



Human Performance

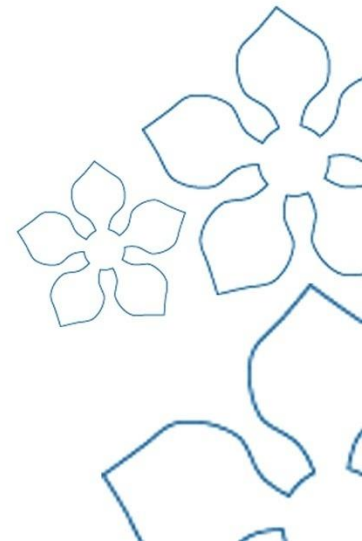
M6X00915

Seminar:
Module Review and Exam Guidance

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Session Outline

- Review coverage of module series.
- Critically consider implications of research evidence discussed throughout module.
- Consider future directions and debates for Human Performance Psychology.
- Provide guidance and discuss areas to focus revision for the forthcoming exam.



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Human Performance

- Interdisciplinary field
- Framework of Performance studies: Classical theory
 - 3 levels of explanation from Cognitive Science
 - Neural
 - Cognitive Architecture
 - Knowledge
 - Originated from AI research but has real-life applications in theoretical & applied contexts.



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Neural Level

- Evidence: Cognitive neuroscience & neuropsychology
 - Attention: ERP studies show early selection & research with visual neglect patients suggests objects (not spaces) are selected.
 - Stress: issues with arousal theory but contemporary research focuses on specific systems in the brain.
 - Ageing: loss of neural function, cell shrinkage in prefrontal cortex, changes in neurotransmission.
 - Individual differences in ability & personality.
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Neural Level: Issues

- Reductionist approach – localising a function is seen as “explaining” it.
 - Imaging studies tell us nothing about neural operations.
 - Psychophysiological studies = Correlational
 - Pylyshyn (1984): information-processing not necessarily reducible to physical processes
 - “Investigating the hardware doesn’t allow us to infer the rules that govern the software operations.”
 - Direct mapping of neural operations and processing codes is questioned.
 - Impact of biological agents on real-life behaviours is often modified by cognitive factors.
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Information-Processing

- Performance research concerned with constraints on processing:
 - Capacity limits in attention and memory
 - Task manipulations from cognitive theory:
 - Patterns of performance can be altered by varying demands/loads.
 - These factors also moderate the impact of stressors.
 - Cognitive Psychology aims to make use of moderating effects to understand Structure of architecture.
 - Many architectural constructs now widely accepted as elements of a larger system.
 - Can be generalised beyond experimental paradigm they originated.
 - E.g., working memory – has helped with understanding of stress, mood, ageing, intelligence, and real-world tasks.
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Information-Processing: Issues

- Resource constructs: influenced theories of stress and individual differences in performance – but factors (e.g., bottleneck) are better supported by experimental evidence (Pashler, 1998).
- Models have limited impact outside domain of application.
- Difficulty in capturing a generalised aspect of processing.
- Many models are insufficient and considered incomplete if they do not account for strategy and voluntary control of performance.
- Focus should be on what performer chooses to do as well as what they can do.





Knowledge level

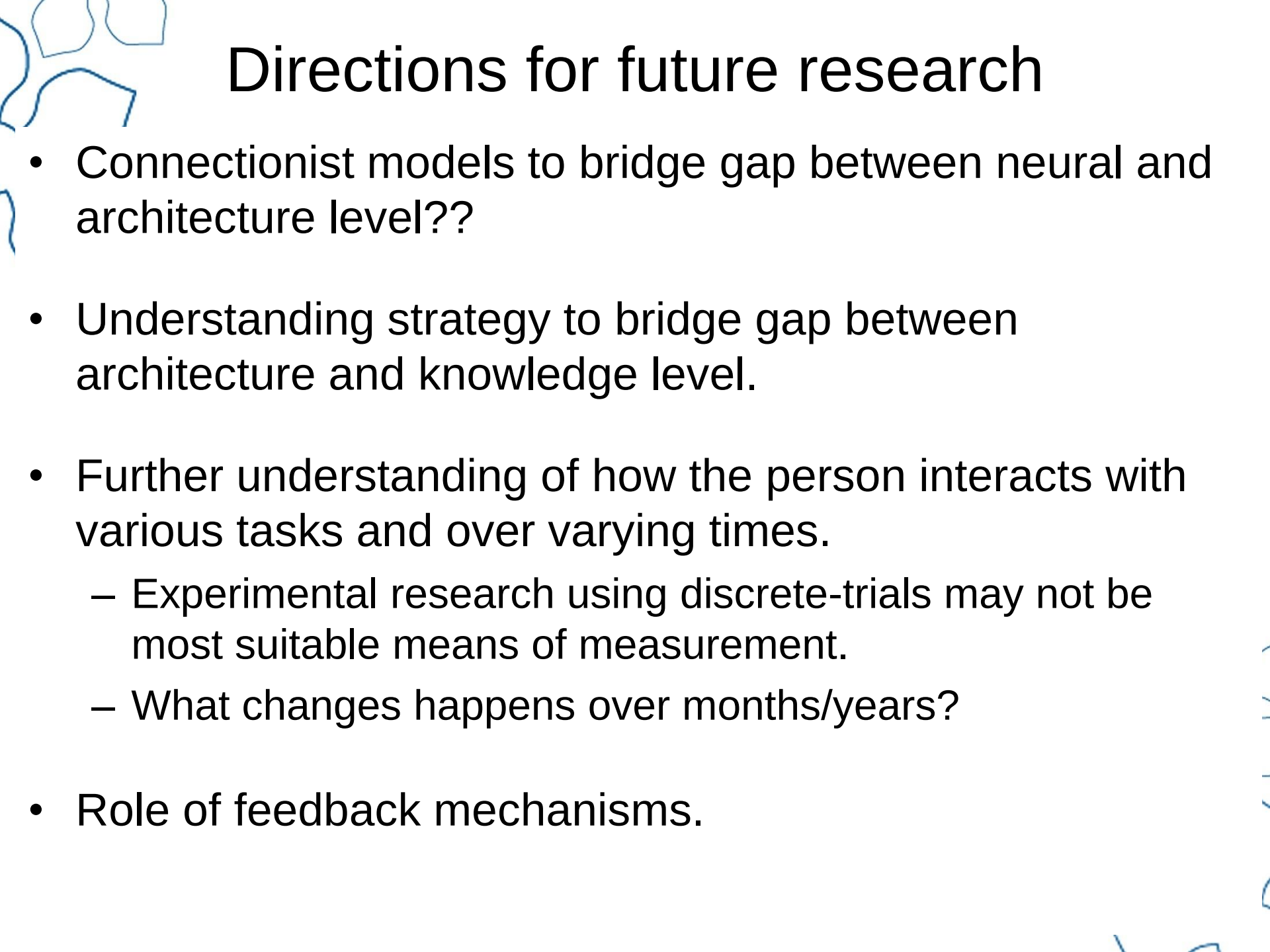
- Intentions, motivations, attitudes, expectancies, and strategies influence performance.
 - Speed-accuracy trade-off
 - Stress & mood states
 - Goals and willingness to apply effort are just as important as a person's processing capabilities.
- Relational perspective needed for knowledge level explanation.
 - Reactions are an expression of the relationship between the person and the particular environment.
- Knowledge level also links performance to wider societal and cultural concerns.
 - Personal meanings inferred by workers regarding their wellbeing.
 - Relationship between humans and machines.

Challenges for future human performance research

- Too many sub-disciplines??
- Too many different terms for the same concepts.
- Needs to be theoretically coherent whilst maintaining practical applicability to practical problems.
- Further understanding of each of the three levels of explanation is required.



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Directions for future research

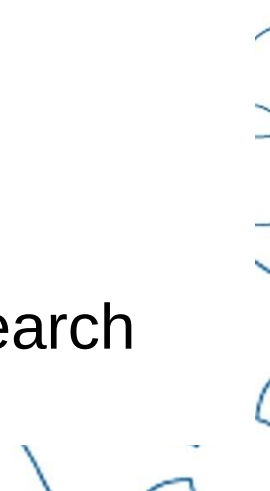
- Connectionist models to bridge gap between neural and architecture level??
- Understanding strategy to bridge gap between architecture and knowledge level.
- Further understanding of how the person interacts with various tasks and over varying times.
 - Experimental research using discrete-trials may not be most suitable means of measurement.
 - What changes happens over months/years?
- Role of feedback mechanisms.

Exam Information

- 1 x TWO hour exam (50% of overall **module** mark).
 - See Exam Timetable on Moodle for date/time/location.
- Answer **TWO** essay style questions from a choice of **six** questions: each worth 50% of overall **exam** mark.
- Questions based on lecture topics **BUT YOU** need to have completed additional reading and include relevant studies to support your arguments.
- Exam questions will be structured so that you will be required to:
 - **Critically discuss or Critically evaluate**



Exam guidance

- Take your time
 - Read through all the questions fully.
 - Think about topic area
 - Can you link in information
 - Take time planning structure of your answer
 - Be precise and clear.
 - **Always use empirical evidence**
 - Examine alternative viewpoints fairly.
 - Use the best evidence.
 - Link pieces of research together.
 - Include information on theories and models.
 - Include information from applied and experimental research
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Exam guidance

Regardless of the questions you answer, your mark will depend on the type of answer you provide

Strong Answers

Provide good description of theory/model or topic in question.

Explain the meaning of any specific terms.

Goes beyond the lecture notes and shows evidence of wider reading.

Include empirical evidence and discuss the studies mentioned.

Provide relevant integration, critical analysis and evaluation of arguments.

Identify strengths and weaknesses associated with each theory based on relevant studies and would clearly explain what the findings mean for theory.

Consider thoughts on wider implications.



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Module Coverage

Lecture	Seminar
Introduction and Overview	No seminar: preparatory reading
Cognitive Modelling and Information-processing	Computational Modelling
Artificial Intelligence	Essay assignment guidance
Signal Detection	Applications of Signal Detection Theory
Vigilance/Attention and performance	The architecture of attention
Models of Memory and real-world application	Considerations for Eye-Witness Testimony
Expert Memory, Learning, and Considerations for Education	Skilled Performance and Expertise
Ageing and Performance	The credibility of “use it or lose it”
Human Error	Can We Reduce Human Error in the Workplace?
Stress and Performance	Exam Preparation and Guidance

Module Coverage

- On the following slides are areas for revision focus.
- They are not questions.....
 - Instead they are general areas where you should be focusing your reading and revision.
 - The questions will ask something specific in relation to these broad areas.
 - Therefore, you must prepare thoroughly for the exam and be capable of tailoring your answer to the specifics of the question.

Memory

- Working memory/interference and performance
- Practical applications – EWT: Influences.....
 - Eyewitness memory: importance & confidence
 - Eyewitness suggestibility & theories
 - Police questioning & interviewing techniques
 - Moderator variables
 - Post ID feedback
 - Recognising suspects: Describing faces
 - Recognising suspects: Police line-ups
 - Violence & Weapon Focus effect + role of unusualness
- **Key reading on Moodle: Esgate et al. (2005) – Introduction to applied cognitive psychology**
- **Key paper on Moodle: Cannabis & EWT**



Ageing

- Decline in sensory ability, memory, attention, processing speed
 - Difference: effortful vs. effortless processing
 - STM/Working memory: becomes worse, Procedural: slower, Semantic: no difference, Episodic: worse, evidence from brain imaging studies.
 - Neurotransmitter depletion in pre-frontal cortex, less activity in hippocampus: But issues with imaging.
 - Not all bad: strategies for successful ageing & performance
 - Prospective memory: Lots of empirical evidence.
 - Positivity effect and shaping goals based on perceived time left.
 - Importance of environmental cues.
 - Traditional vs. contemporary, fluid vs. crystallised intelligence.
 - Theories of change in cognitive abilities: work by **Schaie**
 - General issues with measurements of intelligence.
- **Key reading on Moodle: Craik & Salthouse (2011). The handbook of aging and cognition.**
 - **THREE Key papers on ageing & cognition on Moodle**

Attention

- Architecture of attention:
- Issues: What is attention for? Recognition or Action?
- Perceptual overload & Response incoherence
- Do attention mechanisms exist?: Early selection theories, Attention as a cause or an effect.
- What is the structure of architecture?
 - Research by Hillyard and colleagues (ERP Studies)
 - Space-based vs. object-based theories: Issues with both, Evidence from neuropsychology
- FIT (Treisman), brain structures (Posner)
- Divided attention and workload
- **Many key papers on Moodle**

Signal Detection theory

- SDT applicable in situation where 2 discrete states:
- 1.Signal 2.Noise, which results in 2 response categories:
- 1.Yes (signal present) 2.No (signal not present)
- Generates hits, misses, false alarms & correct rejections.
- Medical diagnosis: Detection of a disease (present/absent)
 - Strength of signal & sensitivity of decision maker, Salience of disease, Number of other 'related' symptoms, Experience of decision maker.
 - Implications: Not detecting cancerous tumour or inaccurately detecting benign cyst as a cancerous tumour.
 - Detection of malignant tumour on x-ray (Swets, 1998).
 - Donchin et al. (2003). Error in intensive care paper.
- Fuzzy logic for understanding grey area in real-world

• **Many key papers on Moodle**

Human Error

- Understanding why errors occur + What are errors?
- 3 types – Recognition, Memory, Attention failures
 - Rule based mistakes + Knowledge based mistakes
- Factors leading to HE: Safety Culture, Organisational systems (automation), Lack of training/competence, Workload, Fatigue
- Causes of fatigue: workload, working environment, shiftwork, overtime, on call, travel time, recovery time.
- Impact on workplace performance: attentional capacity → development of HSE Fatigue index.
- How can we reduce human error in the workplace.
 - Organisational culture, System designs, Organisational safety culture, Fatigue management, Sleep contracts, Bright light exposure, Pharmacological interventions, Exercise, Reliability assessments, Understanding individual differences
- Models: e.g., Swiss Cheese, “Accident Proneness”, Personality & Air Pilot Crashes, Personality factors & mood
- **Many key papers on Moodle**



Stress and coping

- Cognitive Models of stress and performance
- Cognitive theory of emotion
- Coping strategies and performance:
 - Problem-focused coping
 - Confrontative/interpersonal
 - Planful problem-solving
 - Emotion-focused coping
 - Denial, positive-reframing, emotional expression, seek social support
 - Avoidance-oriented coping
 - Person-oriented and task-oriented responses
 - Monitoring vs. blunting
- Research by Nicholls et al. (2016)
- Impact of control and positive emotion in coping
- The “Goodness of fit” hypothesis

Key papers on Moodle + link to video on coping with stress



Exam Questioning

- In the exam, a question is not just going to ask you to describe these aspects.
- At level 6 you will be required to critically evaluate or critically discuss a particular topic in relation to these aspects of performance.
- So, just as an example, if you saw a question in relation to SDT in the exam, only describing what SDT is, will **not** lead to a good mark (it would be lucky to get 40%).
- Of course some description is needed but the marks come from specifically answering the exam question and providing relevant critical evaluation.

Note...

- Do not restrict yourselves into thinking that one exam question will only relate to one particular lecture.
- Exam questions may be answered with the encompassment of information from multiple lectures **and seminars** from the whole module series.



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ESSENTIAL READING!!!

- Wickens, C. D., Hollands, S. B., & Parasuraman, R. (2013). *Engineering Psychology and Human Performance*. Pearson.
 - Matthews G., Davies, D .B., Westerman, S J., & Stammers, R. B. (2000). *Human Performance: Cognition, stress and individual differences*. Hove: Psychology Press.
 - Smith, T. J., Henning, R. A., Wade, M. G., & Fisher, T. (2014). *Variability in human performance*. CRC Press. (Available as a library e-book).
 - Esgate et al. (2005). *An introduction to applied cognitive psychology*. Psychology Press. (Available as e-book).
 - Craik, F. I., & Salthouse, T. A. (Eds.). (2011). *The handbook of aging and cognition*. Psychology Press.
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ESSENTIAL READING!!!

- Look up citations from the lecture slides:
 - If a particular citation is not in the core textbooks, then you can use the library search to find the particular journal article or google scholar.
- At the end of some lectures there may also be suggestions for further reading.
- Read the papers provided on Moodle and the papers provided for the seminars – trust me, these will be useful!!!!



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And Finally...

ALL THE BEST FOR THE EXAM!!!



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