William James; the psychologist and philosopher who first championed the prototypical evolutionary psychology, (psychological) functionalism. James saw consciousness as a means to achieve goals that served evolved biological needs (Saugstad, 2000). Skinner applied William James' philosophy of consequences (pragmatism) directly to the study of behavior (Saugstad, 2000, p. 387). American pragmatism was indeed the single greatest inspiration for his work in psychology. (Saugstad, 2000, p. 386) Common ground between behavior analysis and EP should therefore be more than possible: They both spring from functionalism and the peculiar attention to consequences that characterizes pragmatism. While claiming philosophical ownership over Darwinism is probably a very long stretch, there is a case to be made that Darwinism is an expression of pragmatism; Darwinism being not merely

a case of functionalism, but fundamentally attentive to the role of consequences.

### Overview

What is required are functional analyses both at the level of phylogeny and ontogeny (section “Function in Ontogeny”), a more refined understanding of causal categories, which also distinguishes between proximate and ultimate causes in ontogeny (section “Behavior Analysis and Neurocognitive Perspectives are Defined by Different Causal Categories”) and recognition that operant conditioning is most likely a true selection process, or at the very least, serious consideration of this hypothesis (section “Operant Selection Gives Rise to Novel Adaptive Complexity in Learning and Cultural Evolution”). The flat phenotype view assigns a somewhat monolithic role to operant conditioning, and downplays the contribution of phylogeny to human behavior. It thus unfortunately takes on minor or lesser, though by no means trivial, similarities with the dreaded blank slate. In “Private Operant Selection” I briefly touch upon the significance of operant selection in thinking and premeditative behavior, especially its significant historical reproductive value. In the following section, “Language as a Product of Co-Evolution and Synergy between Domain-Specific and Domain-General Adaptations”, I briefly consider the explanatory strength of accounting for the evolution of language as a co-evolutionary process, and try to shed some light on what a synthesis between domain-general, more specifically operant conditioning, and domain-specific phylogenetic adaptations may look like.

In my concluding remarks, I argue that evolutionary psychology eventually must accommodate the implications of the existence of selection processes in addition to natural selection, or essentially fail (“Dead Man Walking”). However, evolutionary psychology, especially its modular domain-specific multi-adaptation perspective, has a lot to offer and it can still be great.

## Background

### Mind as a Collection of Evolved Domain-Specific Tools: The Viewpoint of the Evolutionary Psychologist

Four distinct schools of thought have been influential in leading up to what is now modern evolutionary psychology. The first is William James’ functionalism that has already been mentioned. The second is Chomsky’s contribution to the so-called cognitive revolution that moved psychology from a predominantly behaviorist to a cognitivist paradigm. Particularly, Chomsky’s thoughts about evolved, innate structures that function as purpose-specific, separate mental organs, is mirrored in evolutionary psychology. The third, and the most important scientific, theoretical and empirical, influence, is sociobiology, particularly associated with E. O. Wilson’s work. The fourth, of course, is Darwinism itself, which also underpins all of the three aforementioned influences.

In short, evolutionary psychology is essentially sociobiology repurposed and modified with a cognitivist vocabulary. This includes a conceptual framework based around information processing and computer analogies. Meanwhile it subscribes to James’ notion that consciousness, or the mind, has evolved on the basis of its functional role in survival and reproduction.

A curious aspect of the difference between evolutionary psychology and sociobiology is that while the former is conceptually explicitly cognitivist, sociobiology is more reminiscent of behaviorism. Sociobiology is even described, though probably somewhat polemically, as “Darwinian behaviorism” (Sterelny & Griffiths, 1999, p. 321). What they both have in common, however, and part of my central point, is that they both lack the ontogenetic functional analysis that behavior analysis offers. Sociobiology may be behaviorist in the sense that it focuses on the behavior of organisms rather than the cognitive mechanisms that are thought to

cause behavior (a defining characteristic of cognitivism). However, it does not analyze behavior as a function of ontogenetic contingencies of reinforcement; a scientific focus associated with behavior analysis and its underlying philosophy of science, *radical* behaviorism (Moore, 2008; Skinner, 1976).

Evolutionary psychology, in line with most of mainstream psychology and biology, generally limits the selectionist account to phylogeny; in other words, the Darwinian evolutionary history of species. Also, of particular importance to my argument is the fact that evolutionary psychology explicitly and deliberately refers learning to a mechanist account (Buss, 1995, 1999; Cosmides & Tooby, 1997; Tooby, 2014). This means that learning is understood entirely as evolved mechanisms that are in turn exclusively explained by biological evolution. Buss, for example, writes:

The mechanisms of learning that make humans responsive to immediate and developmental contingencies owe their existence to evolution by natural selection. The evolved mechanisms and the input that they were designed to be activated by both owe their existence to causal evolutionary processes [...] They are not two separate causal processes, but rather part and parcel of the same evolved package. (Buss, 1995, p. 5)

Notice how Buss paints a picture of evolutionary predetermination of learning, where the kinds of contingencies that learning encompass seem to be mere evolutionary preset dots to be connected as development unfolds.

### **Selection by Consequences: The Behavior-Analytic View**

The Behavior-Analytic standpoint on the relationship between evolutionary biology, learning and culture is that selection is central to both the subject matter of biology, psychology and anthropology, thus corresponding to *three levels of selection* (Skinner, 1981). These three levels are considered “causal modes” (Skinner, 1981, p. 502) and diffe-

rent and distinct expressions of “selection by consequences” (p. 501). This viewpoint is most explicitly formulated in Skinner’s (1981) canonical paper titled *Selection by Consequences*, originally published in *Science*. Cultural evolution is thoroughly examined in *Beyond Freedom and Dignity* (Skinner, 1971), and parallels in selection of behavior in phylogeny and ontogeny are discussed in *The Phylogeny and Ontogeny of Behavior* (Skinner, 1966).

Though it is of minor importance to my main argument I personally consider phylogenetic (“natural”) selection (level 1 selection) and ontogenetic, operant selection (level 2 and 3) to be clearly distinct and easily separated in terms of contingencies (basically reproductive versus reinforcing consequences), whereas level 2 and 3 are mutually indistinct. In other words, individual learning (level 2) and cultural evolution (level 3) will necessarily overlap with each other. On the other hand, we may at least clearly distinguish between level 2 and 3 in terms of scale and subject matter: The learning history of a single individual versus the evolution of cultural practices that spread as a function of social operant contingencies.

Reasonably skeptical evolutionary theorists outside behavior analysis may note that this position rather gracefully avoids the typical fallacy of strong, naïve variants of Lamarckism, which should strengthen its intellectual credibility. In fact, it steers clear of Lamarckism altogether. I imagine that one of the reasons it seems off-putting to some evolutionary thinkers is that they assume that it is just another fundamentally misguided meddling with Lamarckism. Lamarckism is the general theory of the heredity of acquired (and notably learned) traits and behavior, which has gained some renewed interest recently in connection to epigenetics (though epigenetics is hardly a case of actual Lamarckism, depending on how liberally the latter is defined). The subject of epigenetics is briefly revisited and elaborated upon in the section “The Mismatch Hypothesis”.

Correspondingly, of particular importance to my argument is that behavior analysis accounts for learning within a contextual, selectionist, historical framework. This does not just mean that learning is to explain behavior in terms of mechanisms that have evolved through biological evolution. Learning is also to be understood as processes that form part of the explanation of behavior. Or, in terms I have suggested earlier (Vogt, 2011, 2014); learning, particularly the operant selection process, is part of the *ultimate* explanation of behavior — not merely a proximate, mechanistic explanation. These processes, like natural selection, are best understood in terms of phenotype-environment, or behavior-environment, functional interaction.

### Function in Ontogeny

A basic problem of evolutionary psychology is that the theory lacks a functional analysis of behavior (whether conceptualized behaviorally or in mainstream mentalist terms) at the level of ontogeny. Tying shoelaces, reading for exams, stopping at the red light on a trafficked road, abiding by etiquette at a party, turning on the lights to read more easily, discriminating between high or neutral pitch at the end of a sentence which separates telling and asking — they are all instances of functioning in ways that are acutely sensitive to their consequences in the course of lifetime events. In evolutionary psychology, hypothetical evolved psychological mechanisms account for this functioning (Buss, 1995), but a historical account of why they work in any given context is limited to phylogeny. Phylogeny can only provide very undetailed, broad accounts of these very specific behavioral operations on the environment. In so far as the account remains ahistorical and mechanistic, the right kind of information processing for functional behavioral action is simply assumed to appear at the right time, every time. A hypothetical instinct, mental

organ, mental mechanism — a tool for every job — serves as a pseudo-explanation in place of a sound ontogenetic functional analysis of behavior. To function is to produce consequences, and to function with minute discriminative detail in complex, novel environmental contexts presupposes sensitivity to the consequences one produces. There is simply no other fathomable way a living thing could, save supernatural explanations or a prerequisite library of pre-made tools that magically coincide to produce functional responses most of the time, do without this capacity. Let us also be clear on a related matter: No amount of imitational, observational, verbal, or other kind of social learning can replace this capacity — an organism cannot learn to function properly from other organisms that are not functioning properly in the first place. When EP itself uses this argument, it is as a means of discounting the functional relevance of culture (Buss, 1995, 1999; Cosmides & Tooby, 1997; Pinker, 2012).

Chomsky (1977) wholeheartedly denied any notion of function in ontogeny. He likened the hypothetical mental language acquisition organ to that of the heart. One could subject this organ to a functional analysis, but the place for a functional analysis was exclusively in phylogeny. Consider these quotes:

Every organ has certain functions, but these functions do not determine the ontogenetic development of the organism. Nobody would suggest that a group of cells decides that perhaps it would be a good idea to become a heart because such an organ is necessary to pump blood. If this group of cells becomes a heart, it is due to the information present in the genetic code, which determines the structure of the organism.

There is a place for functional explanation, but it is on the level of evolution. It is possible that a heart develops in the course of evolution in order to satisfy a certain function. Of course, I'm simplifying enormously. But this is a point that is useful to keep in mind:

functional explanation does not relate to the way organs develop in the individual. (Chomsky, 1977, para. 18)

The problem with this, of course, is that the heart has a largely fixed functional performance throughout the course of a human lifetime, although even the heart must function flexibly in response to environmental stimuli (stressors and stimuli that prompt physical activity), but possibly limited to respondent behavior. Verbal repertoires perform a myriad of different, novel functions throughout the course of a lifetime. Verbal behavior cannot be merely respondent. According to Chomsky, a co-founder of the cognitive paradigm; it is a good idea to compare the functioning of a literal blood pump to what is organically probably a large, complex neural network, both comprising advanced genetically determined dispositions coupled with immense adaptively disposed plasticity. Even so, perhaps the most important matter here is that Chomsky fails to substantiate his argument for why there is no room for a functional analysis *both* at the level of phylogeny and ontogeny. I urge the reader to reflect on this matter, because it sheds some light on how severely misguided Chomsky's vision for psychology and psycholinguistics really was.

I suspect Chomsky finds himself trapped in the dichotomy of rationalism and empiricism, where knowledge either originates from the (innate) mind (rationalism) that is ultimately produced by evolution (nativism), *or* from sensory experience imprinting on a blank slate mind (empiricism). As a matter of seemingly progressive synthesis then, mind may be changed by what it perceives through the senses, but in a sense similar to stimulus-response, stimulus-organism-response, input-output, and input-processing mind-output. The notion that past consequences in ontogeny can be causes of behavior thus never occurs to Chomsky, which in turn calls into question the real relevance of his influential review (1959) of Skinner's *Verbal Behavior* (1957).

Continuing, Chomsky writes:

Let's go back to linguistics: here comparable remarks can be made. To my knowledge, no functional principle with very great plausibility has yet been proposed. But suppose that someone proposes a principle which says: The form of language is such-and-such because having that form permits a function to be fulfilled — a proposal of this sort would be appropriate at the level of evolution (of the species, or of language), not at the level of acquisition of language by an individual, one would suppose. (1977, para. 20)

Again, Chomsky explicitly compares the ontogenetic functioning of the heart to that of the hypothetical language organ. Chomsky also demonstrates non-understanding of the concept of an operant. Instead of classifying responses in terms of the type of consequences they produce (operants) he latches on to "form", as if function has to present itself in a structurally ordered and neat way to be functional. It also lends some credence to the notion that Chomsky did not really understand what reinforcement is. If he knew that reinforcement is exactly a proposition of such a principle, it would be reasonable to mention it. After having reviewed (1959) an entire book (Skinner, 1957) where reinforcement is proposed as such a functional principle, Chomsky fails to mention it, and to explain why it does not have "very great plausibility".

It may be argued that digging up old quotes from Chomsky is to revive an already settled and closed debate. While I am sympathetic to this notion, Chomsky's views were highly influential in shaping the so-called cognitive revolution, and important aspects of his views are echoed by evolutionary psychologists. The debate should only be considered closed in the pragmatic sense, relating to cost and benefit and resource allocation. In principle, the debate is not settled at all, though there is not room to settle it here. Chomsky describes the mind as a "system of organs" (1977, para. 4) consisting of specialized "mental organs" (see for example Chomsky, 1977, para. 4. & 7.) that he holds to be genetically

Table 1. Interdisciplinary causal categorical framework (x-axis: Causal category, y-axis: Level of selection and corresponding main science)

	<b>Proximate (Vogt, 2011), mechanistic (Biglan, 1995), Aristotelian ‘material’</b>	<b>Ultimate (Vogt, 2011), contextual (Biglan, 1995), Aristotelian ‘final’</b>
<b>Culture (anthropology)</b>	Cultural neuroscience [epigenetics]	Cultural anthropology
<b>Ontogeny (psychology)</b>	Neuroscience [epigenetics]	Behavior analysis
<b>Phylogeny (biology)</b>	Genetics [epigenetics]	Evolutionary biology

determined structures, very similar to the standard position of evolutionary psychology. (Cosmides & Tooby, 1997)

### **Behavior Analysis and Neurocognitive Perspectives are Defined by Different Causal Categories**

Inspired by Ryle’s (1949) ideas of category mistakes (see also Holth, 2001), and Mayr’s (1961) distinction between proximate and ultimate causes in biology, I have sought to place key behavioral sciences into a causal categorical framework (Vogt, 2011, 2014). This framework distinguishes between proximate and ultimate causes on the x-axis, and spans Skinner’s (1981) levels of selection, biology, psychology, anthropology along the y-axis. The most important aspect of this framework is a distinction between proximate and ultimate causation within ontogeny, where neurophysiology is assigned to the former. This not only firmly establishes operant selection as an ultimate co-determinant cause of behavior alongside natural selection, but also suggests a complementary relationship between behavior analysis and neurophysiology, or even behavior analysis and neurocognitive perspectives.

In a closely related manner, inspired by Cleaveland (2002), I suggest a distinction between replicators and interactors of behavior in ontogeny (see also Moore, 2008), drawing upon the same gene selectionist distinction for phylogeny (Dawkins, 1999). It is not unlikely that synthesis and

synergy between behavior analysis and neuroscience holds potential similar to the synthesis between Mendelian genetics and Darwinism, which revolutionized evolutionary biology. Thus a “modern synthesis for psychology” (Vogt, 2011, p. 15; 2014), or ontogeny, is suggested. While I think behavioral replicators can be partly understood indirectly within behavior analysis, through such subjects as atomic behavioral repertoires (Palmer, 2012) and behavioral equivalents to EP’s modularity hypothesis, the replicators of ontogenetic, behavioral evolution are to be identified by neuroscience.

### **Evolutionary Psychology Subscribes to the Outdated Mayrian Causal Categorical Framework**

Chomsky’s mistakes with respect to function in ontogeny are repeated by the founders of evolutionary psychology, Cosmides and Tooby (1997) in their EP primer:

To understand this causal relationship, biologists had to develop a theoretical vocabulary that distinguishes between structure and function. In evolutionary biology, explanations that appeal to the structure of a device are sometimes called “proximate” explanations. When applied to psychology, these would include explanations that focus on genetic, biochemical, physiological, developmental, cognitive, social, and all other immediate causes of behavior. Explanations that appeal to the adaptive function of a device are sometimes called “distal” or “ultimate” explanations, because they refer

Table 2. Replicators and interactors at biological and behavioral, individual and cultural, levels (listed replicative and interactive units of selection are proposed basic units).

	<b>Replicator – basic replicative unit of selection</b>	<b>Interactor – basic interactive unit of selection</b>
<b>Culture</b>	The brain as ‘cultural replicator organ’ (does not replicate across organisms)	Operant practice (particularly molecular practices)
<b>Ontogeny</b>	Neurophysiological associations (Cleaveland, 2002) – brain, central nervous system (see also Moore, 2008)	Operant (particularly the molecular operants)
<b>Phylogeny</b>	Genes – genotype (Dawkins, 1999) (epigenetic triggers do not replicate over time)	Phenotypic traits – phenotype (Dawkins, 1999) (including both behavioral and physiological traits)

to causes that operated over evolutionary time. (Cosmides & Tooby, 1997, “Why does structure reflect function?”, para. 6)

This quote is illustrative: Tooby and Cosmides tell us that *biologists* developed a distinction between structure and function — presumably within and for *their* field of work. What they describe is the highly influential classical Mayrian distinction between proximate and ultimate causes in *biology* (Mayr, 1961). Tooby and Cosmides correctly assert that this dichotomy categorizes causes along the lines of *proximate* (relatively immediate, mechanistic, structural) and *ultimate* (historical, initial, original, functional) categories. Then, they apply this causal categorization to psychology. Quite contentedly, they convey that psychology cast in terms of the classical proximate explanatory category includes such diverse subjects as “genetic, biochemical, physiological, developmental, cognitive, social, and all other immediate causes” (Cosmides & Tooby, 1997, “Why does structure reflect function?”, para. 6). What is missing, of course, is *life history* and *learning*, specifically *learning history* as contributing ultimate causes of behavior. On an evolutionary time-scale the life history of the individual is extremely transient. Seen through the eyes of the evolutionary biologist, a single

life history is nothing but an insignificant piece of dust in the ever-churning grinder that is the incremental feedback loop of natural selection (excluding perhaps fitness juggernauts such as Genghis Khan, who can be considered slightly larger, more influential pieces of dust). For the psychologist, though, the single organism, typically a human individual, has a vast, detailed history of his or her own. Correspondingly; EP does well as a (socio-) biology, but not as a psychology. The Mayrian distinction works well for biology, but not for the seamless synthetic integration of biology, psychology and anthropology that Skinner (1981) envisioned in *Selection by Consequences*. (Vogt, 2014, p. 189) Some may think that Tinbergen’s (1996) four questions offer a substantial improvement on Mayr’s (1961) causal distinction. I think not, as the ontogenetic environment is still considered to constitute proximate causation of behavior (Tinbergen, 1996), and proximate causes are explicitly held to answer “how” questions, as opposed to “why” questions. Only “why” questions may reasonably cover ontogeny as an ultimate co-determinant of behavior alongside biological evolution, but “why” questions are reserved for evolutionary causes, as in Mayr (1961). My guess is that Tinbergen’s “Ontogeny” causal category corresponds to Aristotelian efficient



causes, which are immediately antecedent to material (mechanistic) causes. Essentially, Tinbergen implies an S-R psychology, or S-O-R psychology.

Like Chomsky, Tooby and Cosmides do not even consider a functional analysis at the level of ontogeny. After all, the functional analysis they are interested in is in phylogeny. Broadly speaking, EP can be said to rely heavily on the Mayrian causal categorization. Accordingly, ultimate causes are exclusively attributed to phylogenetic evolution. Mind, and the neurobiology that realizes it, learning and culture, are all proximate causes that are ultimately (literally, in the causal categorical sense) a function of phylogenetic evolution. This goes hand in hand with the related notion that neurobiology will eventually explain almost “everything” about learning and culture (Tooby, 2014). Naturally, if learning and culture are thought to be fully accounted for as mechanisms produced by natural selection, then the brain is the place to focus research. Because of the unfortunate, but long-standing dichotomy between natural and social science, this outlook carries appeal. After all, we must look to natural science for hard knowledge about psychological phenomena, while there are seemingly no hard, natural sciences of learning and culture (besides the emerging catch-all neuroscience that EP envisions)

### **Causal Categorical Arrogance**

Consider this quote:

“Culture,” “learning,” and “socialization” do not constitute explanations, let alone alternative explanations to those anchored in evolutionary psychology. Instead, they represent human phenomena that require explanation. The required explanation must have a description of the underlying evolved psychological mechanisms at its core. (Buss, 1995, p. 14)

What Buss is essentially saying here is that culture and learning are not at all real or independent co-determinants of behavior. Instead they are explained, proximally, by reference

to the psychological mechanisms that enable them, which are in turn ultimately explained exclusively by biological evolution. Similarly, equally prominent evolutionary psychologist Steven Pinker laments:

[...] neither the genes nor the environment can control the muscles directly. The cause of behavior is the brain. While it is sensible to ask how emotions, motives or learning mechanisms have been influenced by the genes, it makes no sense to ask this of behavior itself. (Pinker, 2014, para. 2)

Speaking as if there is literally only a single type of cause at a single level of explanation, Pinker declares that the brain causes behavior. This perspective misses so much. A multi-level functional analysis may shed light on how behavior is a function of historical reproductive consequences, say for food high in fat and sugar (Buss, 1995), because disposition to be reinforced by substances of high caloric value had differential reproductive success. However, today these resources are abundant due to cultural operant selection for production and consumption of highly reinforcing, and thus easily marketable, foods. These foods now reinforce largely passive behavior, since hunting or gathering is no longer required to attain food. Additionally, eating behavior increases in probability in the presence of discriminative stimuli that set occasion for passive behavior, such as consuming television and computerized entertainment in the living room. These discriminative stimuli may even double as motivating operations: Making sugary and fatty food even more reinforcing, say, in the presence of relaxation time in front of the television. In addition, junk food may be cheaper than healthy food (thus differentially both negatively and positively reinforcing), and fast food restaurants may be prominently advertise themselves locally (unavoidable discriminating stimuli). Pinker wants to look inside the brain, but if we want to remedy the Western obesity epidemic we have to look at the environments that shape and maintain consumer behavior. That crucially includes analysis of

the phylogenetic reproductive consequences in our ancestral environments, which EP may shed valuable light on (including bringing attention to plausible food-related domain-specific phylogenetic adaptations) but should not be limited to it, nor to “the brain”. It’s also easy to forget that every modern psychologist is a behaviorist in the sense that behavior is the empirical and conceptual foundation for most of what they talk about. Evolutionary psychologists have never observed “high caloric intake” or “hip-waist ratio” mental modules. Those are mere hypotheses based on observations of human behavior. The usual behavior analytic complaint is that observations of behavior are moved into the organism and reappear as explanations for that behavior. This complaint has some merit even if a causal categorical perspective is employed. If actual psychological mechanisms are proposed, they should be backed by neurophysiological data, not merely hypothesized based on observation of behavior.

The co-founder of evolutionary psychology is even more one-sided in his assertions: All “learning” operationally means is that something about the organism’s interaction with the environment caused a change in the information states of the brain, by mechanisms unexplained. All “culture” means is that some information states in one person’s brain somehow cause, by mechanisms unexplained, “similar” information states to be reconstructed in another’s brain. (Tooby, 2014, para. 6)

His over-arching argument is nothing less than to retire the notion of learning and culture completely, or at least reduce them completely to mechanism and environmental input (Tooby, 2014). Both Pinker (2014) and Tooby (2014) speak of environmental (ontogenetic, cultural) influence exclusively in terms of input. In a sense they seem to be stuck in S-R, S-O-R psychology, or modern equivalents, particularly input-output, or input-mind-output. When Pinker complains about the meaninglessness of “speaking of input as shaping behavior”, he is unwittingly

demonstrating non-understanding of operant conditioning. While reinforcement is “input” in the sense that it constitutes a stimulus or event that the organism per definition is sensing, it is absolutely not “input” in the sense of an immediate triggering or releasing antecedent to behavior. If Pinker does not understand this, it is reasonable to scrutinize and question his qualification for commenting on reinforcement learning, to which “shaping” presumably alludes.

It’s hard, counterintuitive even, to wrap one’s mind around *past consequences as causes*, though evolutionary theorists should be very familiar with the concept. Consequences are usually something we refer to in future tense, as the effects of actions. One may understandably find oneself blind to them as antecedents and causes of behavior. Nevertheless, understanding consequences is prerequisite for understanding operant analysis. Could it be that operant selection is so counter-intuitive that it escapes understanding, even by otherwise brilliant thinkers? At least, I would say, understanding of operant selection is *very* hard from within the confines of a mechanistic (and thus proximate) perspective. As we have seen, these prominent evolutionary psychologists seem to exclusively subscribe to a mechanistic understanding of learning and culture.

Compare this to Skinner’s causal categorical arrogance: “Mentalism kept attention away from the external antecedent events which may have explained behavior, by seeming to supply an alternative explanation” (Skinner, 1976, p. 18).

Skinner’s case is a lot more complex, as he does offer a behavioral alternative to mentalism, in terms of private events, and clearly states that physiology, “the organism’s current structure” (Skinner, 1976, p. 19) causes behavior.

In contrast to EP, behavior analysis considers learning and culture as ultimate causes of behavior. Rather than distinguishing between proximate and ultimate causes in ontogeny, Skinner prefers to take a pragmatic

approach, and assigns “cause” to the point at which effective action can be taken (Skinner, 1976). That means independent, manipulable variables in the environment. At the time of his writings that meant mostly or exclusively variables in the external environment outside the organism, but he explicitly states that once neuroscience reaches a certain level of experimental behavioral control; manipulable, independent neurophysiological variables may also be considered as causes of behavior experimentally (Skinner, 1976). Conceptually he already considers them causes of behavior:

An organism behaves as it does because of its current structure, but most of it is out of reach of introspection. At the moment we must content ourselves, as the methodological behaviorist insists, with a person’s genetic and environmental histories. (Skinner, 1976, p. 19)

An implicit reference to proximate ontogenetic causation can be found in the expression “current structure”, but Skinner seems more concerned with the potential for pragmatic intervention wherever independent variables that can provide experimental prediction and control are found. He is not so much concerned with interdisciplinary conceptual bridge-building, though he clearly designates physiology as the proper study of what goes on the inside of the organism (affording introspection only a very limited and defined role in radical behaviorism). Elsewhere he touches more clearly on causal categories:

The physiologist of the future will tell us all that can be known about what is happening inside the behaving organism. His account will be an important advance over a behavioral analysis, because the latter is “necessarily historical”—that is to say, it is confined to functional relations showing temporal gaps. Something is done today which affects the behavior of an organism tomorrow [...] He will be able to show how an organism is changed when exposed to contingencies of reinforcement and why the changed organism

then behaves in a different way, possibly at a much later date. (Skinner, 1976, p. 236)

Here Skinner shows a lack of causal categorical arrogance, and also semi-explicit or implicit mastery of causal categories — distinguishing clearly between the physiological (“proximate”) causes of behavior and the historical (“ultimate”) causes of which they are a function. He was opposed to causal mentalism, and in turn dualism, and thus classical Rylean (1949) category mistakes; not to physiology as cause of behavior. In the next section we turn attention to the reason *why* evolutionary psychologists have such confidence in disregarding a functional analysis in ontogeny.

### **Operant Selection Gives Rise to Novel Adaptive Complexity in Learning and Cultural Evolution**

In this section, natural selection will sometimes for clarifying purposes be referred specifically to as ‘phylogenetic selection’. In a parallel manner, operant selection and ‘ontogenetic selection’ will be used synonymously and interchangeably. Though there possibly (and likely) are types of ontogenetic selection other than operant selection, they are taken to mean the same in this context. It is of some importance to my general argument that operant conditioning is at once both a phylogenetic adaptation (or rather a complex of adaptations), *and* a selection process that itself enables learning of novel, adaptive behavioral repertoires, which may be called ontogenetic and cultural adaptations. An example of cultural adaptation can be the discovery and mastery of fire. Occasionally, but not always, I will therefore refer to the phylogenetic adaptation specifically as *operant conditioning*, and the ontogenetic selection process that it facilitates specifically as *operant selection*. The lack of terminological distinction between reinforcement as a phylogenetic adaptation and as a process of ontogenetic selection is a conceptual weakness in behavior analysis,

but this patchwork solution will have to work for now.

Evolutionary psychologists may well ignore a functional analysis in ontogeny, but does it really matter? The source of their profound confidence in relegating learning and culture to a mere proximate causal category, is the point that natural selection is the only widely recognized, naturally occurring process capable of producing novel, adaptive complexity. The prominent evolutionary psychologist David Buss (1995, 1999) emphasizes this point heavily. Consider this quote: "When asked to elaborate on precisely what causal mechanisms are being invoked by culture as an alternative explanation [to an evolutionary one], the questioner typically cannot supply additional details. Is "culture" really an alternative explanation?" (Buss, 1995, p. 12)

Where EP gets it wrong, however, is in ignoring the possibility of lesser-known selection processes of relevance to human behavior. They see natural selection as a unique type of process that can only take place in the reproductive cycles of living biological organisms. And it really is unique, in the sense that it is the original, first selection process here on earth. However, that does not necessarily make it the only one. It can itself have given rise to others. Some burden of proof should reasonably shift to evolutionary psychologists for explaining why there has been no phylogenetic, natural selection for organic mechanisms that confer the awesome and unique adaptive potential of selection processes, especially with regards complex, human behavior. The brain is a more advanced organ than the human reproductive system. The first self-reproducing molecules, of which we are descendants, were presumably quite primitive, but still must by necessity and definition have produced a mechanism capable of incremental variation-selection-retention. Why would variation-selection-retention manifest in a single molecule literally by chance and happenstance, yet never be re-invented ever

again in the course of 4 billion subsequent years of natural selection? It strikes me as highly implausible, unless natural selection for some hitherto unknown reason *cannot* or *will not* give rise to other selection processes. The wheel has never evolved directly by natural selection, though incidentally EP inadvertently forces upon itself the position that it effectively has; since natural selection alone must ultimately account for all adaptive complexity, including human-made technology. Nevertheless, I suppose a similar claim can be made about selection processes. The wheel requires mechanisms that are inconsistent with typical organismic, physiological evolution (moving parts that cannot have an enclosing skin; few likely adaptive, organic historical proto-variants that can evolve incrementally). Operant selection, conversely, appears within reach of selection when a somewhat complex nervous system is in place, which is influenced by modulating neurotransmitters with global reach.

Intuitively, the strongest argument in favor of discounting operant selection as a genuine selection process seems to lie in the fact that phylogenetic selection consists of populations of differentially reproducing organisms that have actual tangible descendants, and have a well-documented identification of mechanisms of replication, variation and selection. Operant selection takes place as the interaction between the behavior of the organism and its environment.

There is a strong tendency, regrettable but understandable, to think of natural selection as *the* selection process, and typically the only one known to exist (Buss, 1995, 1999), at least organically. Other candidates are either considered mere analogies not to be taken seriously, or must mirror the exact expressions of variation, selection and retention found in natural selection. One day this confinement of thought will be considered nonsense. Operant and natural selection are two different instances and realizations of incremental variation-selection-retention processes (shorthand: selection processes or

VSR-processes). The VSR-type process in general, not natural selection specifically, is the only known source of non-intelligent adaptive complexity. And most importantly: Operant selection is not a Darwinian selection process, it is, quite simply, an operant (or “Skinnerian”, or “Thorndike”) selection process. It does not proceed through a spiral sequence of variation by individual genetic differences within or between populations, selection by differential reproductive consequences, replication by reproductive, genetic heritability. Those are the requirements for a Darwinian selection process. Operant selection proceeds through a spiral sequence of variation by random, recombined and uncommitted behavioral repertoires, selection by differential reinforcing and aversive consequences, and retention by an increased probability of repetition of the reinforced response under similar circumstances in the future. Retention is probably realized (proximately) by a neurological mechanism that floods the brain with dopamine triggered by reinforcing stimuli, differentially strengthening neural pathways that have fired very recently compared to pathways that have not. When a similar context (a set of discriminative stimuli) and similar motivating operations have occurred (say, food or water deprivation), in the future, reinforced neural pathways are more likely to fire, thus tending towards reproducing a response similar to the one that was reinforced earlier. This corresponds to a basic contiguity-based mode of reinforcement, with the most basic causal relationship between response and reinforcement. *Those are the requirements for an operant selection process.* Holding operant selection to the exact standards of natural selection would be a nonsensical non-argument. The debate is (or should be) about whether it is a legitimate selection process full stop, not whether it conforms to the Darwinian specifics (Pinker, 2012 shows a tendency towards this line of argument). VSR, not Darwinian VSR specifically, is the prerequisite for generation of novel adaptive complexity. This line

of reasoning is allowed, tolerated one could say, because natural selection was the original, first discovered selection process. History could have been different. The church could have retained authority over the account of creation. Darwin could have become a priest as planned. Operant selection could have been discovered before natural selection as a consequence, being more compatible with the views of the church than natural selection. We might then be arguing about trivialities such as whether there is really anything corresponding to motivating operations or punishment in natural selection, or whether selection processes can be effective when a single contingency typically takes several years.

Relating learning and biological evolution to each other in a fruitful manner that complements Darwinism, rather than denying or obscuring it, has a short and turbulent history (Ruse, 2012; Segerstråle, 2000). Understandably, evolutionary biologists have had a hard enough time explaining that evolutionary adaptations do not change and develop in the present, but through the course of the history of the species, typically over grand time scales. Explaining and conveying that evolution occurs through incremental variation-selection-replication, in which the variation is principally subject to random change — and is neither Lamarckian (biological heredity of acquired, for example *learned*, traits), nor teleological (directed towards a purpose or goal) — is hard enough. Finally, it is not self-evident how learning and culture may play any significant role in biological evolution, given that learned traits are not passed on by biological reproductive mechanisms. The tendency to overhype epigenetics probably also adds to the obfuscation (e. g.; Carey, 2012; Pinker, 2014). It is time to establish biology as a *base science* relatively to psychology and the social sciences — neither cutting them off from an evolutionary framework (like the Standard social science model), nor simply engulfing them in an unfounded monopoly on creativity like EP does.

### Top-Down/Bottom-Up

The consequences of what selection processes are considered to exist and how the relationship between biological evolution, learning and culture is construed may be illustrated by the distinction between bottom-up and top-down processes. Bottom-up refers to a non-intelligent cumulative build up of complexity, partly and arguably synonymous with a selection process. Top-down, conversely, refers to generation from a source of intelligence, such as the notion that intelligent, creative minds generate culture.

Corresponding to both the classical proximate/ultimate distinction from biology, and to a general rejection of theories in support of ontogenetic and cultural selection processes, EP essentially advocates a top-down culture theory (see Buss, 1995, 1999; Cosmides & Tooby, 1997; Pinker, 2014). Evolution is seen as a bottom-up process (and rightly so) capable of producing novel adaptive complexity, including psychological, behavioral adaptations. Natural selection thus produces a set of mental modules, domain-specific adaptations shaped and selected on the basis of the reproductive advantage they conferred in solving very specific challenges to survival and reproduction. Waist-hip ratio, for example, would be thought to be governed by one such module, and would specifically aid each sex in finding ideal reproductive partners of the opposite sex. These kinds of mental modules (as proximate causes of behavior) then literally produce and cause culture top-down.

Let's compare this to Skinner's three levels of selection (1981). As is the case with EP, natural selection is considered a bottom-up process capable of producing novel adaptive complexity, from which all adaptations, behavioral and physiological, including operant selection itself, have arisen. Consider this illustrative quote:

In an important sense all behavior is inherited, since the organism that behaves is the product of natural selection. Operant conditioning

[synonymous with operant selection in this context] is as much a part of the genetic endowment as digestion or gestation. The question is not whether the human species has a genetic endowment but how it is to be analyzed. It begins and remains a biological system, and the behavioristic position is that it is nothing more than that. (Skinner, 1976, pp. 48-49)

However, the over-emphasis on operant conditioning in behavior analysis; what I call the 'flat phenotype view' (Vogt, 2011, 2014), is probably best exemplified by Skinner's convenient but misleading and inaccurate distinction between 'species behavior' and 'individual behavior':

The behavior of the organism as a whole is the product of three types of variation and selection. The first, natural selection, is responsible for the evolution of the species and hence for *species behavior*. All types of variation and selection have certain faults, and one of them is especially critical for natural selection: It prepares a species only for a future that resembles the selecting past. Species behavior is effective only in a world that fairly closely resembles the world in which the species evolved.

That fault was corrected by the evolution of a second type of variation and selection, operant conditioning, through which variations in the *behavior of the individual* are selected by features of the environment that are not stable enough to play any part in evolution. (Skinner, 1990, p. 1206, my italics)

It is quite clear here that Skinner does not propose a blank slate, since he assigns a whole repertoire of behavior, "species behavior", to an exclusively phylogenetic origin. On the other hand, it is clearly implied that operant selection is responsible for most or all "individual behavior". First of all, this marginalizes the role of individual genetic differences in primary reinforcement. Thus in turn probably greatly downplaying the potential for innate individual differences in personality (introvert vs. extrovert), tastes (like or dislike seafood) and aspirations (preference to work with

people versus computer systems). It also implies that phylogenetic behavioral adaptations constitute a set of (seemingly merely respondent and simple) repertoires particular to the species and a set of species-specific primary reinforcers—thus the name ‘flat phenotype’. Meanwhile operant repertoires, potentially very complex in nature such as verbal behavior, evolve exclusively through the course of lifetimes (and culturally) and are products of operant selection exclusively.

I suggest behavior analysis adopts a ‘rich phenotype’ view instead. The rich phenotype view explicitly recognizes that operant selection is *one of many* phylogenetic behavioral adaptations, rather than taking on monolithic proportions. Perceptively, Dennett (1996) rhetorically asks why natural selection would ever favor *one, single* adaptation over all others to essentially govern behavior; a timely question indeed. Nevertheless, my answer is that operant conditioning is in fact likely just one among many phylogenetic behavioral adaptations (and operant selection may and should probably be considered a complex of adaptations). However, *not all adaptations are equal* (Vogt, 2011). Instead of assigning a monolithic role to operant conditioning one may simply consider it an adaptation of central importance. Correspondingly, behavior analysis should acknowledge more clearly that culture is a combined product of “top-down” and “bottom-up” processes, in the sense that cultural operant selection works in conjunction with other evolved phylogenetic behavioral adaptations that should ideally be taken into account. Waist-hip ratio has already been mentioned as an example. This may be an evolved algorithm that determines strength of reinforcement, so that a certain ratio is more “attractive”—reinforcing—to the opposite sex.

### The Mismatch Hypothesis

A fundamental notion in evolutionary psychology is that specific differences between the current environments in which

humans now live and pre-historical environments to which humans are still primarily adapted, leads to current maladaptive outcomes. A classic example is that humans are genetically predisposed to seek out and consume foods high in sugar, fat and salt, because we evolved in environments where these highly beneficial nutrients (at limited consumption) were generally low in supply. Now these substances are everywhere around us and readily available at a very low cost of effort. The mismatch hypothesis, in this essential form, is valid and holds water.

The question, however, is how we manage to adapt to current, novel and changing environments at all. Natural selection, in its most basic form, really does only prepare the organism for past environments. The mistake made by evolutionary psychologists is to assume that there has not been significant differential phylogenetic selection for a remedy to this initial blind spot inherent in natural selection itself. A better, much more plausible assertion is that there has been tremendously strong selection for any capacities that promote adaptation to current, novel environments. One such type of capacity that has received lots of attention recently is epigenetics, or what one could more generally label flexible genetic expression. Epigenetics is a set of Darwinian adaptations that enables the phenotype to express itself flexibly in response to cues in the current environment, even across generations in a quasi- or weak Lamarckian manner. Obviously genes that can express themselves flexibly in response to current environmental stimuli will tend to have a replicative advantage over genes that remain fixed in expression.

Even though epigenetics is of great importance to understanding the bigger picture of how phylogenetic and ontogenetic adaptation relate, it really does not provide the central answer to how natural selection has produced organisms that can successfully thrive and reproduce in its current environment (which at any given time point is where survival and reproduction actually

takes place). The most central answer is *learning*, and not just any kind of learning, but learning that enables the behavior of the organism to be sensitive to consequences in the current environment; learning where the functional value of behavioral responses is gauged in the current environment; learning that is capable of giving rise to novel adaptive complexity.

It is understandable that evolutionary scientists would strongly resist the notion of ontogenetic functional analysis and ontogenetic adaptation to current environments, because so much of their time has been spent explaining to students, laymen and scientists in other fields that natural selection is a blind, non-teleological process without purpose (see Pinker, 2012) — that natural selection does not adapt the organism to the environment here and now, and that it does not work towards maximizing fitness in the current environment (see for example Buss, 1995, p. 9). But in their eagerness to emphasize this important point, evolutionary psychologists have missed the flipside of the coin: it is highly unlikely that there has been no phylogenetic, natural selection for adaptations that promote adaptation to the current environment. An organism that has the tools to adapt to current environments will tend to have enormous reproductive advantage over a counterpart that does not. The purely “Darwinian” organism succeeds when reproduction is high and offspring investment is low (r selection as opposed to K selection), exemplified in the extreme by organisms such as bacteria, so that purely Darwinian trial and error is not costly alone on its own. For complex organisms with high offspring investment and relatively low reproduction (K selection); mistakes are expensive, since so much time and energy is spent on a single progeny.

### Private Operant Selection

In a related manner, Dennett (1996) describes a hierarchy consisting of Darwi-

nian, Skinnerian and Popperian organisms, emphasizing that all these are indeed Darwinian, but that the two latter, more complex organisms make use of additional methods of trial and error. The Skinnerian organism may learn by “trial and error” by operant selection during its lifetime, while the Popperian organism may additionally learn by “trial and error” in an internal, simulated environment during that lifetime. Dennett’s Popperian organism is basically equivalent to a Skinnerian organism capable of thinking, or covert, private (Skinner, 1976) behavior (Vogt, 2011). It is thus subject to private operant selection, or one could say, “Popperian selection”, which undoubtedly plays a role in much of human complex behavior.

Much like operant selection prepares the organism for novel evolutionary environments, private operant selection may be thought of as preparing the organism for novel lifetime environments. By functioning under influence of the consequences of a thought up, hypothetical environmental scenario responses to environmental circumstances that have never happened before can be shaped beforehand. Also, if operant selection conferred extreme historical reproductive advantage, private operant, or “Popperian”, selection did only even more so. Private operant selection may plausibly have evolved incrementally from overt operant selection, possibly corresponding with verbal behavior evolving into verbal thought. For Dennett (1996) the Popperian simulated, internal environment is framed as an argument for mentalism, whereas Skinner (1976) maintains that emotions and thoughts are behavior. I have noted before that in one sense the notion of the Popperian organism, or private operant selection, somewhat blurs the lines between mentalism and behaviorism (Vogt, 2011). In another sense mentalism crucially and non-negotiably belongs to a different causal category than behavioral accounts, including accounts of private behavior (Vogt,



2011, 2014). At this point the reader may note that as far as naturalistic explanations goes, teleological explanations, appealing to future goals and intentions acting towards the future, are not explanations at all, while selectionist, historical explanations are real explanations that may account for the apparent teleological quality of human behavior.

### **Language as a Product of Co-Evolution and Synergy between Domain-Specific and Domain-General Adaptations**

Some behavioral repertoires are too complex for satisfactory explanation in terms of either phylogenetic or ontogenetic provenance alone. Language, above all, is an example of such a repertoire. Natural selection alone cannot explain how words and utterances acquired nuanced communicative roles as a function of differential reproductive success. Not only does not language make sense without also subjecting it to an ontogenetic functional analysis, but the phylogenetic analysis of the evolution of language capacity does not make sense without a phylogenetic-cultural co-evolutionary analysis. A concept of ontogenetic and cultural function eases the burden of explanation significantly.

Initially the mouth, tongue and vocal musculature was capable of producing a small range of different sounds uncommitted to eliciting stimuli, which could thus function as a pool of behavioral variation. Different kinds of vocal responses produced different kinds of reinforcing consequences. Some would successfully alert the tribe to out-group intruders or predators. Some would help advance dominance within the tribe, and so on (given that signs of deference had already evolved as a primary reinforcer). Wherever the consequences could follow the response relatively immediately, thus establishing a relation of contiguity, such

as immediate effective action in response to a threat to the tribe, or immediate signs of deference to authority, operant selection of such adaptive responses could take place (Skinner, 1986). This could for example be immediate effective action in response to signaling a threat to the tribe, or immediate signs of deference to authority. As a small proto-verbal repertoire slowly emerged, with greater and greater discriminative nuance, there would in turn be phylogenetic selection for better vocal motor control. A certain calm low-pitched growling sound might communicate dominance and authority, but without instigating a violent confrontation. A more elaborate variant, on the other hand, might communicate a threat of violence. The cultural evolution of these discriminative complexities in terms of social learning of vocal sounds and perception of those vocal sounds in turn provide increased phylogenetic selection for more flexible and precise operant control of vocal musculature and enhanced discriminatory disposition in response to auditory stimuli (in simple terms, better hearing). In relating operant conditioning and modular domain-specific adaptations, we may now forecast a better, more plausible explanation: The neurological motor control of tongue-, mouth- and vocal musculature is a *domain-specific* adaptation in the sense that it controls speech sounds *specifically*, or at least foremost. Nevertheless it works in conjunction with the “general learning mechanism” operant conditioning, as it is involved in behavioral responses and behavioral variation that are subject to shaping, refinement, recombination, realization and further development by operant selection. Presumably, a host of other relatively domain-specific adaptations relate to operant selection in the same manner. This could be called a multi-adaptation perspective where operant conditioning is considered one of many phylogenetic adaptations, with a non-monolithic, yet central and special role (Vogt, 2011).

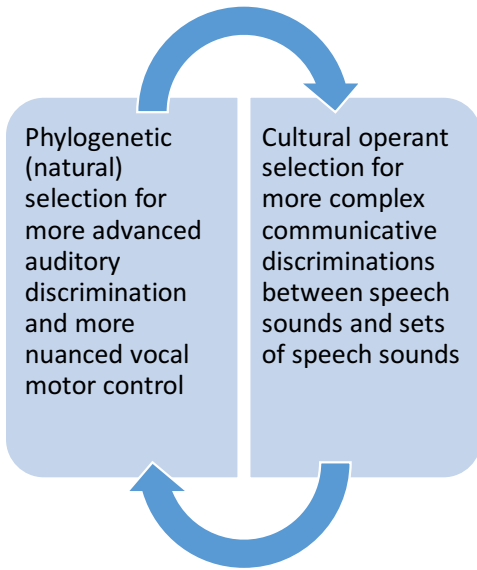


Figure 1. Co-evolutionary synergy between phylogenetic selection for auditory discrimination and vocal motor control and cultural operant selection for communicative discriminations between speech sounds

### Dead Man Walking

I have argued that evolutionary psychology lacks an analysis of behavior as a function of ontogenetic contingencies, and for a distinction between proximate and ultimate causal categories in ontogeny. This causal categorical distinction corresponds with the notion of operant selection as a causal mode (Skinner, 1981) on par with natural selection, capable of producing novel adaptive complexity. It is implausible and inconsistent that incremental natural selection never gave rise to new selection processes during the course of literally billions of years, while natural selection itself arose by chance. A selection process of course has superior creative capacity compared to mere chance. Whereas EP correctly points out adaptive mismatch between pre-historical and current environments; interdisciplinary behavior analysis additionally takes into account learning as a phylogenetically evolved, crucial means for adapting to novel environments

— where survival and reproduction at any given time takes place. Whereas according to EP our minds evolved by natural selection, and minds generate culture, according to interdisciplinary behavior analysis human behavior is a function both of biological and cultural evolution, including co-evolution between them; such as the proposed case of language. EP centers on a favorable modular multi-adaptation perspective, but it cannot account for how all the domain-specific adaptations correspond, coincide and combine to function with minute precision in response to evolutionarily entirely novel stimuli during a human lifetime. A synthesis between domain-general and domain-specific adaptations is needed to account for this.

Evolutionary psychology, in its current form, is in fact a *dead man walking*: No matter how successful in the long or short term, it will sooner or later either have to fundamentally change its core assumptions about learning and cultural evolution, or suffer a fatal decline.

Natural selection alone cannot explain space travel, intricate monetary systems such as fractional reserve banking, division of power by parliamentarism, the checks and balances of a cabinet, congress and a senate, the microchip, multi touch smartphone technology, or the writings of Shakespeare (or even less impressive writing by less distinctive writers for that matter). Evolutionary psychology cannot even in principle account for how the proposed myriads of domain-specific mental modules somehow collaborate to produce a combined functional performance in fundamentally novel and complex environments. Truth is, Skinner (1990) was right: Cognitive science, and with it EP, is a creationism of psychology. But, I would add, not because mentalism and cognitive psychology is somehow “wrong”, but because mechanism; the causal, scientific category to which cognitive psychology belongs, (Biglan, 1995; Vogt, 2011, 2014) is inherently incapable of accounting for selection (Skinner, 1981). The evolutionary

cognitivist just assumes a creative mind and lazily puts in natural selection as its total ultimate explanation. Thus evolutionary psychology is held together by the “world’s strongest ad-hoc hypothesis [...] natural selection—for now.” (Vogt, 2014, p. 190, my translation) A closer look easily reveals that natural selection alone cannot explain all human functional and creative performance, though certainly no explanation can be offered without it.

Evolutionary psychology can still be great. It is right about a lot of things. There are probably a huge number of phylogenetic behavioral (psychological) adaptations, many of which are domain-specific. EP is also wrong about a lot of things. Natural selection cannot account for our ability to learn and invent new things with limited phylogenetic history. Natural selection does not account very well for adaptability to novel environments *without* offering learning as an adaptive product of natural selection.

Behavior analysis uniquely complements evolutionary biology by way of its focus on historical behavior–environment interaction, its empirically grounded selectionism and its centering on learning and adaptation. The two disciplines basically address phylogenetic and ontogenetic adaptation, and behavior as a function of historical reproductive and reinforcing consequences, respectively. However, behavior analysis needs to be more closely in touch with modern evolutionary biology, particularly by adopting a modular, multi-adaptation perspective resembling the one evolutionary psychology offers — and from assigning a monolithic role to operant conditioning to one simply of central importance.

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