

This Week's Citation Classic

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Mackintosh N J. Selective attention in animal discrimination learning. *Psychol. Bull.* 64:124-50, 1965.
[Oxford University, Oxford, England]

This paper attempted to bring the continuity-noncontinuity dispute up-to-date by reviewing data showing that animals do not learn equally about all stimuli present in a discrimination problem, and that the solution of such a problem must partly involve learning to attend to relevant cues and ignoring irrelevant ones. [The *Social Sciences Citation Index*[®] (SSCI[™]) indicates that this paper has been cited over 245 times since 1966.]

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"I originally wrote this review as part of my PhD thesis, completed two years earlier under the supervision of Stuart Sutherland. Although I revised it extensively for publication, I can still detect the brash confidence of its origins. Perhaps that is why it became so popular.

"More probably, it simply appeared at the right time to capture a variety of converging interests. For opposition was growing from several directions to one of the central principles of traditional 'continuity' theory — the notion that all stimuli present at the moment of reinforcement will be associated with that reinforcer. My own interest had stemmed from the classic work of Lashley¹ and Krechevsky² on discrimination learning in rats. That work had long been dismissed in most textbooks which concluded that Spence³ had won the continuity-noncontinuity dispute—even if some more recent work of Lawrence's⁴ had suggested some new possibilities. I was not satisfied with that judgment and tried to show why in this article (which made no pretence to being a neutral review of the literature normally expected in *Psychological*

Bulletin). But others were thinking along similar lines. Research on discrimination learning in young children and in retardates, or on so-called concept-learning in college students, was throwing up a number of related ideas. No one supposed that continuity theory would apply to such subjects, and the work of Zeaman and House⁵ had already pointed the way to the theoretical stance I wanted to take.

"What I did not foresee was that many of the phenomena of discrimination learning that seemed to suggest the operation of a mechanism of selective attention would shortly be demonstrated in supposedly simpler conditioning paradigms. Kamin⁶ reported, rather more convincingly than Lashley had ever been able to, that animals initially conditioned to one stimulus signaling the delivery of a reinforcer, would learn little or nothing about a second stimulus added to the first, when the compound continued to signal the same reinforcer. This seemed compelling evidence for the idea of selective attention: the animals were so busy attending to the first stimulus that they did not have time to attend to the second. Alas, life is rarely so simple.

"For the last ten years, most work on selective association has used simple conditioning paradigms and has tended to support Kamin's original conclusion that failure to learn about an added stimulus does not reflect an inability to attend to one stimulus while already attending to another, but rather that either the redundancy of the added stimulus or the predictability of the reinforcer renders one or the other of them ineffective. Rescorla and Wagner's⁷ influential model of conditioning has made this second alternative popular. I have clung to the first⁸—no doubt because the idea has links with the more traditional theories of selective attention that I was discussing in this review."

1. Lashley K S. *J. Gen. Psychol.* 26:241-65, 1942.
2. Krechevsky I. *Psychol. Rev.* 45:107-33, 1938.
3. Spence K W. *J. Exp. Psychol.* 35:253-66, 1945.
4. Lawrence D H. *J. Exp. Psychol.* 39:770-84, 1949.
5. Zeaman D & House B J. The role of attention in retardate discrimination learning. (Ellis N R, ed.) *Handbook of mental deficiency: psychological theory and research*. New York: McGraw-Hill, 1963. p. 159-223.
6. Kamin L J. Predictability, surprise, attention, and conditioning. (Campbell B & Church R, eds.) *Punishment and aversive behaviour*. New York: Appleton-Century-Crofts, 1969. p. 279-96.
7. Rescorla R A & Wagner A R. A theory of Pavlovian conditioning: variations in the effectiveness of reinforcement and non-reinforcement. (Black A H & Prokasy W F, eds.) *Classical conditioning II*. New York: Appleton-Century-Crofts, 1972. p. 64-99.
8. Mackintosh N J. *Psychol. Rev.* 82:276-98, 1975.