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Evolutionary Evaluation: Implications for evaluators, researchers, practitioners, funders and the evidence-based program mandate

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ABSTRACT

Evolutionary theory, developmental systems theory, and evolutionary epistemology provide deep theoretical foundations for understanding programs, their development over time, and the role of evaluation. This paper relates core concepts from these powerful bodies of theory to program evaluation. Evolutionary Evaluation is operationalized in terms of program and evaluation evolutionary phases, which are in turn aligned with multiple types of validity. The model of Evolutionary Evaluation incorporates Chen's conceptualization of bottom-up versus top-down program development. The resulting framework has important implications for many program management and evaluation issues. The paper illustrates how an Evolutionary Evaluation perspective can illuminate important controversies in evaluation using the example of the appropriate role of randomized controlled trials that encourages a rethinking of "evidence-based programs". From an Evolutionary Evaluation perspective, prevailing interpretations of rigor and mandates for evidence-based programs pose significant challenges to program evolution. This perspective also illuminates the consequences of misalignment between program and evaluation phases; the importance of supporting both researcher-derived and practitioner-derived programs; and the need for variation and evolutionary phase diversity within portfolios of programs.

This paper offers a way of thinking about program development that has deep theoretical foundations and casts new light on some of the major contemporary controversies in evaluation and applied social research. Specifically, Evolutionary Evaluation draws on theories of evolution, developmental systems, and epistemology to articulate a view of program development and evaluation as evolutionary processes with inherent lifecycle qualities. When programs are understood in this way, there are powerful implications for strategic decision making regarding the management and evaluation of existing individual programs and – notably – portfolios of programs; for the imperative of sustaining a large stream of diverse, even emergent programs from varied sources; and ultimately for our investments in knowledge and innovation altogether.

In the sections that follow we: (1) present the theoretical foundations for an evolutionary view of program development and evaluation; (2) operationalize this perspective by defining program and evaluation evolutionary phases and discussing the issue of alignment as a key consideration in ensuring optimal decision-making regarding programs and their evaluation; and (3) link these to the current controversy over evidence-based programming by proposing a more comprehensive definition of what constitutes sufficient evidence. The framework presented here has a number of important implications for program practitioners, researchers, and funders and we explore some of these in a brief conclusion.

Of the many implications of Evolutionary Evaluation, we focus here on the appropriate role for experimental designs and the currently prevailing standards of evidence because these pose the largest contemporary challenge to programming, especially for social and educational programs, and to program evolution. These issues have significant historical roots: one of the major controversies in applied research and evaluation over the past century has centered around randomized controlled trials (RCTs)

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and, in its more recent manifestations, the definition of evidence-based programs (EBPs). We argue that the evidence-based label is being applied to programs prematurely and that the definition of EBPs needs to consider multiple types of validity and the importance of methodological pluralism.

We begin with a discussion of the theoretical foundations for Evolutionary Evaluation. First, we present the concept of evolutionary epistemology which applies biological theories of evolution to the development and progression of knowledge and ideas. We extend this reasoning to program development and evaluation, highlighting the critical role that evaluation plays in the variation, selection, and retention of programs. The application of evolutionary reasoning to programs is further supported by the concepts of ontogeny and phylogeny including insights gained from developmental systems science. Ontogeny and phylogeny are typically terms reserved for the evolution of organisms and species, respectively; however we will describe how the concepts can be applied to programs and to portfolios of programs.

1. Theoretical foundations

The foundations for Evolutionary Evaluation can be found in the fields of evolutionary theory, natural selection (Darwin, 1859; Mayr, 2001), evolutionary epistemology (Bradie & Harms, 2006; Campbell, 1974, 1988; Cziko & Campbell, 1990; Popper, 1973, 1985), developmental systems theory (e.g., Lerner, 2002, 2006; Overton, 2006, 2010), ecology (Molles, 2001; Pickett, Kolasa, & Jones, 1994; Richerson, Mulder, & Vila, 1996) and systems theory (Bertalanffy, 1972; Laszlo, 1996; Midgley, 2003; Ragsdell, West, & Wilby, 2002). These are foundational theories in the life and developmental sciences. Here we show that these theories can be applied directly to programs and how they develop, providing a basis for thinking about how programs evolve over time.

1.1. Evolutionary epistemology

Evolutionary epistemology applies the concepts of biological evolution to the growth and development of human knowledge. The term evolutionary epistemology was reportedly coined by one of the leading thinkers in evaluation, Donald T. Campbell, and the field was initially developed by him and the philosopher of science Sir Karl Popper (1973, 1975, 1985). In his essay entitled *Evolutionary Epistemology*, Campbell (1974, 1988) argued that "...evolution – even in its biological aspects – is a knowledge process, and that the natural-selection paradigm for such knowledge increments can be generalized to other epistemic activities, such as learning, thought and science" (Campbell, 1988, p. 393). Campbell is not suggesting evolution as a metaphor for learning, thinking or science; he is asserting that evolution *is* the fundamental process for all of these. Additionally, he is making the argument that biological evolution itself can perhaps most aptly be viewed as a knowledge process. Toulmin makes the same point: "In talking about the development of natural science as 'evolutionary,' I have not been employing a mere *facon de parler*, or analogy, or metaphor. The idea that the historical changes by which scientific thought develops frequently follow an 'evolutionary' pattern needs to be taken quite seriously; and the implications of such a pattern of change can be, not merely suggestive, but explanatory" (Toulmin, 1967, p. 470).

In his identically titled paper *Evolutionary Epistemology*, Popper (1985) describes three levels of evolution: "genetic adaptation, adaptive behavioral learning, and scientific discovery, which is a special case of adaptive behavioral learning" and argues that for all three "the mechanism of adaptation is fundamentally the same" (Popper, 1985, p. 78–79). Of course, that mechanism is the process of natural selection (whereby traits or features that offer the greatest "fitness" to the environment tend to prevail over time as organisms without those advantageous characteristics tend not to survive or reproduce as successfully). Popper notes that all three levels of evolution share an inherited structure. At the genetic level it is obvious that the inherited structure is the genome. However, it may be less obvious at the behavioral level that there is also an inherited structure – "the innate repertoire of the types of behavior which are available to the organism" (Popper, 1985, p. 79). Perhaps most intriguingly, the corresponding 'inherited' structure in science consists of the "dominant scientific conjectures and theories" that get passed down through academia and distributed throughout communities of researchers. For those who are accustomed to thinking of evolution as something that applies only to biology or genetics, it may initially be somewhat disorienting to accept that both Popper and Campbell are saying that ideas and knowledge follow the exact same process as biological species.

The central thrust of this argument is that our knowledge, including our macro-level knowledge of interventions and programs, evolves according to the evolutionary principles of ontogeny (development of an organism over its lifespan), phylogeny (evolution of a species over time), natural selection, and the trial-and-error cycle of (blind) variation and selective retention (for example, genetic mutations that survive and persist, or disappear). Over time, program variations are tried and survive or not according to current socially (usually unconscious) negotiated selection mechanisms. Instead of the commitment to preserving a program as it is, this perspective encourages recognition that individual programs, like organisms, have a finite life-span, that they should not be assumed to have an infinite horizon, that it is normal to see them as part of an ongoing trial-and-error effort, that they should not be expected to function at a mature level when they are first "born" or initiated, and that the abandonment of an older program and the development of new ones is part of the normal cycle-of-life. From a program's inception and throughout its life course, the focus is on where the program is in its development and how it can be moved along to the next phase in development or abandoned for a better program alternative.

1.2. Ontogeny and the evolution of programs

One of the evolutionary concepts that needs to be re-interpreted in terms of programs is the idea of ontogeny. Ontogeny refers to the development of an organism through different stages or phases over its life course (i.e., in humans: infancy, childhood, adolescence, adulthood). Developmental systems theory recognizes that ontogeny describes a change process that is not necessarily anchored in chronological time or associated with age (e.g., Lerner, 2002, 2006; Overton, 2006, 2010). Age typically serves as a proxy variable for change or development, and is used for convenience or ease of measurement rather than because it has a direct link to the developmental phenomenon of interest. This variability can be seen around the acquisition of any new developmental skill. For example, some children will begin talking as early as 12 months-old while others will not talk until they are 24 months-old.

Moreover, the developmental process is not necessarily linear. Stage theories (e.g., Freud's theory of psychosexual development, Erickson's theory of psychosocial development, Sullivan's theory of interpersonal development, Kohlberg's theory of moral development) which dominated the developmental literature in the early to mid-20th century tended to compartmentalize development into distinct circumscribed phases and individuals were expected to transition through the phases in lock-step. More recently, developmental theory has rejected a stage theory approach and recognizes that development is not described well by abrupt