Event-Coding, Visual Processing, & Motor Expertise

Wayne Gray

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This is a graduate level course. Junior or Senior undergraduates may sign up with consent of the instructor.

OVERVIEW OF RESEARCH AREAS: This Graduate Research Seminar will focus on four themes related to Perception & Action. (1) Our Event-Coding papers are currently in Early View at Topics in Cognitive Science, topiCS. (2) Papers for Time for Action were published in October (2019) as a special issue of Attention, Perception, & Psychophysics. (3) Our Motor Expertise readings are from David Rosenbaum’s recent book, Knowing Hands. And, (4) our Levels of Explanation in Cognitive Science: From Cultures to Molecules papers are also in Early View at topiCS.

GENERAL DESCRIPTION OF SEMINAR: It is expected that students in this seminar will have a range of expertise in these areas in part because some students will be 5th year doctoral students and others will be 1st year ones. There may even be one or two undergrads in this seminar. All are welcomed and all will be judged based on their level of effort not on their prior knowledge.

Although this seminar is being offered by the Cognitive Science Department, students from all other departments of Rensselaer are invited and their contributions will be cherished. However, seats are limited so as to preserve the small group nature of the weekly discussions. Those outside of Cognitive Science should contact the instructor prior to registering. Finally, the syllabus may change during the semester with new readings being added and old ones pruned.


DETAILS OF CLASS STRUCTURE: Details on course structure, expectations, and grading (with differences for Grad students and Ugrads) appear at the end of this syllabus (but before the list of REFERENCES).
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**Wk1  01/16-HISTORY**

Nothing written is due but all should have read these papers **BEFORE** class and come to class prepared to join in a discussion of each one.

- AND read one but not both of these:
  - https://www.ru.nl/donders/agenda/donders-lectures/biography-donders/

**Wk2  01/23-COGNITIVE TOOLS**

All read and write 1.5 pages about the Bechtel paper and 2/3’s pages for each of the other two.


Student presentations: REMEMBER all in class student presentations of papers should be timed ahead of time to be not more than 20min long. This semester we will assign a timekeeper to each paper session whose job will be to flash “countdown” cards at the speaker at the 10min, 5min, 1min, and time up mark. Time begins when the speaker begins talking.

Wk3  01/30-SPEED OF MENTAL PROCESSES & TIME FOR ACTION

- ALL READ ALL THESE & write ...

Student presentations:


Wk4  02/06-TIME FOR ACTION: REACHING FOR A BETTER UNDERSTANDING OF THE DYNAMICS OF COGNITION

SPECIAL ISSUE (Oct 2019) of The Attention, Perception, & Psychophysics Journal

Critical reviews of research and models generated across the fields of cognitive psychology and neuroscience

- AND WRITE ABOUT THESE (1/2 to 1 page for each paper):

STUDENT PRESENTATIONS:

- The papers in this section address the relation between mechanisms of prioritization, selection, cognitive dynamics, and decision-making and goal-directed action
- For each of the three categories, one presentation from one student only. MAX of 3 student presentations.
  - perception – Sounak – Buckingham

– visual search – Neha will do doing Smith


– agency – Chris


Wk5 02/13–TIME FOR ACTION (part 3 – cont’d from last week . . . )

This week there will be one group readings and we will limit its discussion to 30min. After this we will have 6 student presentations, each one will be from a different subareas of October’s *Attention, Perception, & Psychophysics* journal.

- ALL READ AND WRITE one page for this one paper:


Each presentation will be timed and strictly limited to 15min. There will be a short break btw each presentation for the next person to set up while the last person is answering questions.

1. Sounak – recognition of object-directed actions


2. Ropa – cognitive load


3. Roussel – learning and memory

This next set of papers employ motion capture and other technologies to record the trajectories and patterns of movements to generate new understanding of the dynamics of cognitive processes such as:

4. **Chris – language**

This final set (for this week) includes two Theoretical and Methodological Issues:


*END OF EDITORS’ INTRODUCTION: “Taken together, we envision that the outcomes of this special issue will contribute to theoretical advancements gained by real-time read-out of internal perceptual and cognitive dynamics and enable the field to further understand how the mind synergistically operates to achieve adaptive behaviors in the complex real world.”*

**Wk6 02/20–KNOWING HANDS – Chptrs 1-3**

ALL STUDENTS ARE EXPECTED TO HAVE READ ALL CHAPTERS FOR EACH WEEK. The student “discussion leader” is expected to be ready to lead the discussion not to do a solo presentation! Also remember that we are trying to walk through the author’s organization of the material and, perhaps, reflect on his organizational and writing craft.

- Ch01. Introducing hands, pp. 1-18; discussion leader – **Chris Joanis**
- Ch02. Building hands, pp. 19-39; discussion leader – **Sasha**
- Ch03. Energizing hands, pp. 40-64; discussion leader – **Sounak**
- **Talk by Sasha**

**Wk7 02/27–KNOWING HANDS – Chptrs 4-6**

- Ch04. Willing hands, pp. 65-85; discussion leader – **Roussel**
- Ch05. Seeing hands, pp. 86-125; discussion leader – **Sambit**
- Ch06. Hearing hands, pp. 126–139; discussion leader – **Neha**
Wk8 03/05–KNOWING HANDS – Chpters 7-9

- Ch07. Feeling hands, pp. 140–172; discussion leader – Chris
- Ch08. Joining hands, pp. 173–197; discussion leader – Ropa
- Ch09. Extending hands, pp. 198–242;
  - Neha & Roussel

SPRING BREAK
No class on March 12th
NOTE THAT DAVID ROSENBAUM WILL BE OUR OUTSIDE SPEAKER THE WEDNESDAY AFTER BREAK WEEK (March 25th)

Wk9 03/26–LEVELS OF EXPLANATION IN COGNITIVE SCIENCE: FROM MOLECULES TO CULTURE: Part 1.

From Topics in Cognitive Science, topics Editors, Matteo Columbo (Tilburg University, The Netherlands) and Markus Knauff (Justus-Liebig-Universität Gießen, Germany).

All read and write 1.5 pages of Columbo & Knauff’s intro paper:
Columbo & Knauff – Introduction to this topic.

STUDENT PRESENTATIONS:

- Level ??? – unknown

- LEVEL – CULTURAL EVOLUTION
Wk10  04/02 – LEVELS OF EXPLANATION IN COGNITIVE SCIENCE: FROM MOLECULES TO CULTURE: Part 2.

No group reading this week, all presentations

- **Level – NEURAL NETWORKS**

- **LEVEL – MOLECULES**

- **LEVEL – COGNITIVE NEUROSCIENCE**

- **LEVEL – OVERVIEW**

Wk11  04/09 – PAPERS CITED IN BUTZ’ INTRODUCTION AS BACKGROUND TO EVENT-PREDICTIVE COGNITION

All re-read:

- This is a re-read – we read and talked about it in week 2 along with Bechtel and a few other papers

Except for the Barr paper, no group reading this week, all presentations

- who??— the first four are short and would count as one presentation


Wk12 04/16 EVENT-PREDICTIVE COGNITION – Part 1

This part is under construction

Event-Predictive Cognition: From Sensorimotor via Conceptual to Language-based Structures and Processes

From *Topics in Cognitive Science*, Topics Editor, Martin Butz (Computer Science, Universität Tübingen, Germany)

ALL of the papers in this topic have now made their way to Early View.

All read and write 1.5 page on Butz’ Introduction


STUDENT PRESENTATIONS:


More papers from Butz’ Special Issue of *topiCS*

STUDENT PRESENTATIONS:


### REQUIREMENTS

#### 90 REQUIREMENTS

**90.1 PreRequisites**

Permission of the instructor. This is a graduate research seminar in the Cognitive Science Department. However, all interested undergraduates and interested graduate students from other departments are encouraged to contact the instructor to discuss their participation in the seminar. Responsibilities and assignments for undergraduates will be discussed and agreed on, in writing, by the student and the instructor.

**90.2 About the Instructor**

Professor Gray has been a member of the Cognitive Science Department at RPI since the Fall of 2002. For details on his research interests and activities see his homepage.

**90.3 Activities**

Reading, Writing, Presenting, Discussing

- Group discussion.
  - The most important contribution each person can make is to our discussions of the readings. I believe a seminar course in which everyone actively participates can be
the most productive and educational forum in grad school (often for the instructor as well). Bringing together the various backgrounds and training of everyone in the room generally leads to a much richer perspective than would otherwise be possible. There is a lot of individual variability in tendency to speak up in this type of environment, but it is critical to an academic career to be comfortable doing so. You cannot succeed in this field without a willingness (and desire) to share your ideas in the face of criticism, and this is perhaps the best context to practice. If you are someone who has no qualms about dominating a debate, this is also a good place to practice restraint and listening.

- Students (graduate and undergraduate) will take a turn leading a discussion of each week’s core assigned readings. Advanced preparation for this includes the Response Paper for that week’s readings.

- **Response Papers**
  - **NEW for FALL 2019!** We will experiment with different ways of discussing the Response papers. In past seminars, I was the only person who read any of the student Response papers. This semester I will share that responsibility with each of you.
  - As in past seminars, each week all students will write response papers to the readings.
  - As in past seminars, those papers are due by 5:00 pm on the Tuesday before class.
  - Different from past semesters, each student will upload their Response paper to that week’s DropBox (I will send the entire class that link each week).
  - Same as last semester, be sure to put your name on your paper!!!
  - Also different from past semesters, I will assign each paper to one other student to read as its reviewer. Hence, each week, each of you will be a reviewer and a reviewee.
  - The Review: Your reviews are not detailed. Rather, the purpose of your review will be to pull out interesting points and/or address issues raised in the response paper you have read. In doing so, you will rely on your knowledge of the Review paper.

- **Paper presentations. Research papers only – NO REVIEW PAPERS.**
  - Each week, one to three students will each present a research paper selected by the instructor as relevant to that week’s topic. Generally, just one student will read and present each research paper. The number of presentations per student will be inversely proportional to class size.
  - **NEW for FALL 2019!** We distinguish between papers that primarily report original research (Research Papers) and ones that primarily review and/or integrate already published research (Review Papers).
  - The focus of the Paper Presentations is on Research Papers – REVIEW PAPERS CANNOT BE CHOSEN FOR PRESENTATION. My goal is to have you become
familiar with the jargon and conventions of research papers across the wide swath of cognitive science research most relevant to humans.

- In general, each presentation should be 20 when rehearsing the presentation with NO interruptions.

- In class the presentation should not exceed 25 min (which is about the length of time you would get to present your work at a generous conference!)

- A useful strategy is to copy key figures and tables out of each article and supplement with (scant) text stating the major points. Focus on summarizing the research, as the authors present it (including motivation, background, methods, results, and conclusions), but also allow us to hear your voice as well – however, be sure we know when the author is speaking and when you are speaking.

- Undergraduate presentations.

  * As this is a communication intensive course, I will be asking our undergraduates (if any) to also do presentations. These will be fewer in number than the graduate student assignments; however, I will encourage each undergraduate to prepare her/his presentation a week in advance, in time for it to be delivered in a practice session to me or to one of the senior graduate students. This extra meeting is intended as a “practice” session to get you comfortable with this type of presentation.

### 91 Grading Policy

- Examinations – none

- Group Discussion
  - 35% Grad Students; 45% Undergrads
  - For active participation in all discussions on all weeks in which the seminar is held. Exceptions due to professional travel or other activities need to be discussed with the instructor ahead of time.

- Response Papers
  - 35% Grad Students; 45% Undergrads
  - Prior to each week’s meeting, one or more readings will be assign and, for each reading, all students are expected to write a short, one-page Response Paper. The Response Paper should not merely summarize or outline the assigned reading but should reflect your thoughts on the author’s arguments, the strength of evidence, alternative hypotheses, implications, and so on.

  - Response papers are due to the Instructor by 5:00 pm the day before the seminar.

- Presentations
  - 35% Grad Students; 15% Undergrads
Throughout the semester, an average of one or two students each week will be asked to present the findings of a published research paper, assigned by the instructor. The presentation should be in the range of 20-30min. The student should assume the role of the paper’s author and present the case made by the author in her paper. Use of figures, tables, and headings from the paper is encouraged, as well as original visualizations created by the student, as appropriate. The student may also step out of their role as “surrogate author” for various “meta” comments on the material but should, generally, maintain and represent the case made by the original author in her paper.

• Yes. I expect 105% out of you!

92 Honors Policy

• My expectation is that all of the work you do for me in this class will be the work of one individual. Exceptions to this rule will be broadcast to the class by email.

• As you will all find out, I explicitly encourage you to engage in public (using email and other media to broadcast a message to the entire) or private (one-to-one) discourse regarding the readings and topics raised in this class. Study groups are encouraged.

• If any of you have any questions regarding current situations or future situations, remember that I am your first contact on this. Please come and see me.
90 REFERENCES


This document contains 52 references.