SAGE COURSE COMPANIONS

KNOWLEDGE AND SKILLS for SUCCESS



Cognitive Psychology Carol Brown







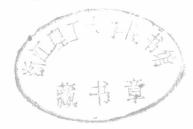
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introduction



Why Use this Course Companion to Cognitive Psychology?

This book is designed to help you succeed on your degree level psychology course. The aim is to provide you with a course companion that gives you a short cut to understanding the basics behind cognitive psychology. It is about helping you to gain the most from your degree level course, pass your examinations in psychology and achieve success in your assignments.

It has been designed and written to provide you, the reader, with an easy-to-navigate guide to the commonly taught curriculum in cognitive psychology, and the ways of thinking and writing that your examiners will be looking for when they start to grade your work.

This companion is not to be used instead of a textbook or wider reading, but rather as a means of memorising content and familiarising one-self with the basics of the discipline when preparing for an examination or planning an assessment essay. The book will help you to structure and organise your thoughts, and will enable you to get the most from your textbooks and the other reading that you will do as part of your course. This companion is designed to point you in the direction of key thinkers and key ideas, and to give you the briefest of introductions to their work and how to put their work in context. It will also point you in the direction of the most important readings and thinkers, and will encourage you to widen your reading and research so as to improve your attainment.

This guide therefore provides you with ways of applying the information that you are familiar with in a practical manner, and is aimed at ensuring that you gain the skills necessary to convey your theoretical/academic material successfully.

As you are still relatively new to the study of psychology you may assume that simply learning the material presented in lectures secures high achievement, but actually the learning and rewriting of information will not gain you top marks. Instead, you need to go beyond simply understanding the material to think critically about the

research presented to you. This ability to evaluate theories/studies is the essential skill from which a psychologist derives success.

How to Use this Book

This companion should be used as a supplement to your textbook and lecture notes. You may want to glance through it quickly, reading it in parallel with your course syllabus and textbook, and note where each topic is covered in both the syllabus and this companion. Ideally, you should have already obtained this book before your course starts, so that you can get a quick overview of each topic before you go into the lecture, but if you didn't do this, all is not lost. The companion will still be equally helpful as a revision guide, and as a way of directing you towards the key thinkers and theories in cognitive psychology.

Part One is about how to think like a cognitive psychologist: it will help you to get into the mindset of the subject and think about it critically. As a bonus, of course, it also means learning how to think like your examiner! Examiners want to see that you can handle the basic concepts of your subject: if you need a quick overview of the background to cognitive psychology, this is the section you will find most useful.

Part Two goes into the curriculum in more detail, taking each topic and providing you with the key elements. Again, this does not substitute the deeper coverage you will have had in your lectures and texts, but it does provide a quick revision guide, or a 'primer' to use before lectures.

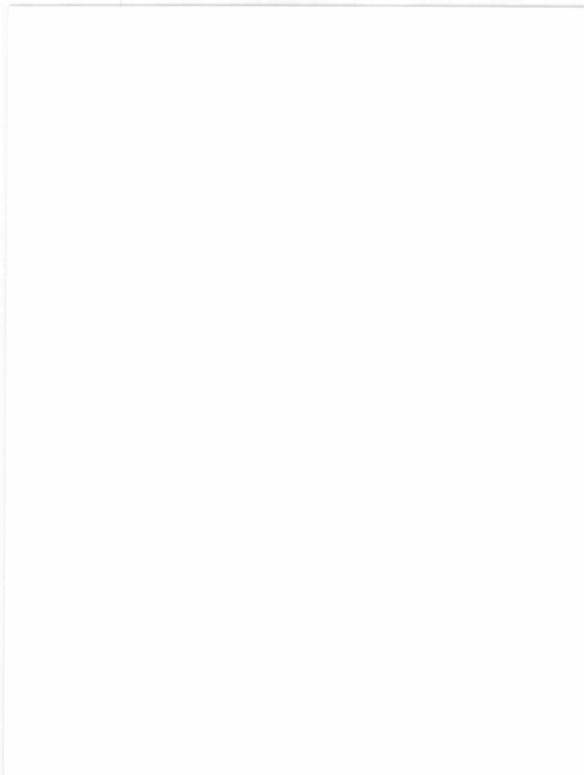
You can also use this book either to give yourself a head start before you begin studying cognitive psychology – in other words, give yourself a preview course – or it can be used as a revision aid, or, of course, both. Each section contains within it the following features:

- Tips on handling the information in exams, or reminders of key issues. This
 will help you to anticipate exam questions, and help you to remember the
 main points to bring in when answering them.
- Examples that are useful for putting theory into a 'real world' context and can,
 of course, be used in exams to illustrate the points you make.
- Running themes of the areas that will always be of interest to a cognitive psychologist. You will find that these can almost always be brought into an exam question, and you will be expected to do so.
- Input from key thinkers in the field, which will be useful to quote in exams, as well as providing you with the main influences and theories within cognitive psychology.

- Sample exam questions with outline answers. These should help you to be better prepared for the actual questions, even though they will, of course, be different.
- The **Textbook guide** is about taking your thinking a stage further by introducing some texts which focus on academic thinking. This will help you to take a broader conceptual view of the topic; on a practical level, this is the type of thinking that moves you from a pass to a first!

Part Three is a study guide which will help you with getting more from your lectures, to remember more when you are sitting exams, and to write essays.

Following the main text is a glossary of the key terms that are used in the book and a list of references.



part one

the basics of cognitive psychology



The overall aim of Part One is to familiarise you with the basics of cognitive psychology. It will:

- · define cognitive psychology as a topic
- look at cognitive psychology and its related disciplines
- give you a brief history of cognitive psychology
- introduce the founding figures and their core ideas
- encourage you to think like a cognitive psychologist
- help you to understand the general principles of assessment and expected learning outcomes when studying this area of psychology
- provide tips and examples of the running themes you will find throughout the forthcoming text.

1.1

definition



Cognitive psychology deals with topics such as perception, memory, attention, language and thinking/decision making. Most critically it is based on the idea that we are like a computer when processing information and have an input, storage and retrieval function. Experimental cognitive psychology presumes that cognitive processes can be tested using empirical (scientific) methods because they can be inferred from behaviour obtained under controlled conditions. Introspection can, however, also be used whereby one examines one's own mental processes.

One should bear in mind, however, that only indirect information can be obtained from internal processes and artificial laboratory environments, and that people are usually unaware of their own mental processes, although introspection can be useful when describing an event rather than interpreting it.



Cognitive psychology assumes we are just like computers and that we process information using input, storage and retrieval processes.

1.2

cognitive psychology and related disciplines/theories



Experimental cognitive psychology

Places an experimental emphasis on cognitive psychology.

Cognitive science

Uses computational/computer models to understand cognitions. It allows specification of a theory to predict behaviour. Flowcharts are used to construct theories and provide a plan from which input can be examined as well as the nature of storage and decision processes. This information can then be used to devise a computer program.

The interaction of psychological theory with programming is a difficult one and the relationship between the performance of a program and human participation may be different: for example, programs may run faster.

There are three main types of computational modelling techniques:

Semantic networks: where concepts are linked by a network of nodes that represent general (associative/similar) relationships, specific relationships or complete ones. The strength of these links will vary according to the similarity of different concepts, and learning occurs when new links are added or the strength of the relationship changes.

Production changes: these are made up of rules ('if ... then ...') that are held in the long-term memory of a production system that also contains a working memory where information that is being processed is held. The system operates by matching such processed information with the 'if' part of the rule to produce the appropriate 'then' response. Strategies are also used to select the most appropriate response.

Connectionist networks: these use modelling techniques that suggest networks have structures and layers which are connected together (like neurons/nodes). Concepts are stored within the network and are activated by patterns, which are simply the associations between inputs and outputs, and especially important is back-propogation, which uses a comparison of actual and correct responses.

Cognitive neuropsychology

Looks at impaired cognitive processes (for example, brain damage) in order to understand normal cognitions. It uses dissociations and is useful because it allows us to see the processes and mechanics involved in normal cognitive functioning. There is, however, a problem with using single dissociations, as a good performance on one task rather than another may simply be due to confounding variables, such as task

complexity, and it is therefore better to look at double dissociations, that is, compare impaired performance on tasks between different patients. Theoretical assumptions of this model include the following: the idea that cognitive systems are modular; the brain and mind are related with specific functions in specific areas of the brain; and impaired cognitive functioning can tell us much about normal cognitive functioning.

When evaluating theoretical assumptions you should always bear in mind that:

- as modules don't actually exist physically, this presents difficulties
- much of the work is based on case studies that are difficult to generalise.

Cognitive neuroscience

Looks at brain functioning using biological techniques to understand human cognitions. For example, single-unit recording looks at the working of single neurons and is a sensitive technique that examines electrical changes; an EEG (electroencephalograph) uses electrodes attached to the scalp to detect small changes in electrical activity in the brain, while a PET (position emision tomography) scan can detect positrons emitted from radioactive water injected into the human body; and magnetic resonance imaging (MRI) measures radio waves that when excited by atoms produce magnetic changes detected by magnets – a computer then interprets these changes and produces 3-D images.

When considering the above approaches, keep it in mind that:

- these may be useful for providing detailed information about neural activity but can be invasive techniques
- they do not necessarily identify specific regions of parts of the brain, as the skull and tissue distort pictures
- rapid changes are difficult to identify and only provide an indirect measure of neural activity.

Often these approaches aren't distinctive and overlap.

1.3

history of cognitive psychology



In any examination or essay you will be expected to know something about where cognitive psychology comes from. This may simply be a matter of demonstrating a general understanding or not getting your origins muddled, but you may well be asked to write directly on the history of the discipline.



Understanding something of the history of cognitive psychology will be crucial in helping you think like a cognitive psychologist.

Key Developments

The years 1956 and 1957 were key dates in the development of cognitive psychology as several important papers/theories emerged including:

- Chomsky's theory of language
- Miller's concept of seven, plus or minus two chunks in short-term memory
- Newell & Simon's general problem-solving model
- Bruner et al.'s ideas on concept formation
- artificial intelligence (AI).

The 1970s saw a further series of vital developments, especially the idea that the information-processing paradigm was the best way in which to study people/human cognition. It made several key assumptions, most notably that:

- people interact purposefully within the world
- patterns/symbols that are used in such interactions are made meaningful in the real-world context
- the processes and patterns used in performing cognitive tasks can be identified by psychologists and there is some neurological basis, although this does not control all information processing
- cognitive tasks may take time before being completed, although the mind has a limited-capacity processor.

1.4

founding figures and their core ideas



Inevitably, much of the discussion in this section concerning the founding figures and their core ideas overlaps with the preceding section detailing the history of the discipline. Core ideas had either a philosophical influence (their ideas and beliefs impacted on thinking about cognitive psychology) or a methodological influence (their ways of working and research studies influenced the development and thinking about cognitive psychology).

Atkinson & Shiffrin (1968) – multistore model of memory

A model of memory which assumes that there are three separate memory stores – sensory memory (SM), short-term memory (STM) and long-term memory (LTM), that information must flow from one store to the next, and that it can only be retained in STM if rehearsal has taken place.

Baddeley & Hitch (1974) - working memory model

This model comprises the *central executive*, which is a control system that is modality free and has a limited capacity; *the phonological loop*, which has an articulatory control system (verbal rehearsal, time-based, inner voice) and a phonological store (speech-based storage system, inner ear); and the *visuo-spatial scratch pad* ('inner eye'), which is designed for temporary storage and manipulation of spatial and visual information.

Broadbent (1958) – filter theory

The assumptions of filter theory are that two similar stimuli gain parallel access to a sensory register that briefly holds the information; a selective filter then allows one input through on the basis of physical characteristics and the other channel rests in the buffer. This is followed by some limited capacity processing and an output response. The importance of the filter, therefore, is that it prevents overload.

Treisman (1960) - attenuation theory

Assumes that the non-attended input is not rejected but is 'attenuated' (diminished) compared to attended information. All attenuated channels are then analysed semantically (that is, information is selected for its meaning) and information that has personal, important or current relevance is recognised thus making an output response possible.

Gibson (1950, 1966, 1979) - direct, bottom-up theory of perception

According to Gibson, perception is bottom-up (influenced by environmental stimuli) and direct. Perception results from sensation initially derived from the optic array, which picks up consistent information from the environment and does so even when there is interaction with different aspects of the environment (the consistency being referred to as invariants). Since this means that light is reaching the eye, it allows perception of depth, location and so on. Resonance aids the process whereby environmental stimuli are picked up and tuned into as an automatic process. Information thus takes the form of optic flow patterns (giving information on speed and direction of movement), texture gradients (closer objects seen in more detail than further ones) and affordances (detail about the function of objects).

Gregory (1972) – indirect, constructivist, top-down theory of processing

This theory predicts that perception is an active process that is based on experience and expectations. Thus schemas (past knowledge, expectations and so on) make inferences about perceptual data. Perceptual constancies and illusions support this notion, that is, the size, shape and location of objects remain the same even when they are seen from different distances, angles and locations because the brain uses schemas to compensate for these changes and interprets on the basis of experience and expectations. A similar process occurs with illusions, of which there are numerous. To give just some examples, this process applies to distortions, ambiguous figures, paradoxical figures and fictions. Perceptual set is therefore also important. This is where previous experience, expectations, motivation and emotion create a bias towards the perception of particular stimuli (or aspects of it) whilst ignoring other available data.

Marr (1982) – computational theory

According to this model, individuals construct and then work through three hierarchical stages of representation before being able to recognise