Behavoural Neuroscience and Computational Psychopathology

In the middle of the last century it was commonly thought that the study of animal learning and the associative theories that developed from that study would be able to answer all the important questions about human psychology such as development, perception, intelligence and ....most ‘everything else’.

For example Tolman wrote “I believe that everything important in psychology (except such matters as the building up of a super-ego, that is everything save such matters as involve society and words) can be investigated in essence through the continued experimental and theoretical analysis of the determiners of rat behavior at a choice point in a maze. Herein I believe I agree with Professor Hull and also with Professor Thorndike.” (Tolman, 1938, p.34). Theories of associative learning and conditioning have subsequently been applied to almost every area of psychology. The primary lasting value has been an emphasis on the scientific method and careful experimentation. However much we might believe that human behaviour is outside the realm of simple conditioning theory, it does provide us with an analyzable framework for studying behaviour and the determinants of behaviour and cognitions. More recently the study of basic brain activity as a correlate of behavior has benefited from this perspective. At various times, all those studying behaviour and the mind; from cognitive psychologists, to neuroscientists, ethologists, philosophers and those interested in the body as it manifests behaviour (such as medical practitioners) have rejected the simplicity of the so-called behaviorist approach. But they are united in their use of these basic technologies upon which current research is based. Regardless of your epistimalogical perspective on behaviourism, a student of psychology needs to understand the experimental methods and experimental designs that have been employed in this area. A second critical point is whether the study of behaviour can be translated to the understanding of thinking, beliefs, creativity, language and the processes that scientists and even medical practitioners
migh use. I will argue that both behaviour and thoughts are described by the principles described by the associative approach.

The study of learning and behaviourist psychology has developed new models that would be unrecognisable to the original proponents of behaviourism (Rescorla, 1988). While classical cognitive psychologists have embraced the ‘new’ associative learning – connectionism, Ethologists have led to a reassessment of the notion of the environment and natural responses. Neuroscientists who originally believed that only direct intervention into the brain, could provide answers now acknowledge the limitations of surgical, chemical and genetic interventions. Learning theory and the procedures developed to measure and record behavior has as much relevance to modern psychology as it did when Tolman first wrote his words quoted above.

The old view that conditioning reflexes replace the mind with a series of responses to stimuli (like a telephone switchboard in 20th century analogies or like electronic switches in our computer-laden binary/analogical world) has been thrown out. The brain is not a computer (or telephone exchange) with connections between afferent stimulus receptors and efferent muscular responses. Learning, even in its simplest form is the acquisition of knowledge about the world but how does the brain acquire, process and store this knowledge? We will discuss how this knowledge acquisition takes place and how associative theories attempt to understand how relationships between stimuli in the animals’ environment are acquired and importantly how this knowledge is shown to be there by testing behaviour. If we are to use behaviour as our observable index of knowledge, we need to be aware of two things 1) what sorts of behaviours are exhibited without prior experience and 2) how behaviours change.

This course uses the fundamental psychological knowledge found in the biological bases of behaviour and cognition to understand psychological disorders from the same computational perspective.

Course overview
The course is approximately represented in two parts each 12 hours long.

**Part 1- Behavioural Neuroscience (12 Hours)**
1. Learning theory concepts and introduction
2. Neurobiology of prediction error
3. Instrumental learning
4. Habits and goals
5. Motivational systems
6. Drugs and neurotransmitters
7. Sex behaviour

**Part 2 Psychopathology (12 hours)**
8. Human Psychopathology and Individual Differences
9. Depression
10. Fear and Phobia
11. Placebo
12. Anorexia and disorders of eating
13. Schizophrenia and disorders of attention
14. Forensic Psychology (including Sexual Offenders and Psychopathy)
Prepratory Reading list


Extra Readings

Available online free


Available in Bookshops and Libraries