In Response

Should Behavior Analysts Accept Imam's Sense of Teleology?

Roy A. Moxley
West Virginia University

Imam (1989) claims "final cause assumes that 'future events are active agents in their own realization' " (p. 81); that "a grand design is *always* assumed" by a final cause (p. 82); that teleology traditionally connotes a final cause; and that *teleonomy* must be used instead of teleology for a functional explanation based on consequences because teleonomy "does not imply or entail a grand design or purpose. . . . is not finalistic in the Aristotelian sense . . . [and] avoids the need to appeal to cognitive concepts of goal or internal representation" (p. 82). The question pursued here is who uses teleology and final, or end, cause in this sense and should behavior analysts endorse such a sense?

To begin with, it's not Aristotle. As illustrated in Aristotle's classification of the "four causes":

A thing may be a cause as the end. That is what something is for, as health might be what a walk is for. On account of what does he walk? We answer "To keep fit" and think that, in saying that, we have given the cause. (*Physics* II.3, Charlton, 1970, p. 29)

This and some more recent uses of final cause (e.g., Griffore, 1978; Moore, 1984; Peirce, 1960, 1.211; Singer, 1924) imply a functional relationship rather than a "grand design" or nonexistent agency. *Teleological* is used in a similar sense: "The special anatomy of an animal may be studied . . . with reference to the function, use, or purpose performed by a part or structure . . . , termed Teleological or Physiological Anatomy," an 1875 citation in Simpson and Weiner (1989, p.

728) echoed by Polanyi (1962): "All physiology is teleological" (p. 360).

The idea that nonexistent future events are active agents in their own causation is also not inherent in the *Argument from Design* referenced by Imam to exemplify the "grand design" of final cause. Here "final causation" is simply "action in view of an end" (Morris, 1875, p. 12; see Bonnette, 1972, pp. 157-180, for a similar argument by Aquinas who maintained final cause is a good, all action is for the sake of the good, and the frequency of effects is evidence of human intention, or the good). The difficulty in the argument from design is not that final cause implies nonexistent agency but that the inferences from analogy are questionable. Morris (1875) infers superhuman agency from "resemblances to design in nature" (p. 18) in analogy with inferring human agency from an artifact. In respect to this analogy and its dubious extension of correspondences, the argument from design has an affinity with mechanistic explanation: "The chief contributions that the mechanists had to offer . . . was the 'argument from design,' which . . . claimed to prove the existence of God by comparing the relationship between God and the created world with that between a clockmaker and a clock" (Mayr, 1986, p. 57).

Imam's sense of teleology is also not found among the pragmatists whose work supports behavior analysis (see Day, 1980; Hayes, Hayes, & Reese, 1989; Lammal, 1983; Morris, 1988). Influenced by the refinement of teleological explanation provided by Darwin's natural selection, pragmatists favorably distinguished teleology and final cause from mechanistic explanations and efficient cause (cf. Dewey, 1896; James, 1879; Mead, 1936;

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Peirce, 1960, 1.211–1.212). Nor is Imam's sense found in modern accounts of teleology that adopt distinctions such as functional classes and probability relationships which are also found for operant behavior (e.g., Churchman & Ackoff, 1950; Moore & Lewis, 1953; Singer, 1924, 1946). Imam's sense is also not found among widespread uses of teleology in systems theory (Ackoff & Emery, 1972), evolutionary biology (Ayala, 1970), physiology (Cannon, 1945), learning theory (Moore & Lewis, 1953), the philosophy of science (Nagel, 1979), cybernetics or feedback theory (Rosenblueth, Wiener, & Bigelow, 1943), and contextualism (Rosnow & Georgoudi, 1986).

Among early behaviorists, Imam's sense of teleology is not found in Guthrie (1960): "Teleological laws have their place in science" (p. 292). Discussing purposive explanations under teleological explanations, Guthrie (1924, pp. 674–676) supported purposive explanations as well as mechanistic ones. Later, in distinguishing a focus on purposive acts from a focus on mechanistic movements, Guthrie (1960) stated, "Acts are defined by consequences but executed by movements" (p. 196). As an account of actions, Skinner's operant is therefore different from mechanistic accounts of movements: "He [Skinner] selects as his response in a basic experiment not movements of skeletal muscle but the accomplishment of a change in the environment" (Guthrie, 1960, p. 252).

Nor is Imam's sense of teleology found in Ringen's (1976) analysis of Skinner's operant theory. Using the language of teleology, Skinner (1974) maintained "operant behavior is the very field of purpose and intention. . . it is directed toward the future: a person acts *in order that* something will happen, and the order is temporal" (p. 55; see Skinner, 1953, pp. 87–90, for similar comments with a caution against a defective meaning of "final cause"). For Skinner (1953), purposive behavior occurs "because of the consequences which *have* followed similar behavior in the past" (p. 87), and Skinner's account has been found to meet modern

definitions of teleology (see Kitchener, 1977; Moore & Lewis, 1953; Ringen, 1976; Staddon, 1983, pp. 79–80). Ringen showed that operant behavior (but not respondent behavior) met the teleological criteria Taylor (1964) favorably opposed to mechanistic explanation. Ringen (1976) concluded, "Thus, in the sense specified by Taylor and Wright . . . operant behavior clearly requires teleological explanation" (p. 242). Ringen's focus on the teleological/mechanistic distinction provides a conspicuous discrimination to support Skinner's (1981) account of operant behavior as "a second kind of selection by consequences" (p. 501) associated with Darwin's natural selection rather than "the causality of classical mechanics" (p. 503).

As the above indicates, although teleology like other terms has been used in various ways, claims that teleology has inherently defective meanings are unjustified (see Ayala, 1970; Beckner, 1968; Braithwaite, 1955; Nagel, 1979; Taylor, 1964; Wright, 1976). In particular, the idea that final cause requires a nonexistent event to be an active agent in its own causation is an explanatory fiction. In Wright's (1976) words,

The reversal of cause and effect has long been hung like an albatross around the neck of teleology, but it is not clear how this view could have survived even modest scrutiny. . . there is nothing in any of the ordinary ascriptions of goals or functions or motives or purposes or aims or drives or needs or intentions which require us to reverse the normal cause-before-effect sequence. (p. 10)

Illustrating the dubious credibility of assertions that teleology or final cause implies an illogical sequence is Imam's (1989) claim that "final cause assumes 'future events are active agents in their own realization' (Ayala, 1970, p. 8)" (p. 81). In this citation, Ayala is quoted out of context and misrepresented as endorsing the statement. Ayala (1970) actually rejected this claim and supported teleology: "Teleology is equated with the belief that future events are active agents in their own realization. Such belief, however, is not necessarily implied in the concept of teleology. . . teleological ex-

planations are appropriate and indispensable in biology" (p. 8).

If teleology does not have an inherently defective meaning, who has given it that meaning? Sources can be found among those who have difficulty understanding explanations in terms of consequences. For example, the commitment of some S-R psychologists to a mechanistic world view apparently entailed their opposition to teleology (e.g., Hull, 1943, pp. 24–26; Kuo, 1928; Lashley, 1923; Weiss, 1929, pp. 81–84). Hull (1943), whose work is a paradigm of mechanistic S-R behaviorism, claimed: "In its extreme form teleology is the name of the belief that the *terminal* stage of certain environmental-organism cycles is at the same time one of the *antecedent* determining conditions which bring the behavior cycle about" (p. 26). This claim about the "extreme form" of teleology is presented without any examples from actual usage. Ironically, Hull's (1930) own account of foresight suggests a reaction to a non-existent event: "Foresight may be defined . . . as *the reaction to an event which may be impending, but which has not as yet taken place*" (p. 514). In addition, Thorndike's (1940/1969) mechanistic explanation of purpose invokes a backward causation: "Our purposes . . . act by the natural force of the confirming reaction; this is as truly a mechanism as the knee-jerk . . . but it has the special property of working back upon connections to strengthen those which are satisfying to a man's purposes" (p. 10). Thus, mechanistic accounts of foresight and purpose have in themselves raised the specter of nonexistent agency and backward causation.

The difficulties that mechanistic viewpoints have with consequence-based explanations are not resolved by teleonomy. Teleonomy has problems being distinguishable from mechanistic explanations and accommodating selection by consequences (cf. Ayala, 1970; Nagel, 1979, pp. 281–285). For example, Mayr (1965), one of Imam's references, restricts *teleonomic* so as to suggest internal representation and a cognitive orientation: "It would seem useful to rigidly restrict the term teleonomic to systems op-

erating on the basis of a program of coded information" (p. 42).

In conclusion, Imam's sense of teleology is not supported in any of the above references to those who use teleology as a descriptor they approve of. Some distant approximations to Imam's sense of teleology, however, can be found in rule-like claims typically offered from a mechanistic perspective without empirical evidence from actual usage. Because anti-teleological claims are associated with mechanistic views, those who believe "Skinnerian behaviorists" reject teleology may also believe "Skinnerian behaviorists" are thoroughly mechanistic or that the operant is a mechanistic construction. For example, Reese (1986), whom Imam thanks for comments on an earlier version of his paper, maintains: "The operant category is also consistent with the mechanical model: The analogue of force is antecedent stimulation; the analogue of movement is operant behavior . . . Skinnerian behaviorists reject teleology, and therefore operant behavior should be said to be controlled by antecedent stimuli" (p. 170–171). Note how seeing "Skinnerian behaviorists" as rejecting teleology contributes to seeing operant behavior as mechanistic. Behavior analysts who would avoid perpetuating this interpretation as well as the interpretation that behavior analysis is a mechanistic S-R psychology should not endorse a defective definition of teleology.

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