

**Syllabus: Psychology 430, Cognitive Science with Lab**  
**Spring term, 1993**

**Instructors:** Steven Keele, Rm 221 Straub, ph. 6-4931  
Dare Baldwin, Rm 483 Straub, ph. 6-4926  
Donna McKeown, Rm 490 Straub, ph. 6-1990

Modern cognitive science is a very diverse field covering many topics of cognition-- perception, memory, language, motor control, attention, decision making and development. Crossed with topics are a diversity of methods for analyzing cognition-- standard psychological approaches involving experimentation, neuropsychological approaches that make use of patient disorders, neuroimaging, animal studies, modelling such as with networks, and the use of development not only as a topic area but as a tool in investigating cognition. It would be impossible to cover all of these in a reasonable way in a set of lectures and labs spanning only one term. The strategy for dealing with breadth in this course is to use a general textbook *Cognition* by Stephen Reed to provide shallow coverage of the many topics of cognitive psychology. The lectures and associated subsidiary readings will be much smaller in breadth, will go into greater depth to provide a stronger flavor of how cognition is approached in detail. Concentrating on fewer topics in lecture also will allow a better opportunity to show how the diverse methods of cognitive science can be employed. Thus, lectures and subsidiary reading analyze aspects of attention and word representation using human experimentation, animal experimentation, patient analyses, and neuroimaging. Language will be analyzed using both the tools of cognitive experimentation and the development of language. Motor control will be analyzed using experimentation, patient analysis, and computer simulation. Laboratory experiences will be structured to show how cognitive experimentation occurs, how development can be exploited, and how simulation can interact with experimentation.

The course will be divided into three main sections. The first section will last approximately 3 weeks, and Keele will be the primary instructor. The second section will last approximately 5 weeks, and Baldwin will be the instructor. The final section, lasting 2 weeks, will again involve Keele.

**Reading:** Text by Stephen Reed, entitled *COGNITION*. Packet of articles available from EMU print shop.

**Exams:** Two midterms (essay) and final (essay). The final might be very brief and might be take home, but the decision has not been made at this time.

**Lecture topics:**

I. On the isolation of cognitive representations and operations: introduces ideas of basic cognitive operations, their measurement, the role of neuropsychology in their validation, and neuroimaging for their localization in the brain.

A. Chronometry and the subtractive technique

1. basic reaction time phenomena
2. Logogen model and the concept of activation over time

B. Theories of attention

1. Historic theories and phenomena
2. Chronometric analyses of attention

C. Word perception

1. Behavioral Methods
2. Neuropsychological Methods
3. Neuroimaging

**II. Categorization, Representation, Language, and Development:** introduces several of the fundamental questions guiding research on human categorization, the nature and structure of mental representations, properties of inferential reasoning, and the nature of linguistic knowledge. Research on cognitive development and language acquisition is examined as a window on the underlying structure of human knowledge.

- A. Categorization
  1. Theories from philosophy
  2. Empirical evidence from psychology
- B. Representation
  1. Analog vs. propositional representations
  2. Modularity
- C. Cognitive development
  1. Acquisition of categories and concepts
  2. Inferential reasoning
- D. First language acquisition
  1. Semantic acquisition
  2. Syntax acquisition

**III. Sequential organization of behavior:** introduces the concept of modularity of mind and the possibility of common processes between diverse tasks such as language and other sequential behavior. Introduces network modelling.

- A. Discussion of Keele and Greenfield articles
- B. Studies of sequencing
- C. Elements of connectionist modelling

### **Reading:**

- I.
  1. Read chapters 1-6 in Reed for section 1 of lecture topics
  2. Schvaneveldt & McDonald
  3. Seyfarth & Cheney
  4. Rayner, et. al.
  5. Schwartz et. al.
- II.
  1. Read chapters 7-11 for section 2 of lecture topics
  2. Johnson-Laird
  3. Lakoff
  4. Markman
  5. Carey
  6. Pinker
- III.
  1. Keele notes
  2. Greenfield

### **Labs:**

- I. For section 1
  1. Degree of processing of irrelevant information.

2. Lexical Decision and priming
3. Lexical Decision: Student extension

**II. For section 2**

1. Mental rotation of images
2. Sentence-picture comparison
3. Infant inferential abilities

**III. For section 3: Connectionist model of sequence learning**