Psychology G4250

Evolution of Intelligence, Consciousness & Language (Seminar)

Spring 2015

Monday: 2:10 – 4:00 p.m.

Room 200C Schermerhorn Hall

<table>
<thead>
<tr>
<th>Herbert Terrace</th>
<th>Joshua New</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:hst1@columbia.edu">hst1@columbia.edu</a></td>
<td><a href="mailto:jnew@barnard.edu">jnew@barnard.edu</a></td>
</tr>
<tr>
<td>Office: 418 Schermerhorn</td>
<td>Office: 415A Milbank</td>
</tr>
<tr>
<td>Phone: (212) 854-4544</td>
<td>Phone: (212) 854-3581</td>
</tr>
<tr>
<td>Office Hours: Tuesday 9:30 – 11:30</td>
<td>Office Hours: Wednesday 12:00 – 2:00</td>
</tr>
</tbody>
</table>

Prerequisites: Science of Psychology or Mind, Brain, and Behavior or the equivalent, based on instructor assessment, plus permission of one of the instructors.

Bulletin description: How did language evolve and why are human beings the only species to use language? How did the evolution of social intelligence, in particular, cooperation, set the stage for the origin of language and consciousness? We will explore how psychologists, philosophers, neuroscientists, anthropologists, biologists and computational scientists, among others, have collaborated during recent years to produce important insights in the evolution of intelligence, consciousness and language.

Introduction: Psychologists, philosophers, neuroscientists, anthropologists, biologists and computational scientists, among others, have collaborated during recent years to produce important insights in the evolution of intelligence, consciousness and language. We plan to show how these disciplines have advanced our understanding of these topics.

Full Description of Course: The main focus of this seminar is the general question, how did language evolve and why are human beings the only species to use language? A related question is, how did the evolution of social intelligence, in particular, cooperation, set the stage for the origin of language and consciousness.
Discussions of these questions occurred with increasing frequency during the later half of the 20th century. Key developments were the publication of Chomsky’s Syntactic Structures in 1957, projects that attempted to teach language to chimpanzees, the demise of behaviorism, the emergence of animal cognition in the study of animal behavior and discoveries about the non-verbal abilities of human infants during their first year and by archeologists about species of Homo that followed our separation from chimpanzees about 6 million years ago.

Consider, for example, the Theory of Mind (ToM), which refers to the ability to infer beliefs, desires, emotions and similar states in another individual’s mind. Premack, who coined this term in 1979, attempted, but failed, to find evidence of a ToM in chimpanzees. But evidence of its presence was obtained in experiments on four-year old children. Once the significance of a ToM became clear, it didn’t take long for psychologists to ask if they relied too much on a child’s linguistic sophistication when assessing a ToM and whether it could be profitably studied in younger, non-verbal children.

A related line of research on “attachment” originated in biology. During the mid-70’s, developmental psychologists began to study emotional relationships between a human infant and her mother. They observed that infants, as young as 5 months old, began to acquire a quasi-cultural intelligence, especially in games in which the infant and an adult teased each other. Infants, as young as 3 months, initiated non-verbal conversations with an adult, in which they took turns babbling, sharing eye gaze, grimacing and smiling.

In 1977, Jerome Bruner discovered the remarkable phenomenon of joint attention. He showed that a nonverbal 12-month old infant could direct her caretaker’s attention to an object, say a toy, and to then share that attention. Until the caretaker directed her gaze at the object in question, the infant often looked back and forth between the object and the caretaker. When the caretaker finally gazed at the same object, the infant simply smiled. That indicated that the infant’s sole motive for looking at the object was to share her attention with her caretaker’s, rather than to actually acquire it. From such joint sharing, it is but a small step to naming the object.

In some instances, improvements in technology made a big difference. Since the nineties, it was possible to investigate the memory of human infants and non-human primates in tasks that made use of touch-sensitive video monitors. These and related experiments, showed that human infants and non-human primates can think without language.

Archaeologists have been studying human origins since the discovery of a Neanderthal skeleton in 1856. But many important discoveries in those areas occurred, at an accelerating rate, during the second half of the twentieth century about the origins and the demise of many species that followed the split between chimpanzees and human ancestors, approximately six million years ago.

In that context, Chomsky broke new ground by changing the focus of linguistics from detailed comparisons of the structure of different languages to the abstract nature of all languages. For Chomsky, the goal of linguistics was the discovery of a universal grammar. That concept, which Chomsky argued was innate and uniquely human, has left an indelible stamp on the field of linguistics. His search for a universal grammar is still in progress.
Serendipitously, it appears that a crucial factor in the evolution of language was the unusual investment that human mothers make while caring for their extremely undeveloped and fragile newborn. Until about 6 months, mothers cradle their infants at a distance that turns out to be optimal for the infant to focus on her mother’s eyes. That facilitates the infant’s ability to discriminate her mother’s moods, and to establish a minimal awareness of the difference between her own and her mother’s emotions. Significantly, it also provides a basis for establishing non-verbal exchanges between the mother and her infant. All of those factors, which are uniquely human, must occur before an infant is ready to acquire a verbal language.

**Learning Goals**

A. An understanding of the theory of evolution as applied to behavior and cognition (as opposed to biological structure) by discussing particular examples, e.g., convergent and homologous evolution, exaptation, niche theory, sexual selection, etc.

B. An understanding of cognition in animals and pre-verbal infants, in particular, the concept of representation and to how it can be investigated without the use of language.

C. An understanding of why language is a special form of communication. An understanding of how language differs qualitatively from innate and involuntary forms of animal communication. An understanding of why grammatical complexity is but one of many differences between language and other forms of communication.

D. An understanding of the Theory of Mind and how it might apply to animals and to pre-verbal and verbal children. An understanding of intentionality and how it can be experimentally evaluated.

**Course Role in Departmental Curriculum**

PSYC G4250 is a seminar designed particularly for first year graduate students who are interested in the evolution of cognition, language and consciousness. It is also open to undergraduate seniors who are majoring in Psychology or in Neuroscience and Behavior, and for students participating in the Psychology Postbac Certificate Program. These students will have priority in registration, followed by junior majors followed by non-majors. The course will fulfill the following degree requirements:

- For Psychology Graduate Students, PSYC G4250 will apply toward the “two seriously graded seminars” requirement of the Master’s degree.
- For the Psychology major or concentration in the College and in G.S., for the Psychology minor in Engineering, and for the Psychology Postbac certificate, it will meet the Group I (Perception and Cognition) distribution requirement.
- For the Neuroscience and Behavior joint major, G4250 will fulfill the 5th Psychology requirement: “one advanced psychology seminar from a list approved by the Psychology Department advisor to the program.”
- For Psychology Postbac certificate students, and for Psychology majors who enter Columbia in Fall 2013 or later, it will fulfill the seminar requirement.
• It will meet one term of the social science requirement of G.S., provided that students obtain the necessary permissions and have taken the prerequisite psychology courses. Majors will have priority over students who are taking the course for social science credit.
• For the Barnard Psychology major, it will fulfill the senior seminar requirement.
• For students who obtain prior departmental approval this class will meet one term of the (natural) science requirements of the College and of G.S.

**Required Readings:** The readings each week will be selected by the instructors and seminar leaders.

**Website:** Course-related materials will be made available on Courseworks. These will include the course syllabus, announcements, additional readings in PDF format, and course lectures (when applicable).

**Course Work and Grading**

1. **Seminar planning and presentations.** Each student will serve as a discussion co-leader for two meetings. Typically, each student should confer with a course instructor about the readings they would like to assign at least 3 weeks before their presentation. Prior to each seminar, all students will circulate by email comments and questions for that week’s readings. Using these materials, the co-leaders will create seminar presentations briefly outlining the week’s topic, posing questions that are of the greatest interest, and – where possible – identifying any challenges to the readings’ conclusions. A student’s presentations will count for 35% of the final grade.

   Students electing one of the first few seminars will meet with both instructors to discuss relevant readings beginning with the second week of the seminar. During these discussions, students will (1) decide what readings should be assigned to other students, (2) work on an outline that will be distributed to the other students at the start of their seminar and (3) discuss options for preparing a PowerPoint presentation that covers relevant topics. The same requirements will apply to co-leaders of later seminars, but meetings with instructors will take place at a more leisurely pace.

2. **Emailed discussion points.** Students will submit a set of questions and discussion points about each week’s readings whose aim will be to provide thoughtful directions for class discussion. These should be e-mailed on the Friday preceding each seminar (15% of the final grade).

3. **Discussion during seminar.** Students are expected to attend each class and to be fully prepared to participate in class discussions (15% of the final grade). Preparation will require thoughtful completion of all assigned readings and generation of responses to the co-leaders’ emailed questions and discussion points.

4. **Take home exam.** Each student will be required to submit a take home essay exam at the beginning of the exam period (35% of the final grade). The topics for the essay will be assigned shortly after spring break. The purpose of the take home exam is to provide students with an opportunity to critically evaluate various issues that have been discussed during the seminar. All of the writing of each essay should be original. The length should be 8-10 pages. Grades will be
determined by (1) the clarity of the student’s arguments about the positions they take on each issue, rather than the degree with which they agree with the instructors’ positions (or with anyone else’s) and (2) students’ ability to include information from the assigned readings an from seminar discussions.

**Summary of grade calculation**

1. Seminar presentations 35%
2. Emailed discussion points 15%
3. Discussion during seminar 15%
4. Take home exam 35%

**Academic Integrity**

You will be expected to adhere to the Columbia University principles of academic conduct. In this course, an especially relevant passage from the Faculty Statement on Academic Integrity pertains:

“Scholarship, by its very nature, is an iterative process, with ideas and insights building one upon the other. Collaborative scholarship requires the study of other scholars’ work, the free discussion of such work, and the explicit acknowledgement of those ideas in any work that inform our own. This exchange of ideas relies upon a mutual trust that sources, opinions, facts, and insights will be properly noted and carefully credited.

In practical terms, this means that, as students, you must be responsible for the full citations of others’ ideas in all of your research papers and projects; you must be scrupulously honest when taking your examinations; you must always submit your own work and not that of another student, scholar, or internet agent.”

Go to [https://www.college.columbia.edu/academics/integrity-statement](https://www.college.columbia.edu/academics/integrity-statement) for the full statement.

**Course Attendance**

Your participation in class each week, as presenters and as discussants, constitutes a majority of the grade for the course. Your attendance each week is therefore quite important. Unexcused absences will detract from points you earn for discussion during seminar and emailed discussion points.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
<th>Sub-Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and Overview</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Discussion of Particular Topics</td>
<td>Instructors will summarize possible options for pursuing each topic</td>
</tr>
<tr>
<td>3</td>
<td>Reading Period</td>
<td>All students will use this period to read articles relevant to the discussions they will co-lead. Special attention will be given to students that select one of the first few topics</td>
</tr>
<tr>
<td></td>
<td>Natural Selection</td>
<td>Convergent &amp; homologous evolution; exaptation; sexual selection</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>Human Evolution</td>
<td>Bipedalism; anatomical changes from chimpanzees to <em>Homo sapiens</em></td>
</tr>
<tr>
<td>6</td>
<td>Evolution of Cognition</td>
<td>Modularity, domain-specificity</td>
</tr>
<tr>
<td>7</td>
<td>Social Cognition</td>
<td>Machiavellian Intelligence, Comparative</td>
</tr>
<tr>
<td>8</td>
<td>Theory of Mind</td>
<td>Intentionality, Intersubjectivity</td>
</tr>
<tr>
<td>9</td>
<td>Gaze Following and Perception</td>
<td>Joint Attention</td>
</tr>
<tr>
<td>10</td>
<td>Infant Cognition</td>
<td>Intersubjectivity; non-verbal testing procedures</td>
</tr>
<tr>
<td>11</td>
<td>Evolution of Language</td>
<td>Gesture; non-verbal conversations between infant and her mother</td>
</tr>
<tr>
<td>12</td>
<td>Concepts and Language Learning</td>
<td>Natural kinds, core knowledge, induction, categories</td>
</tr>
<tr>
<td>13</td>
<td>Evolution of Consciousness</td>
<td>Distinction between awareness and consciousness; functions of consciousness</td>
</tr>
</tbody>
</table>

**Readings:** Weekly reading assignments will be chosen by discussion co-leaders, in consultation with the instructors, and will be available on CourseWorks. Recommended readings are listed below, but co-leaders may also draw from other sources.

**Natural Selection:**


**Human Evolution:**


**Evolution of Cognition:**


**Social Cognition:**


Theory of Mind:


**Gaze Following & Perception:**


Infant Cognition:


Evolution of Language:


**Concepts and Language Learning:**


*Evolution of Consciousness:*

Blackmore, S. (2002). There is no stream of consciousness. What is all this? What is all this stuff around me; this stream of experiences that I seem to be having all the time? *Journal of Consciousness Studies*, 9(5-6), 5-6.


Preliminary syllabus. Subject to revision.