

# PSY241 Cognitive Psychology

Version (29.10.13)

## Course Overview

Cognitive Psychology is the core of contemporary psychology. Many other branches of psychology, from cognitive neuroscience, to clinical and occupational, rely on the foundations which are covered by this model.

PSY241 is a 20 credit module with a three hour exam. In previous years the average grades on PSY241 have been lower than on other modules. This is because many students have done insufficient private study and exam practice.

As well as attending lectures, it is vital that you engage with the other activities of the module if you are going to understand and enjoy the material. Furthermore, doing this will set you up to succeed in all your future study of psychology.

## Motivations

*"Reading maketh a full man,  
conference a ready man,  
and writing an exact man."*

- Francis Bacon (1561-1626) 'Of studies'

The topics covered by PSY241 are important ones, but it can be difficult to understand them and their relation to the rest of psychology. In order to get to grips with cognitive psychology you need to do far more than just read and memorise the material in the lectures and textbook. Firstly, you need to read more than just the lecture notes and the textbook. Textbooks are useful, but in university-level study there is never a single book which contains all you need to know, nor is reading about a topic from one source a good way to get a mature perspective on it. You will need to read from many different sources, including academic papers. Secondly, reading on its own is a good way to start learning about a topic, but it is only a start. You also need to discuss the material, so you can be sure you understand it (and understand what you don't yet understand). Finally, you also need to practice expressing this understanding in writing. For these reasons PSY241 contains lab classes, associated PSY259 tutorials, student-led seminars and a website to which everyone can contribute (called a 'wiki'), as well as assuming that you will carry out at least an hour a day of private study.

## Study groups

A key component of the course are the student-led seminar groups or 'study groups'. These are an opportunity for you to discuss the material in the lectures. I suggest you take the topics from the lecture overview (below) to help you focus your discussions. I have assigned everyone to a group, which will

meet at a regular time to discuss the proposed topics. The groups are based on the PSY259 groups, and listed on the wiki. The first meeting times are on the Thursday of week 2 at 9am, 10am, 11am and 12 noon in the psychology computer lab (for groups A B C and D respectively). At your first meeting you need to agree a regular time to meet with your group, so bring you diaries.

One thing you should discuss in your groups is how to make contributions to the wiki. By thinking about what is already on the wiki and adding your own material, you will develop the skills you need to score well in the exam, and which will prepare you for the rest of your career studying psychology. The greatest benefit will come from those who try and take what others have written and rewrite it, making it clearer and/or more concise. As well as contributing your group's work to the wiki, you should spend some time looking back over other parts of the wiki and seeing where you can make improvements. You can also use the wiki to share study tips and advice on exam technique.

## **The wiki**

Find the wiki at <http://psy241.group.shef.ac.uk/psy241wiki/>

To edit the wiki you will need to login. Your login is your university username (e.g. **pca10aa**) and your password is your date of birth in the form dd/mm/year (e.g. 01/01/1991). If this does not work, please email me: [t.stafford@shef.ac.uk](mailto:t.stafford@shef.ac.uk)

Wikis are great ways for a group to collaborate on a project. In this case, the project is understanding PSY241 and training yourself to get good grades in the exam. You can use the wiki to ask questions, answer questions, read about the course topics, put down ideas about exam technique, find out about how to write an essay and more. In fact, since everyone on PSY241 can edit the wiki you can use it to do anything you think will be helpful. You can add a small point, or a large point, or correct some spelling, or rearrange what has been written already. It doesn't matter as long as you are thinking about the overall coherence of what is up there.

## **Labs**

These provide a chance to see how some important cognitive psychology experiments are run, and a chance to talk to postgraduates and lecturers who conduct research full time.

The working memory lab and visual search lab also provide practice at writing up experimental results.

Separate from this, there is a space on the wiki for recording (anonymously) your individual results on the lab experiments. In this way we can get a sense of the pattern of people's individual differences on the basic cognitive functions that we test over the course.

## **Lectures**

Provide an outline of each topic and key readings for your private study. Please also use the lectures to ask any questions that occur to you.

## **The Exam**

The exam involves writing three essays, from a choice of six, over 3 hours. Questions can be asked from any of the taught material (please consult this course document as the ultimate guide as to what can be examined on this course). There are three sections, each with two questions and you must answer one question from each section. The topics of the questions are, roughly, memory and attention (A), language and thought (B), and vision (C), however questions in any section may ask you to use material from any part of the course. Questions are not revealed in advance. The best way to practice for the exam is to practice answering past questions (currently available via the departmental webpages, but soon to be moved to MOLE page).

The exam takes place during the January/February exam period. We do not know exactly when until the exams office releases the date.

Additional questions and asked and answered on the wiki FAQ.

## **Course Outline**

Below is a guide to the topics covered in each lecture, and the essential and recommended reading. You can read about all topics in the Andrade and May textbook, but please regard this as an introduction to the topics, not the final word. A good understanding of the material requires you to read about the topics in a variety of sources and to practice writing about them too. There are a number of cognitive psychology textbooks as well as Andrade and May, and I encourage you to look at these two – most cover similar material in a similar way, and you may find that another book than Andrade & May works best for you.

N.B. The introductory and overview lectures are not detailed below. There is no extra reading for these lectures

## **Lectures 2 and 3: Working Memory (Dr Nikki Hunkin)**

*Topics covered:* Baddeley & Hitch's working memory model; what is working memory used for and what happens when it goes wrong?

### *Essential Reading*

Baddeley, A, Eysenck, M.W. & Anderson, M.C. (2009) *Memory*. Psychology Press, Hove. See Chapter 2 (Short-term Memory) and Chapter 3 (Working Memory).

Alternatively, you could read the following article:

Baddeley, A. (2012) Working Memory: Theories, Models and Controversies. *Annual Review of Psychology*, 63, 1-29.

This is a rather discursive account but I've chosen it because, in the article, Baddeley describes the development of his model and the views and type of research being carried out at that time. He also considers alternatives to his working memory model which we don't really have time to dwell on in the lecture.

### *Additional reading*

The following papers relate to specific case studies discussed in Lecture 2. All are available electronically via MOLE2 or 'myResource Lists' on the library web pages.

Baddeley, AD, Papagno C & Vallar G (1988). When long-term learning depends on short-term storage. *Journal of Memory and Language*, 27, 586-595. [Patient PV]

Hanley JR, Young AW & Pearson NA (1991) Impairment of the visuo-spatial sketch pad. *Quarterly Journal of Experimental Psychology*, 43A(1), 101-125. [Patient ELD]

Baddeley, A & Logie, R., Bressi, S., Della Sala, S. & Spinnler, H. (1986) Dementia and working memory. *The Quarterly Journal of Experimental Psychology*, 38A, 603-618. [AD patients]

Allain, P, Etcharry-Bouyx, F, & Le Gall, D. (2001) A case study of selective impairment of the central

executive component of working memory after focal frontal lobe damage. *Brain and Cognition*, 45, 21-43. [Patient RC]

#### **Lecture 4: Prospective Memory – Maria Panagiotidi**

Topics covered:

Prospective Memory: definition, differences with retrospective memory, types of prospective memory, theoretical and methodological approaches

*Essential Reading:*

The topic of prospective memory is often not covered in textbooks. The introduction of the following article provides a useful review of the topic:

Groot, Y. C., Wilson, B. A., Evans, J., and Watson, P. (2002). Prospective memory functioning in people with and without brain injury. *Journal of the International Neuropsychological Society : JINS*, 8(5):645-654.

Readings:

Brandimonte, M., Einstein, G. O., & McDaniel, M. A. (1996). *Prospective memory: Theory and application*. Mahwah, NJ: Erlbaum.

Burgess, P., Veitch, E., Costello, A., Shallice, T. (2000). The cognitive and neuroanatomical correlates of multitasking. *Neuropsychologia*, 38(6), 848-863.

Kliegel, M., & Martin, Mi. (2003). Prospective memory research: Why is it relevant? *International Journal of Psychology*, 38, 193-194.

#### **Lecture 5: Attention and Automaticity (RIN)**

*Topics*

Selective Attention: Cocktail party phenomenon, Broadbent's model Capacity: Sternberg task, channel capacity, Yerkes-Dodson Law Automaticity: Visual search, automatic and controlled processing

Automaticity and control of action

Supervisory attentional system

Cognitive neuroscience of attention: posterior and anterior attentional systems

*Readings*

*Essential*

Andrade & May (2004) *Instant Notes in Cognitive Psychology*

*Additional Reading*

Any textbook in cognitive psychology. For example, chapter 5 of Eysenck and Keane (2010, 6th edition) or corresponding chapters in earlier editions. These are all too complicated but are worth dipping into as long as you're expecting to get confused.

## **Lecture 6: Human Learning (RIN)**

### *Contents*

Historical theories of learning: Aristotle, Thorndike, Skinner

Norman's models

Anderson's ACT\* theory of learning

Learning and the brain: cortical plasticity

### *Readings*

Coverage of human learning in standard texts of cognitive psychology is pathetic. Books by J.R.

Anderson in the library provide good coverage on ACT and on learning.

Unsurprisingly, the text that covers these issues most clearly in my view is a chapter I wrote myself (!)

Nicolson, R.I. (1998). Human learning. In Scott, P.J. and Spencer, C.P. (Eds.), *Psychology: A Contemporary Introduction*. London: Blackwell.

By far the most interesting book in recent years is the Penguin bestseller, by Norman Doidge (2007) *The Brain that changes itself*.

## **Lecture 7: Introduction to Cognitive Neuroscience – Dr Megan Freeth**

### *Topics Covered:*

What is Cognitive Neuroscience?

Techniques and Methods

fMRI, EEG, PET, MEG, TMS

### *Optional Reading:*

Student's Guide to Cognitive Neuroscience (Second Edition), Jamie Ward. Chapters 1, 2, 3, 4 & 5

Gazzaniga, Ivry, Mangun : The Methods of Cognitive Neuroscience; in: Cognitive Neuroscience (Second Edition), Norton, 2002, pp. 96-147 (Chapter 4).

Munakata, Y., Casey, B. J., & Diamond, A. (2004). Developmental cognitive neuroscience: progress and potential. *Trends in Cognitive Sciences*, 8(3), 122-128.

## **Lectures 8 & 9 : Semantic Memory (RIN)**

### *Contents*

Forms of memory

Network theories

Teachable Language Comprehender (1969), Spreading Activation Model (1975), Declarative Memory in ACT\*

spreading activation, priming, fan effect

Clinical studies of SM Explanations!?

## *Readings*

### *Essential*

Andrade & May (2004) Instant Notes in Cognitive Psychology

Or most cognitive psychology texts will have extensive coverage of semantic memory e.g. Eysenck & Keane (2010) chapter 7

or Baddeley (2010) chapter 6

## **Lecture 10: Modelling Cognition – the ACT models (RIN)**

### *Contents*

Science metatheory – traditional approach Criticisms of the information processing paradigm Criteria for differentiating between scientific theories Anderson's approach for ACT\*: framework, theory, model

### *Readings*

The metatheory is not well discussed in cognitive psychology texts

Newell A. (1973) You can't play 20 questions with Nature and win. In W.G. Chase (Ed)

*Visual Information Processing* is the classic critique

### *Optional*

Anderson, J.R. (1983). *The Architecture of Cognition*. Cambridge MA: Harvard University Press.

Anderson, J.R. (1989). A theory of the origins of human knowledge. *Artificial Intelligence*, **40**, 313-351.

Anderson, J.R. (1993). *Rules of the mind*. Hillsdale, NJ: LEA.

Anderson, J.R. et al. (2004). An integrated theory of the mind. *Psychological Review*, 111 (4), 1036-1060.

## **Lecture 11: Language & Thought (Dr Yanjing Wu)**

### *Content:*

How language influences thought. The Sapir-Whorf hypothesis, studies on colour perception as an example but also other levels of interaction.

### *Essential Reading:*

Regier, T., Kay, P. (2009) Language, Thought, Color. *Trends in Cognitive Sciences* 13: 439-446.

### *Optional Reading:*

Roberson, D., Davies, I. & Davidoff, J. (2000) Color categories are not universal: new evidence from a Stone Age culture. *Journal of Experimental Psychology: General*, 129, 369-398.

Li, P. & Gleitman, L.R. (2002) Turning the tables: Language and spatial reasoning. *Cognition*, 83, 265-294.

Pinker, S. (1994). *The language instinct*. HarperCollins.

Tomasello, M. (1995). Language is not an instinct. *Cognitive development*, 10(1), 131–156.

## **Lecture 12: Language & Thought 2 (Dr Yanjing Wu)**

Content:

Introduction to Event-related Brain Potentials (ERPs). How ERPs is used to study language processing and what can it tell us about the relationship between language and thought.

*Essential Reading:*

Thierry, G.; Athanasopoulos, P.; Wiggett, A.; Dering, B.; & Kuipers, J.R. (2009). [Unconscious effects of language-specific terminology on preattentive color perception](#). Proceedings of the National Academy of Sciences of the USA. 106, (11) 4567-4570.

Athanasopoulos, P.; Dering, B.; Wiggett, A.; Kuipers, J.R.; & Thierry, G. (2010). [Perceptual shift in bilingualism: Brain potentials reveal plasticity reveal plasticity in pre-attentive colour perception](#). Cognition. 116, (3) 437-443.

*Optional Reading:*

Kutas, M. and S.A. Hillyard. [Brain potentials during reading reflect word expectancy and semantic association](#). Nature 307: 161-163, 1984.

## **Lecture 13: Joined up cognition: scripts, frames and schemas**

*Content*

Rational Analysis of Memory – provide the right info at the right time

Conversational constraints – need for inference

Bransford and Johnson

Scripts, frames and schemas: Schank, SAM and PAM

*Readings*

These issues are not very well covered in standard cognition texts. You will find bits scattered through the standard texts.

## **Lecture 14: Language, Memory and Thought: The Big Questions (RIN)**

*Content*

Question 1: what is memory for? Question 2: How are memories created? Question 3: How is knowledge used?

Question 4: How much of this is ‘built in’ to the human architecture?

Question 5: Where does language come in? Question 6: How about thought?

*Readings*

These issues are not very well covered in standard cognition texts. Again, you will find bits scattered



through the standard texts.

### **Vision Lectures (Dr Stuart Wilson and Dr Jim Stone)**

See the [PSY241 vision](#) page

(<https://docs.google.com/a/sheffield.ac.uk/document/d/1KGyYcPHyujfn3EQ1DyhrVjWaGNHoj4IoqlxjctyOUQk/edit?authkey=CMHrrqcD>) for a general introduction to the vision lectures to be given by S Wilson and J Stone.

#### **Lecture 15: Neural correlates of visual processing (SW)**

In the first vision lecture, we will get an overview of the gross anatomy of the visual system, and introduce the idea of a neuronal receptive field, with particular reference to neuronal receptive fields that have been measured in the primate primary visual cortex.

**Essential:** Chapter 3 (Seeing with receptive fields) and Chapter 9 (Seeing with brain cells) from Seeing book by Frisby and Stone (2010).

#### **Lecture 16: Topographic maps in the visual brain(SW)**

In the second vision lecture, we will see how neuronal receptive fields are organised across the primate primary visual cortex into map-like representations of visual features, and we will consider the role of maps in shaping visual perception.

**Essential:** Chapter 10 (Seeing with brain maps) from Seeing book by Frisby and Stone (2010).

#### **Lecture 17: Heuristics and Biases (Dr Tom Stafford)**

*Topics Covered:*

Heuristics and Biases

Tversky and Kahneman's judgements under uncertainty

Prospect theory

*Essential reading:*

Tversky, A. and Kahneman, D. (1974). Judgement under uncertainty: Heuristics and biases. *Science*, 185, 1124-1130.

*Optional reading*

The 'Heuristics and biases' section or the "judgement and decision making" section of any cognitive psychology textbook

Gigerenzer, Gerd. Todd, Peter, M. and the ABC Research Group. (1999, eds) *Simple Heuristics That Make Us Smart*. Oxford University Press

Tversky, A. and Kahneman, D. (1981). The framing of decisions and psychology of choice. *Science*, 211, 453-458.

## **Lecture 18: Causal Inference (Dr Tom Stafford)**

### *Topics Covered:*

Covariation and Correlation  
Judgements of causation  
Perception of animacy

### *Essential Reading:*

Scholl, & Tremoulet. (2000). Perceptual causality and animacy. *Trends in Cognitive Sciences*, 4(8), 299-309.

### *Optional Reading:*

Shanks, D. R., Pearson, S. M., & Dickinson, A. (1989). Temporal contiguity and the judgement of causality by human subjects. *The Quarterly Journal of Experimental Psychology B: Comparative and Physiological Psychology*. 41B, 139–159.

Buehner, M. J., & May, J. (2004). Abolishing the effect of reinforcement delay on human causal learning. *Quarterly Journal of Experimental Psychology Section B*, 57(2), 179–191.

Chapman, L. J.; Chapman, J. P. (1967). "Genesis of popular but erroneous psychodiagnostic observations". *Journal of Abnormal Psychology* 72 (3): 193–204. doi:10.1037/h0024670

## **Vision (again)**

### **Lecture 19: Spatial (View-Based) Object Recognition (JS)**

We begin by considering just how difficult object recognition is, from a purely abstract perspective. One way around this difficulty is to recognise reliable features (sign stimuli) as a proxy for recognition. Another, more sophisticated method, is to store specific views of an object, and then to *interpolate* between these views when confronted with a new view to be recognised. We examine evidence that this simplistic view-based approach is used by insects and humans. Finally, we consider if this view-based method is consistent with mental-rotation experiments which suggest we also have a 3D representation of each object.

**Essential:** Chapter 8 (Seeing Objects) from Seeing book by Frisby and Stone (2010).

### **Lecture 20: Spatiotemporal Object Recognition (JS)**

In this lecture, we consider the hypothesis that object recognition is based on temporal (ie changes over time) as well as spatial properties of an object. Examples from the animal kingdom suggest that temporal and spatial (ie spatiotemporal) properties are used for recognition. Humans also rely on spatiotemporal information to recognise the sex of humans, as evidenced by Johansson figures, and on spatiotemporal information to recognise rigid 3D objects.

**Essential:** Chapter 8 (Seeing Objects) from Seeing book by Frisby and Stone (2010).

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