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BEHAVIOR HAS COST: REPLY TO TONNEAU

LA CONDUCTA TIENE UN COSTO: RÉPLICA A TONNEAU

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Tonneau correctly points to a flaw in my 1973 explanation, which was oversimplified. His attempted solution, however, is equally flawed. My own proposed solution, that behavior entails cost, appeared in my 1981 paper, to which Tonneau refers, but the significance of which he apparently missed.

The basic point is that behavior always produces mixed consequences, both reinforcement (or benefit) and cost. In Tonneau's thought experiment, holding reinforcer rate fixed after performance on a variable-ratio schedule has stabilized (see his Figure 1), his assumed O-rule makes the incorrect prediction that responding will continue only because it ignores the cost of behavior; that is the underlying flaw in his assumed O-rule. In my 1981 paper, I suggest two O-rules, which I called *indicators*, one based on the matching law and one based on optimality. Since they take cost into account, they no longer lead to the incorrect prediction. This may be understood intuitively, because if reinforcer rate were fixed, then decreases in response rate would result in increases in net benefit (reinforcer rate minus cost), because cost would decrease. Lower and lower response rates would be selected by any reasonable indicator function (O-rule), until response rate would fall to zero.

Tonneau's proposed solution, feedback from the feedback function (his Figure 3; bottom panel), fails logically. A feedback function specifies only what is possible: what reinforcer rate, for example, results from any possible response rate. Behavior, however, depends on what actually occurs: actual events in the environment. Tonneau probably meant to include the actual correlation between responding and consequences in the O-rule. Were that idea developed, it might offer a theory, but I suspect it would turn out to imply a tautology: reinforcement depends on reinforcement.

Tonneau raises another issue, however, that remains to be dealt with: the relation between reinforcement and induction (referred to in his paper as

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"elicitation"). Reinforcers, particularly food, often induce behavior, referred to variously as adjunctive, interim, or terminal behavior. Sometimes it is diffuse general activity, and sometimes it is specific activities, such as food-related chewing in rats and pecking in pigeons. Such induced behavior may either interfere with reinforced behavior, if it is incompatible, or it may augment the reinforced behavior, if it is compatible. Many situations we study in the laboratory include such effects. Tonneau argues correctly that a literal interpretation of the system I presented in 1973 allows only induction. Solving that problem as I did in 1981, however, allows only reinforcement and omits a role for induction. Yet some role for induction seems inescapable (see Staddon, 1973, for a related argument). In attempting to derive a feedback function for variable-interval schedules, for example, I found that the available data constrained the function away from the theoretical asymptote (the linear feedback function for fixed-ratio 1) as response rate decreased toward zero (Baum, 1992). Instead, the asymptote suggested that several responses occurred for each reinforcer. The likeliest explanation is that when reinforcer rate is low, each reinforcer induces some responding. That induced responding only becomes significant when response rate is extremely low. How to incorporate such reinforcer-generated responding remains to be seen.

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