The Effect of Time on Earth on Performance & Experience (AKA: Ageing and Experience)
Spring 2019

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

Description

The construct of “Time on Earth” encompasses phenomenon sometimes attributed to experience, sometimes attributed to biological aging, and other times to “simple” decay or forgetting due to disuse (regardless of biological age). Adopting a cognitive science framework, this seminar will explore both of these constructs on human skilled performance and expertise while also exploring the often unvoiced causal assumptions of the researchers who investigate them. For our purposes, “skilled performance” includes aspects of human perception, motor behavior, memory, and decision-making, as well as the discovery or invention, by individual performers, of new methods of task performance. Examples of the skilled tasks to which we aspire to explain include action video games, medical diagnosis, surgery, driving a car, juggling, and any other situation where “even hesitating requires a decision to hesitate.” Our emphasis will be on the basic research and theories which shed light on skilled performance and which might be use to guide training. The syllabus may change during the semester with new readings being added and old ones pruned. Keep your eye on: http://homepages.rpi.edu/~grayw/courses/syllabi/m%20Sp2019/ for more information.
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Week 1  Jan 17th: THE THICK DIE QUICK AND OTHER INTRODUCTIONS TO INTELLIGENCE, EXPERTISE, & AGING
All read each of the two papers and two NYTimes columns before class – no required Review papers – but you will be asked to discuss each of these sources:


Aging in the Science News:


Week 2  Jan 24th: OVERVIEWS OF AGING & EXPERTISE
[All Reviews are due by 6:00 pm the TUESDAY before class.]
For each of the two papers, read and write $\approx 1/3$ to $\approx 2/3$ page for each of the major subsections.


**Paper presentation by . . . .:**


**Week 3  Jan 31th: THE SOFT CONSTRAINTS HYPOTHESIS**

[All Reviews are due by 6:00 pm the TUESDAY before class.]

All read and write a 1.5 page Review paper for:


**Paper presentations by . . . .:**


**Week 4  Feb 07th: HICKS LAW**

[All Reviews are due by 6:00 pm the TUESDAY before class.]

All read and write Review papers for each of these five sections:

Review papers written by sections

1/2 page: Abstract & Introduction (pp1281-1282) & Conclusion (pp 1295)
1/2 page: Historical Context; p1282-1283
1/2 to 1 page: Hick’s (1952) article; p1283-1284
1/2 to 1 page: Replication of the logarithmic function and empirical restrictions; pp1284-1286
1/2 to 1 page: Additional challenges to Hick’s law; pp1286-1290
1/2 to 1 page: Contemporary models of Hick’s law; pp1290-1293
1/2 page: Applications of Hick’s law; pp1293-1295

Paper presentation by . . . :


**Week 5  Feb 14: THE MYTH OF COGNITIVE DECLINE**

[All Reviews are due by 6:00 pm the TUESDAY before class.]

**INTRODUCTION:**

- Read Gray and Hills (2014): but no Review paper:
  


For Ramscar, review papers written for each section

1. Write 1/2 to 1 page for each of the 9 sections.
2. Note that the last 8 pages are references and the appendix – no comments required for these.

**Ericsson vs Howard, paper presentations by . . . :**


Week 6  Feb 21:  THE BRAIN AGES OPTIMALLY TO MODEL ITS ENVIRONMENT
[All Reviews are due by 6:00 pm the TUESDAY before class.]


- OLDER ADULTS IN GAMES

Paper presentation by . . . :

- CROSSWORD PUZZLES

- CHESS

- GENDER IN SCRABBLE

Week 7  Feb 28: PREDICTIVE PROCESSING
[All Reviews are due by 6:00 pm the TUESDAY before class.]


  - Skim and pick one example to discuss (but do not write more than 1/2 of a page total) for the Application to driving section (pp 167–181).

  - Optional: Feel free to NOT read Relation to existing human factors theories and models.

  - Read the Conclusions and write a 1/2 page about that.
Paper presentation by . . . :


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**Spring Break**

*No class on March 7th*

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**Week 8**  **Mar 14: BRAIN PLASTICITY IN OLD AND YOUNG**

[All Reviews are due by 6:00 pm the TUESDAY before class.]

All read and write a 1-2 page Review paper for:


Paper presentation by . . . :


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**Week 9**  **Mar 21: THE POSITIVE MANIFOLD & COGNITIVE FLEXIBILITY**

[All Reviews are due by 6:00 pm the TUESDAY before class.]

All read and write a 1 page Review paper for each of:


Paper presentations by . . . :


**Week 10  Mar 28: IIV and AGING and HAND STRENGTH**
[All Reviews are due by 6:00 pm the TUESDAY before class.]
All read and write a 1 page Review paper for each of:


Paper presentations by . . . :


**Week 11  Apr 04: IIV & COGNITIVE IMPAIRMENTS**
[All Reviews are due by 6:00 pm the TUESDAY before class.]
All read and write a 1 page Review paper for each of:


Lövdén, M., Li, S.-C., Shing, Y. L., & Lindenberger, U. (2007). Within-person trial-to-trial variability precedes and predicts cognitive decline in old and very old age: Longitudinal data from the Berlin Aging Study. *Neuropsychologia, 45*(12), 2827–2838. doi:10.1016/j.neuropsychologia.2007.05.005


In fact, Krampe and Ericsson (1996) found that 60-year old pianists were able to match young pianists on speeded music-related tasks as long as they maintain high levels of solitary practice. However, when the same expert pianists were tested on traditional cognitive tests sensitive to aging they showed normal age-related decrements in performance.

[All Reviews are due by 6:00 pm the TUESDAY before class.]

All read and write a 1 page Review paper for each of:


Paper presentations by . . . :


  "Compared to an age matched control group, Tomoyori showed a large superiority for memorizing matrices of digits, when the self-paced condition allowed him sufficient time to use his mnemonic encoding methods–similar to the condition for memorizing the digits of pi. The result of Tomoyori’s memory performance at age 66 was still consistent with skills for encoding digits at self-paced rates, which in turn are consistent with the principles of LTWM."


**Week 14  Apr 25: OVERTIME – New papers which revisit themes of this semester**

[NO written Reviews this week – but please read each one (a total of about 15 pages of reading) and come prepared w/ one or two comments:


From: Michael Ramscar  
Subject: Re: The Myth of Cognitive Decline versus The brain ages optimally to model its environment  
Date: 2019-Feb-23 at 05:56:01 EST  
To: Wayne Gray

Hi Wayne

Sorry for the slow reply – I’ve been traveling a lot and dealing with an annoying late winter ’man cold’ the past week, and I am totally behind on everything...

I think the nub of all this lies here:

“The basic premise of this paper [Moran et al.] seems very contrary to that of the Ramscar paper we read last week. It’s taking the stance that with age, the brain becomes more efficient at making *sense* of the world it is interacting with.”

The Moran et al paper is Bayesian, which means it takes representation as a given, whereas, as you rightly point out, my main concern is how we use discrimination learning to develop the representations that allow us to make sense of the world. And of course, one of the things that interests me is that a consequence of using discrimination learning to make sense of the world is that it makes processing nonsense harder (which is just another version of the no free lunch principle, now i think of it).

I dunno if you’ve seen this very short paper, but I hope it makes the point clearly.

Hum, and thinking about your global points, I think the apparent contradiction here points to a really big problem that lies at the heart of a lot of cogsci research – when people don’t worry about where representations come from, they can easily fall into the trap of believing that lunches come for free...

Optional – this is the original, Rao & Ballard, *predictive processing* paper.


Paper presentations by . . .:


- loss of skills


– no loss of skill – it’s like riding a bicycle, you never forget . . .


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.

- Class discussion of each week’s main reading we will based on the Review Paper that each student has written (see next section).

- The Professor will lead the discussion and will call on students to elaborate points made in their Review Paper for that week’s readings. Hence, required advanced preparation for each seminar includes reading the assigned readings, and writing a Review Paper.

- Seminar students will be at different stages in the doctoral program and each student is not expected to have as much background as each of the other students. However, each student is expected to contribute and no student is expected to dominate the discussions.

• Review Papers

- For each week students will be asked to write short, typically 1-2 pages, “Review Papers”. Most weeks there will be Target Paper with one Review Paper – however, check the syllabus as some weeks may have more than one Target Paper with more than one Review Paper required.

- Unless explicitly told otherwise, Review Papers will be due by 5pm the Tuesday before class meets (class meets on Thursday mornings). This will enable me sufficient time to read your papers, to integrate the various themes that different students identify, and to gage the difficulties (if any) the class had understanding the paper.

- The Review Papers will be written in the style of a journal review with you as a reviewer.

  * The “General Comments” section should be written after the rest of the paper and should be in the style of a 1-2 paragraph note to the author and/or bulleted points that discuss the high points, the important points, and the problems in argument, structure, and/or writing.

  * The “Special Comments” section can be written as you are reading the paper and should discuss issues that came to your attention as you read a given section.

    · These issues could include (a) important points that the authors made well or poorly, (b) notes on quality and ease of reading of various tables and figures, and (c) short discussions of the contribution (or lack of contribution) of the various parts of the paper to the whole.

  * The main audience of any journal review is the Action Editor who has commissioned you to do the review. The secondary audience is the author(s).

  * The review’s main purpose is to give the Action Editor the information he needs to decide whether to accept, reject, or ask for revisions. However, a very close
second purpose is to give the author constructive feedback on what is interesting and important in their paper, what seems like dribble, and how they can improve the paper so as to make a better contribution to the field of cognitive science (methodology, theory, statistical analyses, whatever).

* Note that while statistics on these things are hard to get, my estimate is that 75% of journal submissions are “rejected with an invitation to resubmit” on their first round of review.

- Paper presentations.
  - Following our group discussion of the Review Papers, most weeks will include one to three detailed presentations on research papers assigned by the instructor as relevant to that week’s topic. Generally, just one student will read and present each research paper. There will be 1-3 presentations per week, one each by 1-3 different students. The number of presentations per student will be inversely proportional to class size (which is topped at 10 students). Longer or survey papers may be divided among several students.
  - In general, each presentation should be 20-25 minutes long and structured as though you were presenting your own work at a 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.

91 Grading Policy
- Examinations – none
- Group Discussion: 35% – 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.
- Review Papers: 35% – Prior to each week’s meeting, one or more readings will be assigned and, for each reading, all students are expected to write Review Papers. In writing the Review Paper you should assume the role of a constructive Reviewer who is writing a letter of recommendation to the Editor that will also be read and provide feedback to the paper’s author(s). (See above for more details.).
- Review papers are due to the Instructor by 5:00 pm two days before the seminar.
- Presentations: 35% – Throughout the semester, 1-3 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.

93 Rensselaer’s Academic Integrity Statement for all courses at the 4000 level or above:

The Rensselaer Handbook of Student Rights and Responsibilities and The Rensselaer Graduate Student Supplement define various forms of Academic Dishonesty and procedures for responding to them. All forms are violations of the trust between students and teachers. Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own performance. Acts that violate this trust undermine the educational process.

The Rensselaer Handbook of Student Rights and Responsibilities and The Rensselaer Graduate Student Supplement define various forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student’s own work. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your collaboration. Submission of any assignment that is in violation of this policy will result in a penalty. If found in violation of the academic honesty policy, students may be subject to two types of penalty. The instructor administers an academic [grade] penalty and the student is reported to the Dean of Students or the Dean of Graduate Education as appropriate. The first violation results in 0 grade for that assignment. The second violation results in failure of the course. If you have any questions concerning this policy before submitting an assignment, please ask for clarification.
94 References


Lövdén, M., Li, S.-C., Shing, Y. L., & Lindenberger, U. (2007). Within-person trial-to-trial variability precedes and predicts cognitive decline in old and very old age: Longitudinal data from the Berlin Aging Study. *Neuropsychologia, 45*(12), 2827–2838. doi:10.1016/j.neuropsychologia.2007.05.005


This document contains 64 references.