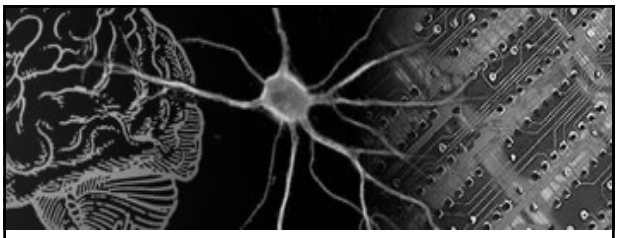


PSYC305

Applied Cognition & Neuroscience

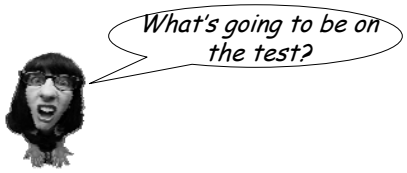
Mātai hinengaro whaipainga me te roro tāiao

Test #1

Thursday -- 10 April

30% of total assessment

covers material from 10 lectures



Date	Topic		Assigned readings (* Available on Moodle ** Provided in class)
26 Feb	Welcome & Intro to Applied Cognition & Neuroscience	SC	*VanCott, *From control systems to knowledge systems* *Flach & Kuperman, *The human capacity for work*
28 Feb	Road Transport: The task of driving	SC	*Groeger, *Applying cognitive psychology to driving* *Summala, *Traffic psychology theories*
4 Mar	Road Transport: Learning to drive	RI	**Dorn, *Driver coaching: driving standards higher*
6 Mar	Road Transport: Vision & navigation	JP	** Warren & Hannon. *Direction of self-motion is perceived from optical flow*
11 Mar	Physiology of Performance I	RI	**Nash, *Fertile minds*
13 Mar	Physiology of Performance II	RI	**Barret and Sowden, *Psychophysiological methods*
18 Mar	Aviation& Aerospace Visual function & performance	JP	
20 Mar	Aviation & Aerospace: Biology barrier & cognitive limits	SC	*Roscoe, *Adolescence of engineering psychology* *Hitchcock, *Pilot performance*
	25 Mar University Holiday		
27 Mar	Aviation & Aerospace: Ground ctl & methods	SC	*Niessen, *Air traffic controller's picture*
1 Apr	Methods of investigation	RI	
3 Apr	Methods of investigation Methods used in Neuroscience	JP	
8 Apr	Review: Putting the pieces together	All	
10 Apr	**Test #1**		

Test divided into 3 sections
SGC section: 23 multiple choice (1 point each)
7 short answer questions, you pick 5 (2 points each)

Introduction to Applied Cognition

Four (five?) eras of Applied Cognitive Psychology (& their sequence)
- Scientific Management – Taylor, Münsterberg, Gilbreths
- Elimination of human error – blind activation, gear-up landings
  - error analyses, Fitt's Law, control & display designs
  - 3 Types of Tools: manual, mechanical, automated
- Information overload – attention & working memory bottlenecks
- Visualisation – mental representations, phenomenon-centered
- Hedonomics – aesthetic longevity & seamless interaction

Future challenges – avatars, virtual worlds, and telepresence

Cognitive tools – two-edged sword

Road transport: The task of driving

Human error – 3 types of error, Common Cause Hypothesis
- The PDA cycle – drivers' effective field of vision, open-loop programs
- The SRK Model & Hierarchical Task Model
- Latent failures, The Swiss Cheese Model

Theories of driver behaviour – the problem of behavioural adaptation
- Risk homeostasis Theory, Task-Capability Interface Model
- Zero Risk Theory, safety zone & Time to Collison

Driver attention – attentional conspicuity & search conspicuity
- Speed change treatments – signs, thresholds & forcing functions
- Speed maintenance treatments – affordances, optic flow & perceptual countermeasures

Self-explaining roads & sustainable safety – 3 principles, road hierarchy
- The Paradox of Automation

Cell phones & driver distraction

Aviation & Aerospace

The "Biology Barrier" – fatigue, vibration, & acceleration
- Fatigue, long flights & jet lag, boredom, stress & circadian rhythms
- Vibration, continuous vs periodic, tracking task performance and RTs
- Acceleration, "Gs" grey-out, tunnel vision, black-out, & G-LOC

Cognitive limits – mental workload & situation awareness
- 3 eras of display design: mechanical, electro-mechanical, electro-optical
- Workload – measurement of information overload
- SA – 3 levels & types of measures
- Inside-out vs outside-in attitude displays & control reversal errors
- HUDs, HMDs, integrated PFDs & channelisation of attention

Air traffic control: shrimp boats, flight progress strips, & ARTS terminals
- 3 levels of ATC – Towers, TRACONs, & en-route
- SA & getting the "picture", training, effects, ARTS symbology, "free flight"

Methods

SITE Test Planning Model & the problem of criteria

Measurement methods – subjective/objective, qualitative/quantitative
- archival, observation, recording, instrumentation, questionnaires

Types of tests, tasks & validity

Lecture 4: Road Transport: Vision and Navigation

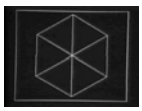
Topics:

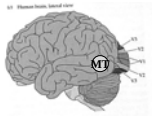
1. Motion perception *
2. Human visual navigation *

* Background information for answering questions such as:

What visual information do we use for steering?
How do we negotiate corners safely?
How do we judge how fast we are going?
Can we design cars that drive themselves?

1. Motion Perception (Partial review of PSYC226 material).
   - •The information provided by movement
   - •Illusions of movement
   - • Neurons that respond to motion





Background Reading:
Chapter 8, 9. Goldstein Textbook (6th Edition)

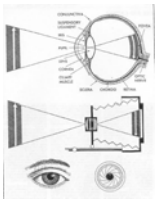
2. Human self-motion estimation
   - •The problem
   - •Translation and rotation
   - • Physiological-based models

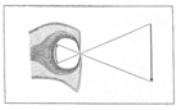
Background Reading:
Warren & Hannon paper.

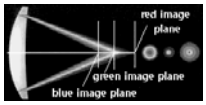
Lecture 8: Aviation and Aerospace Visual Function and Performance

Topics :

1. Eyes (Wald reading).
2. Chromatic-aberration (see Wald article)
3. Visual slant perception
4. Approach and landing errors in aviation







Lecture 11: Methods used in Neuroscience

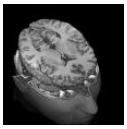
Topics:

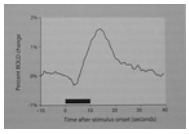
1. Methods of Cognitive Neuroscience
2. Modern Psychophysical Methods

Figures from:
Cognitive Neuroscience: The biology of the mind
by Michael S. Gazzaniga, Richard B. Ivry & George R. Mangun.
(2nd Ed. 2002, WW. Norton & Co. NY).

1. Experimental Techniques used with animals.
2. Neurology
3. Computer Modelling.

•Psychophysics (Classical Methods review)
•Extensions of the classical methods
-Two Alternative Forced Choice procedure
-Staircase Methods.

PSYC305-08A
Applied Cognition & Neuroscience
Test 1

Physiology part (Robert Isler)

9 multiple choice (1 point each)
12 short answer questions (2 points each)
1 special question (1 point)

Test 1

- Road Transport: Learning to Drive

Dorn, Driver coaching: driving standards higher

- Physiological Performance Indicators

Nash, Fertile mind
Flynn, New Theory on intelligence

- Psychophysiology

Barret and Sowden, Psychophysiological methods

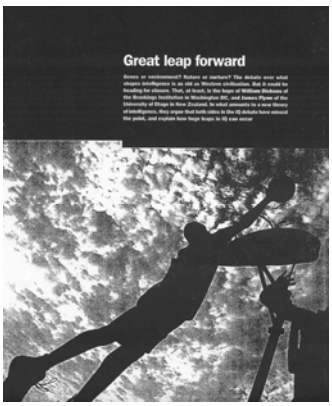
- Methods of Investigation

Higher level driving skills versus vehicle control skills
Frontal lobes development in novice drivers
Driver Coaching versus Driver Instructing
Optimal level of arousal theory
Raine's research
Caspi et al., research
Flynn's new theory on intelligence
Psychophysiology definition
Why do we sleep?
Why REM sleep?
Effect of breathing
Bio feedback
Psychophysiology research areas
Methods of Investigation in Applied Research

Role of Genotype in the
Cycle of Violence in Maltreated Children
By
Caspi, McClay, Moffitt, Mill, Martin, Craig, Taylor & Poulton from London, Wisconsin and **Dunedin**.

was published in Science Volume 297 2 August 2002

" To determine why some children (boys) who are maltreated grow up to develop antisocial behaviour, whereas others do not."



Questions