Stimulus Sampling Theory

General

Stimulus sampling theory was developed in 1950s by American psychologist William Estes influenced by works of Edwin Gurthie. This theory suggests that a particular stimulus-response association is learned in a single trial, but the overall **learning process** consists of **accumulated S-R associations**.

What is stimulus sampling theory?

Stimulus sampling theory is also called a **statistical learning theory**, since its main aspect is the probability of a certain stimulus occurring in a trial and of being paired with a given response. According to this theory, a stimulus consists of one or more unobservable units, **stimulus elements**. These elements are paired with various responses during the process of learning. The probability of a given response to a stimulus is equal to the number of stimulus elements associated with that response present in the given stimulus divided by the total number of stimulus elements associated with that response.

This theory is based mainly on five primitive notions:

- S - set of stimuli which is not directly observable
- r - number of responses
- t - number of possible trial outcomes
- X - sample space set containing all possibler experiments or trial sequences
- P - probability measure on the Borel field B(x) of cylinder sets of X[1]

This basic variables form a broad set of axioms and formulas. Details can be found here.

Estes viewed learning and behavior as **mechanical** like all behaviorists. Still, later he **included memory** as a factor in his theory, and suggested stimuli don't directly cause a response. They evoke memories of previous experiences, enable one to analyze possible outcomes and decide on the response that will lead to most desirable outcome (*scanning model of decision making*).

Just like Gurthie, Estes rejected reinforcement and its relations to learning. **Reinforcement** has to do with the **performance** as it influences not learning, but how already learned material will manifest itself. Forgetting in Estes' theory occurred through unavailable stimulus elements due to external or internal variations. Spontaneous recovery can occur due to a relevant stimuli reoccurring.

Criticisms

Mathematical models of Estates and other behaviorists have helped in making psychological approach more scientific, yet this models have rarely introduced any new important concepts and were generally still considered **too simple** to explain all properties of learning.

Keywords and most important names

- **stimulus sampling theory**, **statistical learning**
- William Estates

Bibliography

TIP: Stimulus Sampling Theory (W. Estes).

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Read more

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[1]

For discussion and meaning see Estes, W. K. and Suppes, P. Foundations of linear models. in R. R. Bush and W. K.Estes, Studies in mathematical learning theory. Stanford, California. Stanford University Press. 1959.