

1b | Antecedents of Cognitive psychology

In this section of the module we're going to discuss the major influences on the study of cognition.

So, how did the field of cognitive psychology develop?

Well, you might be surprised to hear that when your grandparents were going to school and reading books there was no such thing as cognitive psychology. In fact, cognitive psychology is a relatively recent discipline only really taking off as a separate discipline in the 1960s. However, when one looks through the history of science in general one sees hints of cognition throughout. I'm only going to touch on some of these just in order to give you a sense of the key influences of cognitive psychology.

So to begin with and to give you some historical perspective discussions of the nature of the human mind date back to at least the time of Aristotle and Plato. But we're going to jump right up to the 17th and 18th century to start our discussion.

During this time, philosophers began to seriously debate the nature of the human mind and knowledge. Two central philosophical traditions concerning the nature of the human mind that emerged during this time, and that in many respects are still with us today, are that of Empiricism and Nativism.

Empiricism, which was supported by David Locke, John Hume, and Stuart Mill to name a few, rests on the tenet that knowledge comes from an individual's own experience. That is, all knowledge that we have is acquired from the observation and analysis of events that we experience. Put another way, when humans are born their cognitive apparatus, that is their mind, is thought to be a blank slate and all of their cognitive abilities and their knowledge is thought to be acquired through their interactions with their environment

Nativism on the other hand emphasizes the role of biological or genetic factors in determining one's cognitive abilities. This view comes from the philosophical traditions of Rene Descartes and Immanuel Kant. Nativists attribute individual differences in cognitive abilities to innate abilities that people are born with. That is, they argue that many cognitive abilities and the cognitive processes that underly them are hardwired in the brain and are thus difficult to modify with experience.

Despite over a century of research into the mechanisms underlying the nature of the human mind the nativist/empiricist debate is still a controversial one today.

We will look next at different schools of experimental psychology that laid the foundations for Cognitive psychology today. It is important to keep in mind that when we talk about these

different schools of thought or major influences, they are not necessarily all independent and they differ in terms of their stance on the nativist/empiricist debate.

Historians often date the founding of the actual field of cognitive psychology back to 1879. It was then when Wilhelm Wundt founded the first institute for research in experimental psychology. As an experimental psychologist, Wundt's primary goal was to discover the elemental components of the human mind. In other words, he wanted to discover the building blocks to conscious experience. In essence, he wanted to create a table of mental elements, much like a chemist's periodic table. Once a set of elements was identified Wundt believed that psychologists could determine how these units combine to produce complex mental phenomena. This search for the key components or building blocks of the human mind is referred to as **structuralism**.

This structuralism tradition was also followed by one of his students, James Baldwin, who set up the first experimental psychology lab in North America at the University of Toronto in 1889. The primary experimental method used by Wundt and Baldwin was **introspection**. This technique involved presenting highly trained observers, these were usually graduate students, with various stimuli and asking them to describe their conscious experiences. By personally reporting on one's conscious experiences Wundt and Baldwin believed that they could uncover the basic elements of human conscious experience.

Although much was learned from their work, the method of introspection has a number of serious limitations that makes it difficult to draw any conclusions about introspective reports. Most centrally, there are many aspects of human cognition that occur without conscious awareness and are thus not available to conscious introspection techniques. That being said, their research and the development of their laboratories were instrumental to the development of cognitive psychology as a discipline.

While Wundt and Baldwin were carrying out their research and establishing their laboratories from a structuralist perspective, William James was carrying out research in the United States from a polar opposite viewpoint. He argued that experimental psychologists' primary goal should be to explain the functions of the mind, for example, how and why it works the way it does, rather than uncover its elemental units. Hence the term **functionalism** was applied to his approach. Structuralists and functionalists differed not only in their key questions, but also in their methods. In order to uncover the elemental units of the mind structuralists were convinced that the proper setting for experimental psychology was the laboratory, where experimental stimuli could be tightly controlled. Functionalists, on the other hand, argued that in order to understand the key functions of the mind one must get out of the laboratory and study the whole organism in real life situations. Like the previous nativist/empiricist debate, structuralism and functionalism, to this day both have its group of followers.

You might want to keep these two dichotomies, that between nativism and empiricism and structuralism and functionalism, when we talk about the contemporary paradigms of cognitive psychology in the later section of this module.

We're now going to move on to **Behaviorism**.

In contrast to the prior attempts to uncover the elemental units of the mind and also as part of an opposition to the subjective techniques such as introspection Behaviorism developed at the turn of the century and ended up dominating research in psychology until well into the 60s. The basic tenets of Behaviorism as it was classically envisioned can perhaps best be captured by this quote from John Watson in 1913:

"Psychology as the behaviorist views it is a purely objective natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. The behaviorist, in his efforts to get a unitary scheme of animal response, recognizes no dividing line between man and brute. The behavior of man, with all of its refinement and complexity, forms only a part of the behaviorist's total scheme of investigation." (p. 158) (Watson, 1913, pp.158, 176)

As is clearly evident in this colourful quote, proponents of Behaviorism were quite vocal in their critique of the introspection technique. Rather, they argued that scientists should only focus on that which was observable which is overt behaviour. The study of learning was also emphasized, as was the relationship between inputs, that is the stimuli that are out there in the environment, and outputs, those are the behavioural responses from the organism. During this period, it became unfashionable to talk about mental representations, consciousness, or mental states at all. These things were thought to be beyond the scope of scientific study. Now the behaviourist tradition is often viewed in a negative light. That is that it had a negative impact on the development of psychology as a scientific discipline. However, it should be noted that the behaviourist tradition was responsible for the development of rigorous research methods that allowed researchers to examine the workings of the mind without relying on subjective measures such as introspection. We're just going to discuss two more theoretical influences before we're done with this section.

Also in opposition to the structuralist tradition, the school of Gestalt psychology began in the early 1900s. The central assumption of this approach was that psychological phenomena could not be reduced to simple elements, but rather had to be analyzed and studied in their entirety. Specifically, proponents of this view argued that an observer did not construct a perceptual experience or conscious cognitive experience of any kind based purely on simple, elementary sensory aspects of this experience. Rather, they argued that individuals were able to experience or perceive the total structure of an experience or an object as a whole.

Put another way, from a structuralist perspective, perceptual experiences arise in a bottom-up fashion, from basic elements to a perceptual experience, rather than in a top-down fashion. From a Gestalt perspective, top-down processes can determine the perceptual experience. In short, they focused on the holistic aspects of conscious experience. For example, what order is imposed on our perceptual processes? And, what are the rules by which people parse the world into wholes to give us the unified perceptual experience? Like the structuralist perspective however, and probably mainly a product of the time in which this field emerged, the primary methodology used was introspection.

Some examples of the types of stimuli Gestalt psychologists used to study these top-down influences on perception can be seen in the following figure. Note that A, B, and C in this figure all contain 8 equal lines. But people will experience them differently, saying A has four pairs of lines, B has 8 unrelated lines, and C has a circle or octagon made up of 8 line segments. Here, the arrangement of lines, that is the relationship among the elements as a whole, plays an important role in determining our perceptual experience.

The final major influence to the study of cognitive psychology that we are going to talk about is the study of individual differences and human cognitive abilities, pioneered by Sir Francis Galton. Galton's interest in individual differences in cognitive abilities was inspired by his reading of Charles Darwin's writings on evolution. Galton wondered whether intellectual abilities, like other biological properties could be subject to the same pressures of natural selection, and thus be inherited. To examine this, Galton began analyzing historical data. This involved looking at family trees of eminent men, those he judged to be superior in terms of intellectual abilities to determine the root of cognitive ability. Later in his career he invented a number of cognitive ability tests as well. One area of study he is perhaps most well known for is the study of mental imagery as a cognitive ability. That is, he found that individuals differed markedly in their ability to conjure up mental images of objects in their mind. He was a pioneer in this area and his work on mental imagery sparked an entire research area devoted to the study of the human mind's capacity to generate internal visual representations of objects. In fact, we have a whole module in this course, Module 8, dedicated to this faculty. More generally however, Galton's work on the genetic basis of cognitive abilities and capacities inspired future generations of cognitive psychologists to develop new questionnaires and new testing techniques to further understand the multifaceted nature of cognitive processes.