Research in Cognition Processes
Psychology 394
Winter, 2005

Instructor: Professor D. Besner
Office: PAS 4034
If you want to set up a meeting or ask questions outside of class, then I welcome you
e-mailing me (dbesner@watarts.uwaterloo.ca) or coming to my office (I'm happy to
see students in my office at most times, or, failing that, to set up a time to meet). You can
always email me with questions (including most nights and weekends). I try and answer
all questions within several hours.

T.A.: Mike Reynolds
office: PAS 4049
e-mail: **mg2reyno@watarts.uwaterloo.ca**

Meet Times:10:30-12:00 Tuesday/Thursday
Location: PAS 4288

Course Objectives

The objective of this course is to introduce the student to some of the basic methodology
involved in typical psychological research in the content area of cognition and
perception. The main emphasis is on preparing the student to critically evaluate different
types of published research (e.g., standard reports of experiments on intact subjects
involving simple or factorial designs; single case studies of brain damaged patients).
Another component of the course involves writing (and re-writing) of a pair of short (2
page) summaries/critiques. The course does not focus on trying to teach a "content" area.
Rather, journal articles will be studied to see what they can tell us about research
methodology, and the interaction between theory development and the process of
experimentation. That said, the papers chosen for this course track a topic from a variety
of perspectives (standard experiments; investigations of patients with acquired brain
damage; computer simulations) so as to attempt to impose some coherence on what is
read, and to encourage a broad perspective.

To put it another way, the goals are to teach you how to:
      (1) read a paper in the content area of cognitive processes
      (2) better understand design problems, statistical issues, and underlying
       assumptions often not made explicit in the literature
      (3) tell people about what you have read in a way that is clear and
        concise.
      (4) hopefully, get you to better understand and appreciate some of what it is that
         cognitive psychologists do, and to understand that, with training and
         guidance, it is possible to do high quality research. To make that point
         clearly, some of the published (or in press) papers you read have been

authored by former and current graduate students at the University of Waterloo.

Book for the course: None. In my view most texts are not helpful in large part because they sanitize the messy process of formulating an idea, turning it into an experiment, and then dealing with the resulting data both conceptually and statistically. Better to struggle with primary references and see whether you can get a sense of how issues evolve over time. We will therefore read a set of papers from the journals (and some chapters). A detailed reading list will be provided shortly.

Course Components and Grading Scheme

1. Presentation(s) and Participation (15% for the presentation; 25% for particpation)

We will examine, in class, a number of published journal articles. Each student will present *at least* one such article to the class.You are expected to give a considerable amount of care and attention to the preparation for your presentation. It must be concise, but you are the resource expert for the paper that you are presenting. In other words, you should have a lot of the details of the paper at your fingertips (i.e., in memory) in the event that a question is asked (e.g., how many subjects were tested?; were the conditions blocked or randomized?; was factor Y significant in the analysis as a main effect?; was there feedback after every trial? etc). **However, please avoid going into too much detail during your presentation**. There should be enough detail that your audience can understand:

> (1) what question was investigated
> (2) what the experiment consisted of (i.e., explain what was actually manipulated, and how the experiment was done)
> (3) what the predictions were
> (4) what the data are (that is please SHOW us the data)
> (5) what the analysis of this data said (without specifying the size of the F, or the degrees of freedom)
> (5) how the data fit or do not fit with the theoretical hypotheses.

Please prepare a handout for your classmates that summarizes your presentaton. Copies of your overhead are sufficient.

By "class participation" I mean being responsive to what is going on in the class. For example, listening attentively when students are presenting papers such that you can answer questions about what they are saying. **Be prepared to answer questions in class with respect to the ongoing discussion.**

2. Summaries (7.5% each)

Students will also write 2 summaries of selected papers (maximum 3 double spaced pages) and hand them in for evaluation. The dates for these summaries to be handed in are: Feb 1, 2005, and March 1, 2005. Mike and I will subsequently meet (outside of

scheduled class times) on an individual basis with students and go over the summary in detail and suggest ways in which it can be improved. The student can then hand in a revision (these are due at the next class meeting). The major intent of this exercise is to help improve your writing and conceptualization of the problem at hand.

The summary topics are:

1. Illustrate a double dissocation in the ability to read exception words and nonwords in the context the of the dual route model of reading with reference to patient data and explain, theoretically, the underlying mechanisms. Be sure to include a figure of the model.

2. Explain why the DRC model runs into difficulties in trying to simulate the effect of stimulus quality with respect to the action of 3 factors (word frequency, regularity, and letter length). What solution might be offered. Be sure to show or describe the data clearly.

   Please note that all written work must be typed and **double spaced**. This allows Mike and myself room to write comments. Work that is not in this format will be returned to you unmarked.

3. Quizzes (45% [15% each])

There will be three small tests (mostly multiple choice, but I will likely include a few short answer questions) given in class time. The tests are not cummulative. Two practice tests from years past are attached so that you can get a feel for the kind of questions that have been asked. These tests will take place on **Feb 1, 2005** (test #1), **March 1, 2005** (test #2) and **April 5, 2005** (test #3).

4. Project (10%)
In the event that we are able to think of a tractable class experiment that be carried out in a short amount of time then the total value of the quizz will be reduced to 35% (this remains to be seen).

Tips for Your Presentations:

1. Use overheads (or powerpoint).
2. Use 24 point font on your overheads. (when its too small no one can see it).
3. Don't use too many words. Use a point format in which you have a word or two that references the issue that you will be discussing (rule: less = more).
4. Don't gesture to the overhead as a whole when you are discussing data that are on it. Point to the data that you are describing with your finger (let your fingers do the walking).
5. Speak slowly and clearly, but loudly enough that you can be heard!
6. Make eye contact with your audience (i.e., don't talk to the blackboard or turn your body away from your audience).
7. Don't obscure the overheads by standing in front of them
8. Know your material. Practice with a friend before a presentation, and ask for constructive criticism

Advice on how to read a paper and study for a test [students tell me that they wish they had listened to this advice]

Write the following information on a 3 x 5 file card:

1. Name of the author and title of the paper.
2. What is the theoretical *question* being asked and how is it *operationalized*?
3. What was actually done (i.e., What was the *task*?; What was the dependent measure?; Was there a special population of subjects?).
4. What were the results? Specify them in terms of a graph or table.
5. What were the conclusions? Critically, how do they relate to the original question?

Academic Offences

"Note on avoidance of academic offenses: All students registered in the courses of the Faculty of Arts are expected to know what constitutes an academic offense, to avoid committing academic offenses, and to take responsibility for their academic actions. When the commission of an offense is established, disciplinary penalties will be imposed in accord with Policy #71 (Student Academic Discipline). For information on categories of offenses and types of penalties, students are directed to consult the summary of Policy #71 (Student Academic Discipline) which is supplied in the Undergraduate Calendar (p.1:11). If you need help in learning how to avoid offenses such as plagiarism, cheating, and double submission, or if you need clarification of aspects of the discipline policy, ask your course instructor for guidance. Other resources regarding the discipline policy are your academic advisor and the Undergraduate Associate Dean."

Psychology 394: Practice Quiz (these are questions that I have used in the past. This does not mean that they will appear in any of the quizzes you get, but then again some questions may be used)

Instructions:
Clearly circle the **best** answer for each question. There is no penalty for guessing.

2. According to Coltheart (1981), the regularization errors (e.g., pronouncing PINT such that it rhymes with MINT) seen in surface dyslexics is due to damage to:
a) the abstract letter identification system
b) the non-lexical phonological recoding route
c) the word recognition (lexical) route
d) none of the above

3. Stolz & Merikle (2000) observed that conscious influences decrease over time whereas unconscious influences increase over time. This finding could be due to:
a) differences in how subjects placed their criterion
b) a loss of episodic detail
c) improperly establishing the subjective threshold
d) all of the above

4. Cognitive psychologists doing RT experiments typically assume that the underlying psychological scale is:
a) equal interval
b) non-linear
c) ordinal

5. According to Ramachandran's (1995) theoretical analysis of patients with parietal lobe lesions, vestibular stimulation of their _____ results in a(n) _____ of their paralysis.
a) confabulator; acknowledgement
b) confabulator; denial
c) anomaly detector; acknowledgement
d) anomaly detector; denial

6. Sternberg (1969) concluded that search through short term memory was _____, given that the slopes for positive and negative trials were _____.
a) self-terminating; parallel
b) self-terminating; non-parallel
c) exhaustive; parallel
d) exhaustive; non-parallel

7. Borowsky & Besner (1991) found that context and degradation interacted when the unrelated context was an unrelated word, but did not interact when the unrelated context was asterisks. This demonstrated the importance of:

a) replicability
b) speed-accuracy tradeoffs
c) baselines
d) asymmetric transfer

8. Dr. Strangelove wants to assess the presence of a 3-way interaction in his experiment. He needs a <u>minimum</u> of _____ factors in his experiment with a <u>minimum</u> of _____ levels of each factor.
a) 2; 2
b) 2; 3
c) 3; 2
d) 3; 3

10. Johnston et al. (1995) demonstrated a typical PRP effect where Task 2 RTs _____ as SOA between Task 1 and Task 2 decreased.
a) increased
b) decreased
c) remained constant
d) bi-modalized

11. A false alarm is analogous to _____ as a miss is analogous to _____ .
a) sensitivity; bias
b) bias; sensitivity
c) a Type I error; a Type II error
d) a Type II error; a Type I error

12. In Merikle et al. (1995), subjects given exclusion instructions who did <u>not</u> use previously studied items to complete word stems had:
a) conscious processes dominating performance
b) unconscious processes dominating performance
c) retroactive interference preventing short-term consolidation
d) proactive interference preventing short-term consolidation
e) none of the above

13. Pashler (1984) argued against _____ selection, given his finding that the effects of stimulus quality and probe onset _____ .
a) early; interacted
b) early; were additive factors
c) late; interacted
d) late; were additive factors

14. Counterbalancing will prevent asymmetrical transfer effects.
a) true
b) false

15. Given the following payoff matrix, the observer should adopt a:

HIT $3	MISS –$3
FALSE ALARM –$10	CORRECT REJECTION $10

a) strict criterion
b) lax criterion
c) neutral criterion
d) moving baseline criterion

17. The effects of A and B produce the following pattern of data: There is a larger effect of B at Level 1 of A than at Level 2 of A. Thus, A and B:
a) are additive factors
b) interact
c) are mutually exclusive
d) are independent

18. How many cells are in a 2 x 2 x 3 within-subjects design?
a) 4
b) 7
c) 8
d) 12

19. Roediger and McDermott's (1995) data suggest that confidence is a
_____ predictor of accuracy in memory performance.
a) good
b) poor
a) 20.

21. When computing an item analysis, one should z-score the data for each subject. The reason for doing this is to:
a) remove outliers
b) counterbalance for items
c) increase the df for the error term
d) reduce the effects of between-subjects variance

22. Gilovich et al. (1985) argued that the belief in the ''hot hand'' in basketball is due to:
a) memory bias for series and sequences
b) the misperception of chance events
c) the proliferation of misinformation
d) a backlash from the misguided belief in ''cold feet''

23. Dr. Feelgood collects the following data:

CONDITION A

CONDITION B

Subject	RT	%Err	RT	%Err
1	500	28	600	14
2	700	14	750	7
3	650	0	660	0
4	300	0	320	14
5	750	21	800	21

When analyzing his <u>RT</u> data, Dr. Feelgood should be concerned about:
a) floor effects
b) ceiling effects
c) both a) and b)
d) neither a) nor b)

24. The intent of an item analysis is to inquire whether:
a) your effect generalizes to a new sample of subjects
b) your effect generalizes to a new sample of items
c) both a) and b)
d) none of the above

25. Coltheart & Freeman (1974) showed that case alternation impaired the identification of high frequency words more than low frequency words.
a) true
b) false

26. Sharma & McKenna (1998) concluded that there was a semantic component in the _____ Stroop task.
a) significant; vocal
b) significant; manual
c) non-significant; vocal
d) non-significant; manual
e) both a) and d)
f) both b) and c)

27. Bekerian and Bowers (1983) argued that Loftus & Loftus' (1980) finding that subjects were unable to accurately recall events was due to:
a) memory overwriting
b) memory decay
c) failure of short-term consolidation
d) both b) and c)
e) none of the above

28. Fera et al. (1994) argued that the evidence against late selection was weak, given that SOA and stimulus quality were additive only when using _____ font and only when that font was presented _____ .
a) a pixel; first
b) a pixel; second
c) their; first

d) their; second

29. Assuming an additive stages model, what is the <u>minimum</u> number of separate stages one would have to infer if all the 2-way interactions in a 2 x 2 x 2 within-subjects experiment are significant and the 3-way interaction is not significant?
a) 1
b) 2
c) 3
d) 4

30. Here are some hypothetical mean RT and % Error data for two conditions:

	RT (ms)	Error (%)
Condition 1	400	2.0
Condition 2	350	4.6

Which condition is more difficult?
a) Condition 1
b) Condition 2
c) inconclusive

32. Clancy et al. (2000) found that women with memories of childhood sexual abuse were more likely to falsely recognize new items as being from a previously viewed list, especially when the list was
.
a) repressed; short
b) repressed; long
c) recovered; short
d) recovered; long

34. Bremner et al. (2000) showed that ''abused PTSD'' women falsely recognized more critical lures than did ''abused non-PTSD'' women. This lead Bremner et al. to conclude that:
a) the claims of childhood abuse by ''abused PTSD'' women were false
b) childhood abuse causes PTSD
c) ''abused PTSD'' women have an increased capacity for false memories
d) both a) and c) are correct

35. Imagine a 3 x 4 within-subjects factorial experiment. If factor A has 3 levels, how many levels do you have to collapse across in order to decide whether there is a main effect of B?
a) 3
b) 4
c) 7

d) 12

36. In Pashler's (1992) bank teller analogy, the bank teller represents:
a) the difference between long and short SOAs
b) cognitive slack
c) the bottleneck
d) underadditivity

Here are some hypothetical data from a 2 x 2 within-subjects design. Use this data to answer questions 37-39.

	A1	A2
B1	50	100
B2	200	300

37. What is the size of the main effect of A?
a) 50
b) 75
c) 100
d) 150
e) 162.5
f) 175
g) there is no main effect of A

38. What is the size of the main effect of B?
a) 50
b) 75
c) 100
d) 150
e) 162.5
f) 175
g) there is no main effect of B

39. What is the size of the A x B interaction?
a) 50
b) 75
c) 100
d) 150
e) 162.5
f) 175
g) there is no A x B interaction

40. A critical assumption of Sternberg's additive stages model is that:
a) there is interactive activation between stages
b) stages are serially organized and cascaded
c) stages are serially organized and discrete
d) none of the above

41. Loftus & Loftus (1980) claim that the biggest problem with the evidence used to support the theory that information is permanently stored in the brain is that:
a) it indicates that this is an issue of retrieval, not storage
b) it relies on untestable subjective reports
c) it is vulnerable to ceiling and floor effects
d) it is improperly scaled

42. Ramachandran (1995) inferred that patients with parietal lobe lesions (anosognosics) _____ have tacit knowledge of their deficit. As such, they chose to perform tasks that _____.
a) did; required 2 hands
b) did; required 1 hand
c) did not; required 2 hands
d) did not; required 1 hand

43. In Merikle et al. (1995), a high incongruency ratio (i.e., most trials were incongruent) in the Stroop task led to:
a) congruent trials being faster when conscious processes dominated
b) incongruent trials being faster when conscious processes dominated
c) congruent trials being faster when unconscious processes dominated
d) incongruent trials being faster when unconscious processes dominated
e) both a) and d)
f) both b and c)

44. Patient A can only hear music by Pink Floyd whereas Patient B can only hear music not by Pink Floyd. This indicates that the mechanism used for hearing music by Pink Floyd and the mechanism used for hearing music not by Pink Floyd are:
a) serially organized
b) not serially organized
c) dependent
d) independent
e) both a) and d)
f) both b) and d)

45. It was noted (in class) that individual patient data is important relative to group patient data because:
a) individual patient data provide more power to detect an effect

b) averaging across groups of patients can yield a pattern
   seen in no individual patient
c) individual patient data is more generalizable
d) all of the above

47. In Pashler's (1992) bank teller analogy, whether you
walk quickly or slowly up to wait for the teller (assuming
the teller is busy) will not affect how much time you spend
in the bank. This is because the extra time taken to walk
slowly is:
a) subject to the psychological refractory period (PRP)
   effect
b) absorbed into the slack created by having to wait for the
   teller
c) minimal compared to the time spent at the teller
d) added to the time spent at the teller

Another Practice Quiz

1. What is a factorial design? Describe what a main effect is, and what an
   interaction is. How many cells are there in a 2 x 2 x 2 within subjects design.
2. Give an example of a factorial design with one between subject factor, and
   two within subject factors. Specify the independent factors and their levels,
   and the dependent factor(s).
3. Draw both a graph and make up a table of data from a 2 x 2 x 2 experiment in which
   there is a triple interaction, but no 2 way interactions, and no main
   effects.
4. Describe what a speed-error trade-off is, and show some hypothetical data
   that illustrate situations in which there is and is not such a tradeoff.
5. Describe what signal detection theory is, how it can be applied to the study of
   recognition memory, and why you would want to use it there. Include a
   clearly labelled figure in which there the criterion is set such that there are
   more hits than false alarms.
6. Describe Sternberg's Additive Factor Method. Distinguish between additive
   factors, and additive stages. Briefly note what the observation of
   underadditivity implies, with an example.
7. Give an example of asymmetrical transfer between conditions in an
   experiment.
8. Explain what Type 1 and Type 2 errors are. Which is more likely in an
   experiment, and why? What is the best way to guard against a Type 1
   error? A Type 2 error?
9. What is counterbalancing, and why is it used? Will counterbalancing prevent

asymmetrical transfer effects from occurring?
10. Describe what floor and ceiling effects are, and how they limit the interpretation of interactions.
11. Describe the typical assumption about the nature of the underlying psychological scale as it is applied to the interpretation of RT data. Why might this be a problem when applied to accuracy data, and what can be done about it from the viewpoint of how follow-up experiments could be conducted.
12. Assuming an additive stages model, how many separate stages would one infer if all the two way interactions in a 2 x 2 x 2 within subjects experiment are significant, but the 3 way interaction is not. Illustrate this in a labelled diagram.
13. Explain what a double dissociation is, and provide an example.