

How the Child Discovers Language

Professor Laura Ann Petitto

PSYC25

Winter Term 2011

University of Toronto Scarborough

CLASS TIMES

Tuesdays, 1:00-3:00pm

CLASS LOCATION

New Science Research Building, SY110

PETITTO OFFICE HOURS

Tuesdays, 12:00-1:00pm in SY122

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PETITTO OFFICE LOCATION

New Science Building, SY122

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FINAL EXAM

TBA

TEACHING ASSISTANTS

Kaja Jasinska, Gelareh Jowkar-Baniani, and Anthony Naimi



"When we study human language, we are approaching what some might call the 'human essence,' the distinctive qualities of mind that are, so far as we know, unique to [humans]."

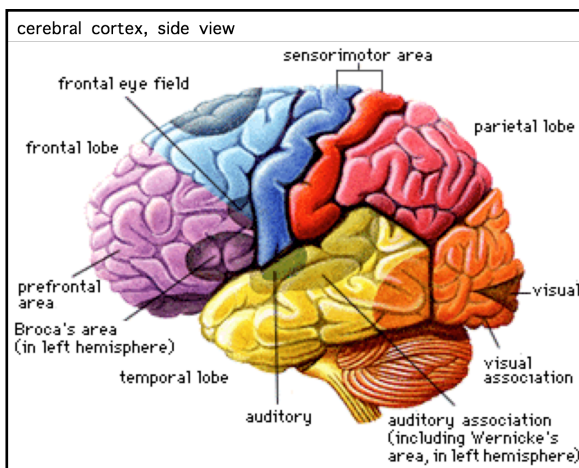
Noam Chomsky, *Language and Mind*

"Language acquisition is the jewel in the crown of cognition. It is what everyone wants to explain."

Steven Pinker, in G. Kolata, *Science*

"The question 'What is language?' is

comparable with - and, some would say, hardly less profound than - 'What is life?'..."
John Lyons, *Language and Linguistics*



COURSE OVERVIEW Human Language is one of the most spectacular of the brain's cognitive capacities, one of the most powerful instruments in the mind's tool kit for thought, and one of the most profound means we as a species use in social, emotional, and cultural communication. Yet the break-neck speed and seemingly "effortless" way that young children acquire Language remain its most miraculous

characteristic. Despite different cultural backgrounds and home rearing environments, all healthy children by around age three and a half have already acquired the basic elements of their native Language. We will discover the *biological* capacities as well as the environmental input and social interaction factors (e.g., family, schooling) that, taken together, make this feat possible. To appreciate the task facing the young child, we will ask what is Language and how is it similar to and different from Communication. We will establish the basic facts of language acquisition, including children's babbling, phonology, early vocabulary, morphology, syntax, semantics, and discourse knowledge, as well as their early gestural, pragmatic and discourse competence. Prevailing theoretical explanations and related research methods will also be explored. We will then leave our hearing-speaking modality and explore the world of language acquisition in total silence—the world of Deaf and hearing children acquiring natural signed languages—as a new window into the factors that are most key in acquiring all human Language. We will dispel myths about bilingual children's acquisition of two Languages. Whenever applicable, we will explore the above through the exciting new lens of the world's most advanced Neuroimaging technologies for looking inside the baby's brain as well as new Genetic polymorphism and Microchip analyses into the genetic foundations of language acquisition in our species.

READINGS Textbook entitled: Hoff, E. (2009/4th Edition). *Language Development*. Belmont, Ca: Wadsworth/Thomson Learning, **in addition** to obligatory readings on Blackboard.



COURSE OBJECTIVES & REQUIREMENTS

The goal of this course is to provide students with a strong understanding of this exciting component of being human: how we acquire language. The primary responsibility of the student in this course is to learn and understand the material covered in the lectures and in the readings. Therefore, it is essential that students attend classes, complete the Thinking Guides, and read all of the assigned material. You will be asked to think about the material, to integrate and *synthesize* the material, and, of course, to understand the material. This will be especially true on the exams.

STUDENTS WITH DISABILITIES

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. The UTSC AccessAbility Services staff (located in S302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

ASSIGNMENTS, EXAMINATIONS, DISTRIBUTION OF GRADING

- ▶ 15% Take Home Assignment (short questions on specific reading given out in class)
- ▶ 35% Midterm (In-class: Analysis of short child language video-clip(s), Short-Answer Questions, plus 1 Essay Question)
- ▶ 40% Final Exam (Analysis of 2 child language scenarios, Multiple Choice Questions, Short-Answer Questions, plus 1 Essay Question)

▶ **10% Class Participation & Attendance:** Students are expected to attend all scheduled classes. If you do the readings, come to class and “participate” (e.g., hand in the *Thinking Guides*, discuss issues, and/or contribute to group discussion) you will do great here; see Thinking Guides discussion below)

Note: Maximum length requirements will be imposed on each assignment/exam item above, and points will be lost if length requirements are not strictly followed.

THINKING GUIDES or “Concept Maps.” I care that you have long-term (life-long) learning in this class (not just short-term, pre-exam cramming/learning). To help me achieve this goal, I have designed the overall structure/sequence of material presented in this course as well as how I present content in each individual class, according to leading discoveries and principles regarding how humans *learn*. Four principles to promote life-long learning include that you actively (i) learn an idea “on-line,” in the situation/context of the very class that you are in, and every day that you are in class, (ii) manipulate (act upon) an idea, (iii) “hear” and consider an idea (as “heard” in reading *and* as “heard” orally in a class lecture) and (iv) discuss and/or manipulate (“act upon”) an idea that was “heard” – which can be achieved through group discussion (as in group-think and/or distributed reasoning) or through writing (e.g., answers, connections, extensions that you make in a Thinking Guide).

Thus, at the beginning of each class, I will hand out “Thinking Guides,” which will contain each individual class’ key points, key constructs, or key goals. The Thinking Guide will provide you with opportunities to “manipulate” (act upon) some of the class’ key concepts. If you fill these in as you listen in class, your ability to retain new concepts and information over time will be increased. Thinking Guides will be collected after each class in lieu of taking attendance, *though they will not be graded*, because, as you will see, you may modify and enhance them during our group discussions. Irrespective of grades, a Thinking Guide is an instrument to help you achieve the gift of life-long learning (my gift to you). All Thinking Guides will be returned to you to keep for future reference in preparation for the exams, and beyond.

Helpful Tip: Further to advancing the above goals, do read carefully this syllabus. Here, too, you will find an invaluable guide to what topics within each assigned reading to pay careful attention to prior to entering the class, as well as what will be the key concepts focused on within each class.

DEADLINES, GRADING AND RE-GRADING POLICY



- i. *Assignment:* Your assignment must be handed in on time.
Late assignments will receive a mark of zero.
- ii. *Tests:* *Extra-ordinary* and extreme care will be devoted to grading all exams fairly and accurately. Thus, there will be no re-grading of exams except for clear calculation errors.
- iii. *Thinking Guides:* Hand in immediately before you leave each individual class. Missed a class? You have one full week from the time of the missed class to hand it in (which you should be able to do based on your readings and/or discussions with classmates).

COURSE OUTLINE

CLASS 1

Jan. 11 Tuesday, Introduction: Why Study Language Acquisition? Overview of Course Topics and Methods of Evaluation

Topics: (1) Why study Language acquisition? What can it tell us about the mind/brain? Brief historical notes regarding L.A., including some critical terminological distinctions in the study of child language: Language *Development* (and Developmental Psychologists) versus Language *Acquisition* (and Developmental Psycholinguists, also called “Child Language”) versus Language *Learning*. Note: This is a course about “Language Acquisition.” Be sure to understand why. We will discuss the role of Cognitive Science & Cognitive Neuroscience in Developmental Psycholinguistics, as well as modern “Developmental Cognitive Neuroscience” experiments investigating early infant language brain tissue. We will also identify contemporary theoretical issues in *Developmental Psycholinguistics* and *Developmental Cognitive Neuroscience* language studies (be sure to understand these issues now, as they will surface repeatedly throughout the course). Further, we will understand language “Competence” versus language “Performance.” (2) Course content overview (also: What’s new in/unique to *this* course?), course content rationale (course designed in ways to optimize life-long learning!), and course requirements (methods of evaluation). To Ponder: How did *you* acquire language?

Reading: i) Fromkin & Rodman (An Introduction to Language), “Part 1: The Nature of Human Language,” and make sure to answer questions at the back of this chapter. And, separately, also read ii) Hoff, Chapter 7

Assignment: You are to answer the questions found at the back of the Fromkin & Rodman Chapter, and be sure to hand in answers (typed) at the end of our next class, January 18 (no late assignments accepted). Rationale for Assignment: To ensure that all students in this class are at the same level of understanding about what is *Language* (i.e., the target capacity that all human children must discover!)

CLASS 2

Jan. 18 Tuesday, What is Language?

Topics: General properties of Language structure and organization; language as a “hierarchically organized system” (know what this term means). The organization of sounds/phonemes (smallest meaningless units) into morphemes (smallest meaningful units), words, phrases, clauses, and sentences. To Ponder: Be able to identify “in the shower” the levels of language organization!

Reading: i) Hoff, Chapter 1. Please read all, and please give attention to section on “*Methods of Research in Language Development.*”

Hand In: EXERCISES from back of Fromkin & Rodman's Chapter due by the end of class. No late exercises accepted.

CLASS 3

Jan. 25 Tuesday, What is Communication? Do apes have Language or Communication?

Topics: Language versus Communication. What's the difference? Talking Apes" What are they really saying? Do apes (and other animals) have "Language?" To Ponder: Are all things that are communicative "Language?" Why?

Reading: i) Terrace, Petitto, Sanders & Bever (1979); and, ii) Seidenberg & Petitto (1979); and, iii) Seidenberg & Petitto (1987).

Returned: EXERCISES from Fromkin & Rodman's Chapter

CLASS 4

Feb. 1 Tuesday, Theoretical Issues in--and Theories of--Language Acquisition

Topics: Nature-nurture issues--role of imitation, reinforcement (and caretaker's input--often referred to as "the motherese hypothesis"); active versus passive learning; role of action in the acquisition of knowledge structures (esp. regarding language); contribution of early cognitive abilities to the acquisition of language (the cognitive or linguistic basis of classification; are their specific linguistic versus general cognitive knowledge structures in acquisition?); are their semantic versus grammatical classificatory principles underlying early acquisition (issues in semantic versus syntactic bootstrapping?); issues of continuity, discontinuity, and reorganization in language acquisition; notion of "constraints" in acquisition; induction and deduction (definition and role in acquisition); "parallel distributed models" of language acquisition (PDP, "connectionism" models) versus rule-based models (role of "rules" in acquisition); "learnability theory" and language development; universals and particulars in language acquisition; principles and parameters approach to language acquisition; other terminology & accounts (e.g., "emergentist"). To Ponder: Know and understand *what is a theory?* Do we need theories? (If so, what do they provide?)

Reading: i) Hoff, Chapter 2; and, (ii) Baker, Michnick-Golinkoff, & Petitto (2006)

CLASS 5

Feb. 8 Tuesday, The Facts of Language Acquisition I (Birth to 12 months)

Topics: Continuation of Theories in Language Acquisition. Methods in Child Language Research. Early period of Language Acquisition: Overview of milestones in child language acquisition. Comprehension versus production asymmetries in language acquisition. Characteristics of the so-called "Pre-linguistic" child. Early gesturing (communicative functions, communicative interactions) even before the baby's first word; is this identical to "Language?" Are words mapped directly onto children's "Pre-linguistic" gestural/communicative base in a one-to-one manner? Nascent beginnings: Pragmatics and Discourse. To Ponder: Is language acquisition achieved in a linear, step-wise manner? What new insights into this question does the existence of natural signed languages provide?

Reading: i) Hoff, Chapter 3 and ii) Hoff, Chapter 4; and, iii) Petitto (1987).

CLASS 6

Feb. 15 Tuesday, The Facts of Language Acquisition II (Birth to 12 months)

Topic: Early period of Language Acquisition. Segmentation of the linguistic stream, "Categorical Discrimination" in infants, Phonological Categories (know what is a

phone/phonetic unit, phoneme/phonemic unit). Statistical learning vs Rule-based learning in babies. And, the very important BABBLING stage in early language acquisition! Having established that domain-specific knowledge must be involved in language acquisition (above), and having identified key constraints underlying early gesture versus language (also above), we will now explore the ontogenetic origins of the language capacity (know what ontogenetic and phylogenetic mean). A prevailing view is that the maturation of the mechanisms for the production & perception of speech & sound determine the time course and content of early language acquisition. Do they? Here we will consider the discovery of babbling on the hands(!) in deaf and *hearing* babies who are exposed to natural signed languages from birth, as well as its implications for our knowledge of the biological foundations of all human language. We will examine this phenomenon using both qualitative and quantitative evidence, especially evidence from state-of-the-art OPTOTRAK 3-D Computer-Graphic motion analyses. To ponder: Think beyond the fact *that* “deaf babies babble too,” to *how* might it be so. If the development of the mouth muscles are not dictating the time course and structure of the babbling stage, then what is? !!

Reading: i) Petitto & Marentette, (1991, *Science*; hand babbling, monolinguals); and ii) Petitto et al. (2001, *Nature*; hand babbling, bilinguals); and iii) Holowka & Petitto (2002; *Science*, mouth babbling); and, iv) Petitto, 2007 (phonological development, infant brain scanning, fNIRS).

Optional Reading: Marcus et al., (1999); and, Saffran, et al., (1996).

Handed Out: Midterm Study Sheet; and “What you now know about children’s language acquisition: PART I”

Optional Attendance: This week there will be a *Pre-Midterm Exam Review* (Time/Place: TBA)

No Class – No Class

Feb. 22 Tuesday, No Class (University Reading Week)

CLASS 7

Mar. 1 * IN CLASS MIDTERM * IN CLASS MIDTERM *

CLASS 8

Mar. 8 Tuesday, The Facts of Language Acquisition III (By 12 months, and beyond)

Topic: “Later” period of Language Acquisition. Learning “names” for things (early word/lexical development). To Ponder: “Constraints” on learning (also “biases” and “predispositions”); what are these terms referring to? What is a “constraint?” Are all word meanings learned entirely through “extension?” (What is “extension” and “intension” – note this latter word has no “t” but an “s” !!)

Reading: i) Hoff, Chapter 5; and ii) Holowka, Brosseau-Lapr e and Petitto (2002)

CLASS 9

Mar. 15, The Facts of Language Acquisition IV (By 18 to 36 months, and beyond)

Topics: “Later” period of Language Acquisition. The acquisition of syntax and morphology. To Ponder: What is a “grammar” anyway? (What previous construct is it like?) Why have there been so many grammars proposed?

Reading: i) Hoff, Chapter 6

Returned: MIDTERM GRADES posted

Optional Attendance: This week there will be a *Post-Midterm Exam Review* (Time/Place: TBA)

CLASS 10

Mar. 22 Tuesday, The Biological Foundations of Language: Children raised without language input – Please don't miss this class. Please make every attempt to be present.

Topic: (1) The Biological Foundations of Language: Eric Lenneberg's 4 Hallmarks of an animal's/human's behavior to be considered a candidate as a biological "trait."

Traditionally, what was the evidence gathered in support of there being a "biological" basis for human language acquisition? (2) One case study on the Biological Foundations of Language: The effects of extreme environmental deprivation – wild children raised by animals and isolated children. The case of "Genie." The "Critical Period Hypothesis" and the "Sensitive Period Hypothesis." What do these phrases refer to? Where do we stand today? (3) The Genetic Foundations of Language: What is the modern understanding of the "biological," "genetic" foundations of language? Why has there been so much excitement about a gene named FOXP2?

To Ponder: Why must we be careful to understand that there is no such thing as "one gene one function?"

Reading: A classic: i) Lenneberg, E. (1967); and, ii) Newport, E.L. (2002); and, iii) Dominguez & Rakic (2009, *Nature*).

CLASS 11

Mar. 29 Tuesday, The Biological Foundations of Language: When the child learns more than one language. Childhood Bilingualism.

Topic: What are the facts of early bilingual language acquisition? Is the young bilingual child "confused" and "delayed?" If not, why not? How is this possible? What mechanisms might exist in the brain to permit multiple language acquisition? To Ponder: Think about what the initial settings in the brain might be to account for the facts of bilingual language acquisition.

Reading: i) Hoff, Chapter 8; and, ii) Petitto et al., 2001; and, iii) Kovelman, Baker, & Petitto, 2008.

CLASS 12

Apr. 5 Tuesday, Please do come to class today. Summary & Integration. How do children acquire Language: The Answer

Topic: Review of term's evidence regarding the key biological and environmental factors that make possible human language. To ponder (the big question): How might language acquisition *begin*?

Reading: i) Hoff, Chapter 9; and, ii) Petitto, 2005; and, iii) Petitto et al., 2000.

Handed out: "Final Study Sheet" (You must come to class to get the sheet), and "What you now know about children's language acquisition: PART II"

Optional Attendance: This week there will be a *Pre-Final Exam Review* (Time/Place: TBA)

Readings Cited Within (In addition to the Hoff textbook)

- Baker, S. A., Michnick-Golinkoff, R., & Petitto, L. A. (2006). New insights into old puzzles from infants' categorical discrimination of soundless phonetic units. *Language Learning and Development*, vol. 2(3), pp.147-162.
- Dominquez, M. H. and Rakic, P. (2009). The importance of being human. *Nature*, vol 462(12), 169-170.
- Fromkin & Rodman (An Introduction to Language), "Part 1: The Nature of Human Language
- Marcus, G. F., Vijayan, S., Bandi Rao, S., and Vishton, P. M. (1999). Rule-learning in seven-month-old infants. *Science*, 283, 77-80.
- Holowka, S. & Petitto, L. A. (2002). Left hemisphere cerebral specialization for babies while babbling. *Science*, vol 297, No. 5586, 1515.
- Holowka, S., Brosseau-Lapr e, F., & Petitto, L.A. (2002). Semantic and conceptual knowledge underlying bilingual babies' first signs and words. *Language Learning*, 52(2), 205-262.
- Kovelman, I., Baker, S.A., & Petitto, L.A. (2008a). Bilingual and Monolingual brains compared: An fMRI investigation of syntactic processing and a possible "neural signature" of bilingualism. *Journal of Cognitive Neuroscience*, 20(1), 153-169.
- Lenneberg, E. (1967). *Biological Foundations of Language*. New York: John Wiley & Sons, Inc., Chapter 4.
- Newport, E.L. (2002). Critical periods in language development. In L. Nadel (Ed.), *Encyclopedia of Cognitive Science*. London: Macmillan Publishers Ltd./Nature Publishing Group.
- Petitto, L.A. (2007). Cortical images of early language and phonetic development using Near Infrared Spectroscopy. In K. Fischer & A. Battro (Eds.), *The Educated Brain*. England: Cambridge University Press, pp. 213-232.
- Petitto, L. A. (2005). How the brain begets language: On the neural tissue underlying human language acquisition. Chapter in J. McGilvray (Ed.), *The Cambridge Companion to Chomsky*. England: Cambridge University Press, pp 84-101.
- Petitto, L.A. Holowka, S., Sergio, L. & Ostry, D. (2001, a). Language rhythms in babies' hand movements. *Nature*, 413, 35-36.
- Petitto, L.A. & Marentette, P. (1991). Babbling in the manual mode: Evidence for the ontogeny of language. *Science*, vol. 251, 1483-1496.
- Petitto, L.A., Katerelos, M., Levy, B., Gauna, K., T etrault, K., & Ferraro, V. (2001,b). Bilingual signed and spoken language acquisition from birth: Implications for mechanisms underlying bilingual language acquisition. *Journal of Child Language*, 28(2), 1-44.
- Petitto, L.A., Zatorre, R., Gauna, K., Nikelski, E. J., Dostie, D., & Evans, A. (2000). Speech-like cerebral activity in profoundly deaf people while processing signed languages: Implications for the neural basis of human language. *Proceedings of the National Academy of Sciences*. December 5, 2000. vol. 97(25), 13961-13966.
- Petitto, L. A. (1987). On the autonomy of language and gesture: Evidence from the acquisition of personal pronouns in American Sign Language. *Cognition*, 27(1), 1-52.
- Saffran, J.R., Aslin, R.N., & Newport, E.L. (1996). Statistical learning by 8-month old infants. *Science*, 274, 1926-1928.

- Seidenberg, M. S., & Petitto, L. A. (1987). Communication, symbolic communication, and language in child and chimpanzee: Comment on Savage-Rumbaugh, McDonald, Sevcik, Hopkins, and Rupert (1986). *Journal of Experimental Psychology, General*, *116*(3), 279-287.
- Seidenberg, M.S., & Petitto, L.A. (1979). Signing behavior in apes: A critical review. *Cognition*, *7*, 177-215.
- Terrace, H.S., Petitto, L.A., Sanders, R.J., & Bever, T.G. (1979). Can an ape create a sentence? *Science*, *206*, 891-902.