

### **Section –C: Long Answer Type Questions (10 Marks)\**

**4 Attempt Any 2 (500 words max)**

**2 X 5 marks**

**Q1.** In a bar probe experiment by Pashler in 1984, he presented a linear array of 8 letters, .....

**Questions to attempt:**

- a. What are the independent and dependent variables in the experiment ..... 1 mark
  - i. Independent variable: probe Onset Delay, discriminability
  - ii. Dependent variable: RT, %error
- b. What are the results in the experiment 2 marks
  - i. RT shorter for high discriminability as compared to low discriminability letters
  - ii.  $RT(-200) < RT(0) \sim RT(300ms)$
  - iii. % Error low for high discriminability as compared to low discriminability letters
  - iv. RT and error rates less for day 2 as compared to day 1.
- c. Which theory of attention does it support (Early/ Late) and why? 2 marks

Early selection models of attention like Broadbent's Filter Models states that attention selects information at an early precategorical stage on the basis of features like location, pitch, loudness etc, excluding all other information from further processing. In this study too just by changing the feature (stimuli discriminability-high/low) the RT were shorter for high discriminability than low discriminability stimuli. Also the error rates were less for high discriminability than low discriminability stimuli. This shows that by just changing physical attributes (in this case stimulus discriminability) of the stimuli, its processing can be improved (marked by shorter RT for high vs low discriminability stimulus). Therefore the results support early selection theory of attention.

**Q2.** Erikson & Erikson in 1974, performed a target detection experiment using Flanker's paradigm. The stimuli variations that were used is.....

**Questions to attempt:**

- a. What are the independent and dependent variables in the experiment ..... 1 mark
  - i. Independent variable: probe Spacing between letters, Flanker distractors
  - ii. Dependent variable: RT
- b. What are the results in the experiment 2 marks
  - i. RT shorter as a function of spacing between stimuli.
  - ii. RT shortest for condition 1 when noise was same as the target.
  - iii. RT longest for condition 3 when noise was incompatible from the noise.
  - iv. RT for mixed condition was higher than blocked condition.
  - v. RT for mixed and blocked conditions was shorter than that of flankers conditions 1-5.
- c. Which theory of attention does it support (Early/ Late) and why? 2 marks

Late selection theory of attention highlights that stimuli are not selected at a precategorical stage but rather all stimuli are processed until semantic analysis. Only if the stimulus is not attended the information about it semantics decays and does not reach consciousness. One of its implications would be that both target and distractor would be processed until semantic analysis. Therefore, a late selection view would suggest that target processing would be affected by the presence of distractors. In the present experiment, as can be seen in figure 5, the RT decreases as a function of

spacing between the letters in flanker stimuli. That is to say the RT were shortest when spacing between target and distractor was maximum (1 degree) and maximum when spacing between target and distractor was minimum (0.06 degree). This indicates that distractors were interfering with target processing when the spacing was minimum between target and distractor (0.06 degree), thereby causing increase in RT. In other words the interference of the distractor in target processing can be decreased by increasing the spacing between them. Therefore, the results are in support of later selection theory as it highlights distractor interference in target processing which could only happen if both target and distractor are processed until semantic analysis.

**Q3.** Compare invasive methodologies like intra and extracellular recording with that of non-invasive methodologies like EEG, fMRI. What are the advantages and disadvantages of each category?

Invasive methodology corresponds to data recording techniques which require an invasion of brain tissue either in live participants or post mortem tissue. Non-invasive methodology on the other hand corresponds to recording neurophysiological data without surgically invading the brain tissue.

The advantages of Invasive over noninvasive methodology:

1. High precision as data can be recorded in close proximity to the neuron or directly from a single neuron.
2. Intracellular recording can be used to study structure of neurons in various regions of the brain which is not possible through noninvasive methodology.
3. Can be used to study dynamics of neurons to various chemicals or stimuli types for their characterization within a brain region.

The advantages of Non- Invasive over invasive methodology:

1. Data can be recorded simultaneously from the whole brain.
2. Effect of stimuli or experimental treatment can be simultaneously compared across various regions of the brain.
3. It does not cause any form of scarring.
4. Data can be collected in a shorter time scale.
5. It can be recorded across a large set of participants due to its non-invasiveness giving good estimation of population behavior.

Disadvantages of invasive:

1. It is invasive and causes scarring.
2. Intracellular recordings can only be performed post-mortem.
3. Both extracellular and intracellular methodologies are restricted to one and few neurons respectively.
4. Data collection is restricted to few participants as it requires some form of invasiveness.

Disadvantages of non-invasive:

1. It does not give any information on single neuron dynamics
2. Its spatial and temporal resolution is less than invasive methodologies like extracellular and intracellular recordings