

Seminar on the Evolution of Language
PSYC GU4242
3 points

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Tuesdays 2:10-4
Location: 406 Schermerhorn Hall

Office hours: Thursdays 9-10am and other times TBA

Course description: This seminar will consider the evolution of language at the levels of the word and grammar, in each instance, phylogenetically and ontogenetically. Since humans are the only species that use language, attention will be paid to how language differs from animal communication.

Prerequisites: Introduction to linguistics, introduction to psychology, and permission of instructor.

Role of PSYC GU4242 in the Psychology curriculum: GU4242 is a seminar open to graduate students and advanced undergraduate students. It fulfills the following degree requirements.

- For graduate students, it can partially fulfill the seminar requirement for the M.A. or the elective requirement for the M.Phil.
- For undergraduates Psychology majors or concentrators and for students in the Psychology Postbaccalaureate certificate program, it meets the Group I (Perception & Cognition) distribution requirement.
- For Psychology majors and Psychology Postbac students, it fulfills the seminar requirement.
- For undergraduates pursuing the Neuroscience & Behavior major, it fulfills the advanced seminar requirement in the Psychology portion of the major.
- Graduate students in Psychology and junior and senior Neuroscience & Behavior, Psychology, and Linguistics majors will have priority for registration. However, for non-majors in the College and in G.S., GU4242 could count as one term of the natural science requirement, provided the student has taken the prerequisite courses and has instructor permission.

Role of PSYC GU4242 in the Linguistics curriculum: This course can be used to meet the “psychology and biology of language” theme requirement or the elective course requirement for the Linguistics major.

Weekly schedule:

1. January 21	Introduction
2. January 28	Skinner's <i>Verbal Behavior</i>
3. February 4	Chomsky's critique of <i>Verbal Behavior</i>
4. February 11	Darwin
5. February 18	Wallace's Problem
6. February 25	Ape language experiments
7. March 3	Pre-human ancestors: Chimpanzees → Australopithecus
8. March 10	Pre-human ancestors: Homo habilis → Homo sapiens
9. March 24	Cooperative breeding
10. March 31	Intersubjectivity
11. April 7	Joint attention
12. April 14	Phylogenetic and ontogenetic origins of words
13. April 21	Chomsky's theories about the origin of grammar 1
14. April 28	Chomsky's theories about the origin of grammar 2

Grades, on a 100-point scale, will be calculated as follows:

Seminar presentation:	40 points
Seminar participation:	10 points
Written questions on readings:	10 points
Take home exam:	40 points

To ensure that students have an adequate amount of time to prepare their seminar presentations, I will meet with students that chose one of the earlier topics as much as necessary during the first two weeks of the semester.

There will be 14 class meetings. All of the topics will be covered but, in some cases, two students may be assigned to lead a seminar on a particular date. How this works will be determined by students' individual preferences. These will be discussed during the first meeting of the seminar (January 21) and determined by the number of students that actually take the course.

Background reading. Depending on the extent to which a student is familiar with a particular topic, I will assign enough background material to ensure that he/she will be able to lead a discussion of that topic.

Selection of assigned readings for seminar. These readings will be circulated at least one week before each seminar.

Preparation of outline for talk. After deciding which aspects of a particular topic should be highlighted, the student will prepare a 1-2 page outline of his/her seminar.

Annotated bibliography. Each student should select 2-3 readings that were especially helpful for his/her talk and summarize in a short paragraph what was special about that reading. The annotated bibliography should **NOT** be in the format of a book report. Instead, it should provide commentary about the innovation, incisiveness, brilliance, etc. of a particular reading. These bibliographies will be helpful during the preparation of the take-home exam.

Seminar Outline: The leader(s) of each topic will distribute his/her outline at the seminar and be prepared to cover the main points and to also lead the discussion.

Mid-semester evaluation: One day before each seminar, students will be required to submit 1-2 questions about the assigned readings. These questions will be graded on a pass/fail basis and will contribute to the students score on "seminar participation". At the middle of the semester, students' questions will be used to assess their progress in the seminar.

Circulation of Annotated Bibliographies and PowerPoint Presentations: Be sure to circulate an annotated bibliography for your talk on the day on which you present it. These are usually helpful for students preparing their take home exams. For the same reason, it would be helpful to circulate your PowerPoint presentation if you use one.

Please peruse the suggested list of topics that will be covered before we meet on January 21 to make sure that they are what you were expecting. The readings I suggest are intended to show what **might** be relevant for your topic. Feel free to add your own favorites. We will discuss the readings, my suggestions and yours, when we meet to prepare your talk. At that meeting, we will select readings for your talk and those that will be assigned to all members of the seminar.

Take home exam: About 3 weeks before the end of the seminar I will distribute an essay exam about the topics that were discussed in this seminar. The exam will be due one week after final exams begin.

One of biology's great mysteries is how language developed from animal communication. All animals communicate, but only humans use language to communicate. Given the limited overlap between the involuntary expressions of a narrow range of animal emotions and the voluntary exchange of unlimited amounts of information between humans, some scientists refer to the evolution of language as the "hardest problem of science"¹.

Darwin assumed that language had to evolve, like all other biological functions, but he was unable to explain how. Hypotheses that he and others proposed were considered so scientifically weak that the Linguistic Societies of Paris and London banned

discussion of the evolution of language shortly after Darwin published *The Origin of Species*.

That ban was honored for more almost a hundred years. During the middle of the 20th century, however, psychologists, linguists, philosophers and anthropologists have made various proposals about the origin of language. Those proposals will be the main focus of the seminar.

Introduction: Discussion of rationale for each week's topic.

Skinner's *Verbal Behavior*. That book presents the most well-developed account of language by a behaviorist. It attempted to show how verbal behavior differs from other types of conditioned behavior by including the "audience", as compared to the physical world, as a provider of reward. Skinner distinguished the acquisition of words and sentences by treating them, respectively as individual responses and chained behavior. Sentences were examples of chained behavior.

Skinner, B. F. (1957). *Verbal Behavior*. New York

Chomsky's critique of *Verbal Behavior*: That critique was the most serious blow to behaviorism. It was also the start of cognitive psychology. Discussion will begin with the influence of Lashley's criticism of chaining theory, why language cannot be explained by chaining theory, and the distinction between chained behavior and hierarchical control. It will refer to Chomsky's examples of sentence types that can't be explained as chained behavior, for example, embedded sentences and adjacent phrases. Finally, it will explain Chomsky's goals in devising grammars that exceed the limitations of chaining theory, for example, transformational grammar, rules and representation, binding theory and minimalist theory.

Chomsky, N. (1959). A review of Skinner's *Verbal Behavior*. *Language*, 35, 26-58.

Darwin: The theory of evolution, natural selection, mutations, genetic drift and other bases for changes of species. Peculiar to the study of language is the dyad of the speaker and the listener. Another question is, what has to be explained; just the origin of words and grammar, or related factors such as cooperation?

Ayala, F. (2008). Science, evolution and creationism. *Proceedings of the National Academy of Sciences USA*, 105, 3-4.

Dawkins, R. (1976). *The Selfish Gene*. New York, NY, Oxford University Press.

Dennett, D. (1995). *Darwin's dangerous idea*. New York: Touchstone.

Gould, S. J. and R. C. Lewontin (1979). "The spandrels of St. Marco and the Panglossian program: A critique of the adaptationist program." *Proceedings of the Royal Society of London* 205(281-288).

Wallace's problem: Wallace, the co-founder of the theory of evolution, disagreed with Darwin after originally agreeing that biological typically result from natural selection. Wallace

asked why language evolved given that it "was more than nature needs", specifically, how did language insure survival?

Bickerton, D. (2014). *More Than Nature Needs: Language, Mind, and Evolution*. Cambridge, MA: Harvard University Press (Chapter 1).

Levinson, S. (2014). Language and Wallace's problem. *Science*, 344(6191), 1458-1459.

Ape language experiments: Why non-spoken languages were used to train chimpanzees to communicate. Why attempts to teach them a gestural language (American Sign Language) and artificial visual languages failed. The importance of considering imperatives (as opposed to declaratives) and rote-learned sequences as purported instances of language.

Gardner, B. T., & Gardner, R. A. (1969). Teaching sign language to a chimpanzee. *Science*, 162, 664-672.

Premack, D. (1971). Language in chimpanzees. *Science*, 172, 808-822.

Terrace, H. (2019). *Why chimpanzees can't learn language and only humans can*. New York: Columbia University Press. (Chapter 2).

Pre-human ancestors – Chimpanzees → Australopithecus: Chimpanzees are our closest living ancestors. At the start of the ape language experiments, little was known about other ancestors. During the last 40 years, many additional ancestors were discovered. Some are more plausible candidates for originating language than chimpanzees because of the shift from a quadrupedal to a bipedal gait, an increase in brain size, changes in dietary requirements and the beginning of stone tool technology.

Terrace, H. (2019). *Why chimpanzees can't learn language and only humans can*. New York: Columbia University Press. (Chapter 3).

Wood, B. (2005). *Human evolution. A very short introduction*. New York: Oxford University Press.

Pre-human ancestors (continued) – Homo habilis → Homo sapiens: To continue this discussion, we will read selected excerpts from the following texts:

Dawkins, R. (2004). *The ancestor's tale*. New York: Houghton Mifflin.

Klein, R. (1989). *The human career: Human biological and cultural origins*. Chicago: University of Chicago Press.

Lewin, R. (2005). *Human evolution: an illustrated introduction*. Malden, MA: Blackwell.

Cooperative breeding: Most scholars of language evolution recognize that the first use of language, in particular words, presupposed an unusual ability to cooperate. Psychologists and biologists have written extensively about the origin of cooperation, particularly above the level observed in apes. In this seminar, I will focus mainly on Hrdy's view that cooperative breeding was needed to achieve that level of cooperation. With cooperative breeding, a natural mother allows kin, and other peers, to look after a newborn infant, -a practice that is diametrically opposed to that observed in apes, where

a mother wouldn't allow anyone to attend to an infant until she is six months old. Infants reared by collective reading attempt to solicit more care from various mothers (alloparents), as compared to that obtained from a natural mother. Hrdy argues that collective breeding in human ancestors in particular, in *Homo erectus*, was crucial in their learning to share food (a necessary condition for the caloric requirements of their large brains) and, ultimately, in naming food sources that had to be cooperatively scavenged.

Burkart, J. M., Hrdy, S. B., Van Schaik, C. P. (2009). Cooperative Breeding and Human Cognitive Evolution. *Evolutionary Anthropology*, 18, 175-186.

Hrdy, S. (2009, October 10). How humans became such other-regarding apes. Retrieved from <http://onthehuman.org/2009/08/how-humans-became-such-other-regarding-apes/>

Hrdy, S. B. (1999). *Mother nature: A history of mothers, infants, and natural selection*. New York: Pantheon Books.

Hrdy, S. B. (2005). Cooperative Breeders with an Ace in the Hole. In E. Voland, Chasiotis, A., Schiefenhovel, W. (Ed.), *Grandmotherhood: The Evolutionary Significance of the Second Half of Female Life* (pp. 295-311): Rutgers University Press.

Intersubjectivity: Because of a reduction in the size of the pelvis, the volume of the brains of human infants at birth is reduced relative to that of other ancestors. As a result of their limited mobility, human infants have to be cradled until they are six months old. That arrangement allows infants and mothers to gaze into each other's eyes more so than in other primates. That is the basis of an intense exchange of affect between an infant and her mother, starting at birth. As shown by recent research by developmental psychologists, this *dyadic* relation, called intersubjectivity, gives rise to many rhythmic exchanges of sound and bodily movement between mother and infant.

Terrace, H. (2019). *Why chimpanzees can't learn language and only humans can*. New York: Columbia University Press. (Chapter 4, first part)

Joint attention: Once an infant begins to crawl, she comes in contact with many objects in her environment and often picks them up or points to them to draw the attention of a parent. The *triadic* relation between an infant, a parent and an object, gives rise to a cognitive interaction between the infant and her parent which adds to previously established non-verbal interactions established during intersubjectivity. Once an infant and a parent can share attention to an object, it is relatively easy to attach a name to that object. In hindsight, the reason why chimpanzees could not learn to name objects is their lack of a history of intersubjectivity and joint attention.

Bruner, J. S. (1983). *Child's Talk: learning to use language*. New York, NY: W.W. Norton.

Terrace, H. (2019). *Why chimpanzees can't learn language and only humans can*. New York: Columbia University Press (Chapter 4, second part).

Phylogenetic and Ontogenetic Origins of Words: Bickerton was one of the few linguists to specifically address the origin of words and the first to consider Wallace's problem in explaining the evolution of language. His was the most reasonable explanation of the

origin of words (protolanguage) and, hence, the first step in explaining the evolution of language by natural selection. Bickerton's hypothesis about the use of words and scavenging by *Homo erectus* is the only answer to Wallace's problem that depends on natural selection. Other explanations, for example pair bonding, hunting, making tools, etc., fail that test.

Bickerton, D. (2014). *More Than Nature Needs: Language, Mind, and Evolution*. Cambridge, MA: Harvard University Press (Chapters 3 & 4).

Bickerton, D., Szathmary, E. (2011). Confrontational scavenging as a possible source for language

There is general agreement that words evolved before grammar both phylogenetically and ontogenetically. There is also general agreement that initial word learning requires a foundation of intersubjectivity and joint attention. As discussed by Bruner, Bloom, McNamara and Tomasello, initial word learning follows from shared intentionality.

Bloom, P. (2000). *How Children Learn the Meanings of Words*. Cambridge: The MIT Press

Bruner, J. S. (1983). *Child's Talk: learning to use language*. New York, NY: W.W. Norton.

Macnamara, J. (1972). Cognitive basis of language learning in infants. *Psychological Review*, 79(1), 1-13.

Tomasello, M. (1999). *The Cultural Origins of Human Cognition*. London: Harvard University Press

Chomsky's theories about the origin of grammar: There is general agreement that words evolved before grammar both phylogenetically and ontogenetically. There is also general agreement that initial word learning requires a foundation of intersubjectivity and joint attention. As discussed by Bruner, Bloom, McNamara and Tomasello, initial word learning follows from shared intentionality. Chomsky's latest theory, the Strong Minimalist Thesis, reduced grammar to a single operation, *Merge*. That operation allows any two words to be combined. Because of its simplicity, Chomsky argued that it resulted from a mutation, one that occurred about 80,000 years ago. Aside from the biological implausibility of such mutation, the SMT suffers from a variety of problems ranging from its failure to explain the origin of words, which are necessary to create an innumerable large number of sentences which, for Chomsky, is the hallmark of language, and its insistence that the primary function of language is to think, rather than to communicate. Chomsky's approach to language will also be evaluated with respect to his insistence that grammar, whether by mutation or otherwise, had to appear suddenly. That view will be evaluated in the context of recent suggestions that grammar emerged gradually.

Hurford, J. R. (2014). *The Origins of Language, A Slim Guide*. New York: Oxford University Press.

Terrace, H. (2019). *Why chimpanzees can't learn language and only humans can*. New York: Columbia University Press (Chapter 5).

Students with Disabilities: Students with special needs who may require classroom/assignment accommodations should make an appointment with me before or during the first week of class. You should also contact the Office of Disability Services (ODS) in Lerner Hall before the start of the course to register for these accommodations. The procedures for registering with ODS can be found here: <https://health.columbia.edu/services/register-disability-services>

Academic integrity: As members of this academic community, we are responsible for maintaining the highest level of personal and academic integrity: “[E]ach one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity.... The 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... [and] you must always submit your own work and not that of another student, scholar, or internet agent” (from the Columbia University Faculty Statement on Academic Integrity).

¹ Christiansen, M. and S. Kirby (2003). Language Evolution. Oxford, England, Oxford University Press.