This Week's Citation Classic ®

This paper described a simple method for investigating the energizing effects of frustrative nonreward on goal-directed instrumental responses. It served as the basis for a theory that attempted to integrate the partial reinforcement extinction effect, discrimination learning, and a number of other reward-schedule effects in instrumental learning. [The _SCI_® and the _SSCI_® indicate that this paper has been cited in more than 280 publications.]

The Origin of the "Frustration Effect"

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In 1951, I presented my first paper at a conference—at a meeting of the Southern Society for Philosophy and Psychology in Roanoke, Virginia. It was titled "A three-factor theory of inhibition: an addition to Hull's two-factor theory." (An extension of this paper was subsequently submitted to our premier theoretical journal, the _Psychological Review_, and was promptly rejected.) The burden of the paper was that Clark Hull's two-factor theory of inhibition, as presented in his famous book, _Principles of Behavior_,[1] was incomplete because it did not include a concept of anticipated frustration, along with reactive inhibition (I_R) and conditioned inhibition (sI_R), in its explanation of the response suppression that occurs when previously reinforced responses are subjected to experimental extinction—that is, are no longer reinforced. Hull's earlier conception of the fractional anticipatory goal response (r_G-s_G) was my model, and I proposed fractional anticipatory frustration (r_F-s_F), a hypothetical Pavlovian conditioned response, as the third inhibitory factor: When added to I_R and sI_R, r_F-s_F completed the inhibitory triad.

As a young experimental psychologist, just out of graduate school at the University of Iowa, where Bridgman's concept of operational definition had been favorably discussed, it was now incumbent on me to provide an empirical basis for this hypothetical r_F-s_F. I had defined it as a conditioned-response form of the unconditioned response, primary frustration (R_F). The definition of the unconditioned stimulus needed to elicit the unconditioned response (R_F) seemed to me straightforward: the disconfirmation of a reward

expectancy; that is, the omission of a reward that previously had been present following a response. How to measure R_F was then the problem.

The solution came to me in the form of a variant of the simple straight-runway apparatus then in frequent use with laboratory rats. (The subjects for the experiment were the progeny of three pregnant rats sent down from Iowa; there were then no animal facilities at Newcomb College.) Built out of pine boards and hardware-cloth mesh, the apparatus consisted of two straight runways in series: Startbox→Runway 1→Goalbox 1→Runway 2→Goalbox 2. The Goalbox of Runway 1 became the Startbox for Runway 2. The other item of equipment was a stopwatch. The idea was to run hungry rats down this "double-runway," first giving reward (R) in _both_ goalboxes; then, after reward expectancy was built up in both goalboxes, to institute test trials in which, on a random half of the trials, responses in Runway 1 to Goalbox 1 were not rewarded. Speeds in Runway 2 following these N-trials would then be compared with speeds in Runway 2 following the intermixed R-trials, and the increase in N-speeds over the R-speeds in Runway 2 would be the measure of primary frustration (R_F). This unconditioned response for the conditioned response of anticipatory frustration (r_F-s_F) is the third inhibitory factor that I thought should be added to Hull's other two. It turned out that the invigoration of the response in Runway 2, which came to be known as the "frustration effect," was a reliable and stable finding (though others differed on its interpretation), and the double runway became a standard method for investigating the variables that affect the strength of primary frustration. I was surprised at the popularity and the application of this simple idea and procedure, and I thought of (and still think of) this experiment, which I conducted with Jacqueline Roussel, an undergraduate student at Newcomb College, Tulane University, Louisiana, as a small, albeit necessary, step in the theoretical sequence that I intended to pursue in the 1951 paper. The elaboration of a more comprehensive theory of reward-schedule effects in instrumental learning, frustration theory, emerged some years later in several theoretical papers, two of which also were designated _Citation Classics_.[2,3]

1. Hull C L. _Principles of behavior._ New York: Appleton-Century-Crofts. 1943. (Cited 2,860 times since 1945.)
2. Amsel A. The role of frustrative nonreward in noncontinuous reward situations. _Psychol. Bull._ 55:102-19, 1958.
     (Cited 840 times.) [See also: Amsel A. Citation Classic. (Smelser N J, comp.) _Contemporary classics in the social
     and behavioral sciences._ Philadelphia: ISI Press, 1987. p. 125.]
3. ---------. Frustrative nonreward in partial reinforcement and discrimination learning: some recent history and
     theoretical extension. _Psychol. Rev._ 69:306-28, 1962. (Cited 585 times.) [See also: Amsel A. Citation Classic.
     (Smelser N J, comp.) _Contemporary classics in the social and behavioral sciences._ Philadelphia: ISI Press, 1987.
     p. 131.]
*Received October 22, 1990