Analysis of Sensory Thresholds using Difference Equation Techniques

K.Rameshkumar¹, K.Kalaiarasi²

¹(Lecturer in Chemistry, District Institute of Education and Training, Uthamacholapuram, Salem- Tamilnadu India

²(Department of Biotechnology, Periyar University, Salem, Tamilnadu India)

ABSTRACT

Analysis of Sensory Thresholds using Difference Equation Techniques. In this difference equation method to know that how far physical stimulus and psychology stimulus interpret.

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Introduction

Sensation occurs when sensory areas in the cerebral cortex receive nerve impulses, usually when body sensors such as the touch receptors of the skin are stimulated. Sensation must be distinguished from perception, which is based on the interpretation of patterns of sensation. Perceptions are what your brain makes of those sensory patterns. Under some conditions more than one reasonable interpretation of the same sensory pattern is possible, and in those cases each possible interpretation may give rise to a different perception. For example, in the Necker cube, a single pattern of lines gives rise to two alternate perceptions, depending on which surface of the cube the brain "decides" is closer.

Definition of Sensory Threshold

A sensory threshold is the level of strength a stimulus must reach to be detected. Psychologists study sensory thresholds to learn how humans and animals process sensory information. An absolute threshold is the lowest level of strength necessary for detection. For example, when sounds are just loud enough to hear (but no louder), they occur at the absolute threshold. Absolute thresholds vary according to sensory adaptation (diminished sensitivity to stimulus after prolonged exposure). Animals often have different absolute thresholds than people. The differential threshold is the point of lowest intensity at which one can tell that a
stimulus has strengthened. A closely related topic is subliminal perception, the unconscious detection of a brief, subtle stimulus; whether this occurs is controversial.

**Sensory Thresholds**

The first systematic studies of sensory thresholds were conducted by physiologist **Ernst Weber** at the University of Leipsig in Leipsig, Germany, the same university where Wilhelm Wundt would later transform psychology into an experimental science. Weber's experiments were designed to determine sensory thresholds, of which there are two types:

- Absolute threshold -- the minimum intensity of a stimulus that one can detect
- Difference threshold -- the minimum difference in intensity between two stimuli that one can detect.

**Formulation of a Difference Equation Model**

\[ u(n) \text{ is the initial intensity before the change, and } k \text{ is the Weber fraction or Weber constant. Where } \]

\[ \Delta u(n) \text{ is the difference threshold Using Weber's Law: } n \quad (0 \leq n \leq \infty) \]

\[ \Delta u(n) = ku(n) \]

\[ \text{Equation (1)} \]

The solution of the Equations (1) \[ n \quad (0 \leq n \leq \infty) \]

\[ u(n) = (k + 1)^n \]

\[ \text{Equation (2)} \]

Equation (2) was used for the hypothetical data. We assume that the elimination coefficient \( k \) depends lifting gram weight and intervals \( n \quad (0 \leq n \leq \infty) \)

**Discussion of the Results**

Equation (2) shows that \( u(n) \) approaches a constant value at \( n \quad (0 \leq n \leq \infty) \)

![Graph showing psychological stimulus vs physical stimulus](Fig1.png)
Fig: 1 shows that at the high end of the intensity scale, we become almost (but not quite) insensitive to changes in the intensity of a stimulus, while retaining a high sensitivity to changes in stimulus intensity at the low end of the intensity scale.

Reference