Biological psychology

GRE Subject Test · GRE Psychology

Scope and prerequisites

GRE Psychology topic 1 (I). Read SP.1, NE.1 and HB.1 for the detailed biological mechanisms. The practice tasks below are original, not official ETS questions.

Concepts and method

sensation : Reception of sensory stimulation. **response criterion** : The threshold for reporting that a signal is present.

Sensation concerns reception of stimulation; perception concerns interpretation. They interact but are not interchangeable.

Signal detection separates sensitivity from the criterion for saying yes. Expectations can change the response criterion.

Neurons communicate through electrical signals and synapses. A brain region's involvement does not establish that it acts alone.

Lesion and imaging studies give different evidence. Consider confounds and the limits of inferring causes from associations.

A biological explanation needs a path from a physical process to the observed behaviour. Receptors change stimulus energy into neural signals; connected brain systems process those signals. An association in an image cannot tell us whether activity causes, follows or merely accompanies the task. Sleep also depends on both a roughly daily circadian rhythm and pressure that builds during wakefulness. Motivation and emotion involve interacting neural, endocrine and environmental processes. A single brain area or hormone is rarely a complete explanation. Detailed methods are in SP.1, NE.1 and HB.1.

Worked reasoning

A person expecting an alarm reports more faint sounds as alarms. Hits may rise, but false alarms may also rise. This can reflect a more liberal response criterion rather than better sensory sensitivity.

In a fictional alarm task, a bonus for reporting alarms raises hits from 60/100 to 80/100 and false alarms from 10/100 to 30/100. Does this establish improved sensitivity?

Hit rate rises from 60% to 80%, but false-alarm rate also rises from 10% to 30%. A more liberal response criterion can produce both changes. Hit rate alone cannot establish improved sensitivity; compare separation of signal and noise using both rates and a suitable model. Neither the bonus nor these illustrative counts identifies a neural cause.

Signal detection: four outcomes separate sensitivity from bias

	Signal present	Signal absent
Respond yes	Hit	False alarm
Respond no	Miss	Correct rejection

Four outcomes let sensitivity be measured separately from the bias towards saying yes

Independent transfer

A participant sleeps little before a memory scan. Recall falls and one region is less active. Give two competing explanations and a design improvement.

Attempt independently, then use the matching skill sheet solution.

Review and source limits

Avoid this error: A brain image showing activity during a task is not proof that the region alone causes the behaviour.