

THORNDIKE, EDWARD LEE

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EDWARD LEE THORNDIKE

Born: 1874 | **Died:** 1949

Nationality: American

Primary Field(s): Educational Psychology, Comparative Psychology, Behaviorism

1. Summary

Edward Lee Thorndike stands as one of the most influential American psychologists of the early 20th century, widely regarded as the founder of modern **educational psychology**. His extensive career, primarily spent as a faculty member at Teachers College, Columbia University, revolutionized the study of learning by applying quantitative, objective methods to mental processes. Trained initially at Harvard University under William James, Thorndike quickly shifted his focus from the subjective observation of human consciousness to the objective study of animal behavior, paving the way for the behaviorist movement. His foundational work, particularly his doctoral dissertation *Animal Intelligence* (1898), established the theoretical framework known as **connectionism**, proposing that learning occurs through the strengthening or weakening of bonds between stimuli (S) and responses (R).

Thorndike's scientific approach was instrumental in transitioning psychology from a philosophical discipline to an experimental science. He was deeply committed to applying psychological principles to practical problems, especially within education and mental testing. His research on the transfer of learning challenged established notions of formal discipline, promoting instead the importance of specific learning content. Furthermore, his development of standardized testing methods made him a pioneer in the field of psychometrics. His legacy is enshrined in his famous **Law of Effect**, a central principle that explained how reinforcement shapes voluntary behavior decades before B.F. Skinner popularized operant conditioning.

2. Key Contributions: The Puzzle Box and Connectionism

Thorndike's most famous experimental contribution was the use of the **puzzle box** to study instrumental learning in cats, detailed in his 1898 dissertation. Unlike prior animal studies that often relied on anecdotal evidence, Thorndike employed rigorous, quantifiable procedures. A hungry cat would be placed inside a box from which it could only escape by performing a specific action, such as pulling a loop or pressing a lever. Upon escaping, the cat was rewarded with food. Thorndike carefully measured the time required for the cat to escape on successive trials, charting the gradual decrease in latency.

The results of these experiments led Thorndike to reject the prevailing notion that the cats exhibited sudden, insightful learning. Instead, he observed a pattern of trial-and-error behavior,

characterized by random attempts that gradually became more focused and efficient over repeated exposures. He graphically represented this process using **learning curves**, demonstrating that the acquisition of the correct response was a slow, incremental process of association. This observation formed the bedrock of his theory of connectionism, which posited that learning is the gradual forming of neural connections (S-R bonds) between sensory input (the stimulus of the box and lever) and motor output (the successful escape response).

Connectionism proposed that all learning, whether in animals or humans, operates on the same fundamental principles of stamping in or stamping out S-R bonds. This mechanistic view positioned Thorndike as a crucial precursor to strict behaviorism, providing the objective, non-introspective methodology that John B. Watson and later B.F. Skinner would adopt and elaborate upon. His insistence that psychological phenomena could be reduced to observable behavior and measurable associations marked a significant epistemological shift in the field.

3. Thorndike's Laws of Learning

Based on his extensive research, Thorndike formulated several foundational principles governing the formation and strengthening of S-R connections, collectively known as his Laws of Learning. These laws provided a clear, mechanistic explanation for how habits and skills are acquired, impacting educational practice for decades.

The most significant of these laws is the **Law of Effect**. This principle states that responses that produce a satisfying or pleasant effect in a particular situation will be more likely to occur again in that situation, while responses followed by discomfort will be less likely to occur. Essentially, consequences determine behavior. If an action leads to a reward (satisfier), the S-R connection leading to that action is strengthened or "stamped in." Conversely, if the action leads to punishment (annoyer), the connection is weakened. This concept provided the first formalized scientific explanation for reinforcement and punishment mechanisms in learning, profoundly influencing all subsequent behavioral theories.

Another key principle was the **Law of Exercise**, which contains two sub-components: the Law of Use and the Law of Disuse. The Law of Use stated that the more frequently an S-R connection is used, the stronger it becomes. The Law of Disuse stated that the longer an S-R connection is unused, the weaker it becomes. While Thorndike later revised the Law of Exercise, finding that mere repetition without reinforcement was insufficient for strengthening bonds, the initial formulation emphasized the importance of practice in skill acquisition, a concept that remains vital in educational settings.

Finally, the **Law of Readiness** addressed the motivational and physiological state of the organism. This law suggested that learning is most effective when the nervous system is ready to conduct or cease conducting impulses. For example, when a student is mentally and physically prepared to

learn (ready), performing the action is satisfying, and not performing it is annoying. If the student is not ready, being forced to act is annoying. This law provided a psychological justification for considering the learner's developmental stage and internal motivation before presenting new material.

4. Educational Psychology and Measurement

Thorndike's impact extended far beyond animal behavior, establishing him as the primary architect of modern **educational psychology**. He believed that education should be managed scientifically, relying on empirical data rather than tradition or intuition. He applied his connectionist principles directly to pedagogy, arguing that effective teaching required identifying the specific S-R bonds necessary for a skill and reinforcing them systematically.

One of his major contributions to educational theory was his research on the **transfer of training**. Prevailing educational philosophy held that studying difficult subjects like Latin or mathematics strengthened the overall "mind" (formal discipline). Thorndike challenged this, demonstrating through empirical testing that the transfer of learning only occurs to the extent that the two tasks share identical elements. This finding had massive implications for curriculum design, suggesting that students should focus on subjects and skills directly relevant to their future lives and occupations, rather than relying on abstract mental exercise.

Furthermore, Thorndike was a pioneer in developing standardized tests and psychological measurement, or **psychometrics**. He developed scales for measuring children's intelligence and ability, believing that anything that exists must exist in some amount, and therefore, must be measurable. His work on standardized testing laid the groundwork for modern IQ testing and achievement assessments, fundamentally changing how schools evaluate performance and potential.

5. Major Works

Animal Intelligence: An Experimental Study of the Associative Processes in Animals (1898)

The Elements of Psychology (1905)

Introduction to the Theory of Mental and Social Measurements (1904)

The Psychology of Learning (1913)

Educational Psychology (Three Volumes, 1913-1914)

The Measurement of Intelligence (1927)

6. Criticisms and Debates

While foundational, Thorndike's work faced several critical challenges, both methodological and theoretical. Early critiques often focused on the limited scope of his early experiments; critics

argued that the puzzle box scenario was highly artificial and failed to capture the complexity of natural animal learning or problem-solving, which might involve insight or cognitive mapping rather than purely mechanistic trial-and-error.

The Law of Effect itself underwent significant revision, largely due to Thorndike's own later research. Initially, he believed that both satisfying consequences (rewards) and annoying consequences (punishments) had symmetrical effects on the S-R bond. However, later experiments, particularly those involving "annoyers," suggested that while rewards strongly strengthen connections, punishments are far less effective or consistent in weakening them. This forced modification demonstrated that reward and punishment were not simply opposites in the learning process.

Furthermore, his strict adherence to connectionism was eventually overshadowed by the rise of cognitive psychology. While his objective methodology remained crucial, the purely mechanistic view that all learning is reducible to simple S-R bonds failed to account for complex human language acquisition, memory organization, and problem-solving strategies that require internal cognitive processing beyond observable stimuli and responses. Despite these later theoretical limitations, Thorndike's influence on behaviorism and applied psychology remains indelible.

Further Reading

[Edward Thorndike \(Wikipedia\)](#)

[Law of Effect \(Wikipedia\)](#)

[Connectionism \(Wikipedia\)](#)

[Edward Lee Thorndike \(Association for Psychological Science\)](#)