

**Department of Applied Psychology
Arizona State University - Polytechnic**

PSY 560, Fall 2006

Advances in Theoretical Psychology: Modeling Knowledge Structures

Time: Tuesday 6:00-8:50 PM

Place:

Office Hours: Tues. & Thurs. 1:00 – 2:00

Professor: Russell Branaghan

Office: 340E Sutton (Building 140)

Phone:

Email:

Course Description

We will introduce and discuss current challenges, questions, research and theories related to the modeling and use of knowledge structures.

Readings include book chapters that provide reviews of each topic as well as journal articles that report current research findings and methods. Since this course is a seminar, it will focus on discussions of the major themes and findings in the readings.

Course Objectives

- To understand the importance of modeling structural knowledge
- To learn the most common methods for modeling structural knowledge
- To understand the use of network modeling methods in social sciences
- To understand the applications of structural knowledge methods to design and education
- To identify new research topics that might aid in furthering scientific understanding of structural knowledge.

Text Book

Jonassen, D.H., Beissner, K. & Yacci, M. (1993). *Structural Knowledge: Techniques for Representing, Conveying, and Acquiring Structural Knowledge*.

Seminar Leaders

During the first class session, students will select topics for which they would be willing to lead the class. The leader may structure the class any way he or she wants as long as it involves the discussion of the major topic, the readings and any other materials the leader thinks is relevant. Please feel free to consult with me if you have any questions or would like any input about how to structure your discussion.

Term Paper

Each student will write a paper (about 20 pages or so), in APA style. Each student will present a high level summary of his or her paper to the class on December 5th. Each presentation should be roughly 30 minutes in duration. Students may choose to write either a literature review or a research proposal related to modeling knowledge structures.

Grading

Class participation	20%
Session leadership/presentation	30%
Term paper	50%

Date	Topic and Reading	Leader
Aug. 22	Introduction - Textbook Chapter 1.	Branaghan
Aug. 29	Structural Knowledge, Human Expertise and Learning - Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and Acquisition. <i>American Psychologist</i> 49, 8, 725-747. - Day, E. A., Winfred, A. & Gettman, D. (2001). Knowledge structures and the acquisition of a complex skill. <i>Journal of Applied Psychology</i> , 86, 5, 1022-1033. - Cooke, Nancy J; Schvaneveldt, Roger W. Effects of computer programming experience on network representations of abstract programming concepts. <i>International Journal of Man-Machine Studies. Vol 29(4) Oct 1988, 407-427.</i>	Branaghan
Sep. 5	Knowledge Elicitation - Textbook Chapters 2-4. - McDonald, James E; Plate, Tony A; Schvaneveldt, Roger W. Using Pathfinder to extract semantic information from text. In <i>Schvaneveldt, Roger W (Ed). (1990). Pathfinder associative networks: Studies in knowledge organization. (pp. 149-164). xi, 315 pp. Westport, CT, US: Ablex Publishing.</i> - Cooke, Nancy J. (1992). Eliciting semantic relations for empirically derived networks. <i>International Journal of Man-Machine Studies. Vol 37(6), 721-750.</i>	
Sep. 12	Cluster Analysis and Multi-dimensional Scaling - Textbook Chapter 6.	
Sep. 19	OTT - Textbook Chapter 8.	
Sep. 26	Pathfinder - Textbook Chapter 7. - Dearholt, D. W. & Schvaneveldt, R. W. (1990). Properties of Pathfinder Networks. In R. W. Schvaneveldt (Ed.) <i>Pathfinder Associative Networks: Studies in Knowledge Organization</i> . Norwood, NJ: Ablex Press. - Cooke, Nancy Jaworski. Using Pathfinder as a knowledge elicitation tool: Link interpretation. <i>Schvaneveldt, Roger W (Ed). (1990). Pathfinder associative networks: Studies in knowledge organization. (pp. 227-239). xi, 315 pp. Westport, CT, US: Ablex Publishing.</i>	
Oct. 3	Characteristics of Graphs and their Use in Social Sciences - Durso, F. T. & Coggins, K. A. (1990). Graphs in the Social and Psychological Sciences: Empirical Contributions of Pathfinder. In R. W. Schvaneveldt (Ed.) <i>Pathfinder Associative Networks: Studies in Knowledge Organization</i> . Norwood, NJ: Ablex Press. - Henderson, G. R., Iacobucci, D. and Calder, B. J. (1997). Brand Diagnostics: Mapping branding effects using consumer associative networks. <i>European Journal of Operational Research</i> , 111, pp. 306-327.	Branaghan
Oct. 10	Graph Comparison - Goldsmith, T. E. & Davenport, D. M. (1990). Assessing Structural Similarity of Graphs. In R. W. Schvaneveldt (Ed.) <i>Pathfinder Associative Networks: Studies in Knowledge Organization</i> . Norwood, NJ: Ablex Press. - Johnson, Peder J; Goldsmith, Timothy E; Teague, Kathleen W. Similarity, structure, and knowledge: A representational approach to assessment. <i>Nichols, Paul D (Ed); Chipman, Susan F (Ed); Brennan, Robert L (Ed). (1995). Cognitively diagnostic assessment. (pp. 221-249). x, 471 pp. Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.</i> - Goldsmith, Timothy E; Johnson, Peder J; Acton, William H. Assessing structural knowledge. <i>Journal of Educational Psychology. Vol 83(1) Mar</i>	

	1991, 88-96.	
Oct. 17	<p>Applications</p> <ul style="list-style-type: none"> - Paap, K. R. & Roske-Hofstrand, R. J. (1988). Design of Menus. In Helander, M. (Ed.) Handbook of Human-Computer Interaction. North Holland: Elsevier Science Publishers. - Schvaneveldt, Roger W; Beringer, Dennis B; Lamonica, John A. Priority and organization of information accessed by pilots in various phases of flight. <i>International Journal of Aviation Psychology</i>. Vol 11(3) Jul 2001, 253-280. - McDougall, Sine J. P; Curry, Martin B; de Bruijn, Oscar. The effects of visual information on users' mental models: An evaluation of pathfinder analysis as a measure of icon usability. <i>International Journal of Cognitive Ergonomics</i>. Vol 5(1) 2001, 59-84. 	
Oct. 24	<p>Applications</p> <ul style="list-style-type: none"> - d'Apollonia, Sylvia T; Charles, Elizabeth S; Boyd, Gary M. Acquisition of Complex Systemic Thinking: Mental Models of Evolution. <i>Educational Research and Evaluation</i>. Vol 10(4-6) Dec 2004, 499-521. - Davis, Mark A; Curtis, Mary B; Tschetter, Jeffrey D. Evaluating cognitive training outcomes: Validity and utility of structural knowledge assessment. <i>Journal of Business and Psychology</i>. Vol 18(2) Win 2003, 191-206. - Gillan, Douglas J; Cooke, Nancy J. Using pathfinder networks to analyze procedural knowledge in interactions with advanced technology. <i>Salas, Eduardo (Ed). (2001). Advances in human performance and cognitive engineering research. (pp. 125-161). xi, 337 pp. US: Elsevier Science/JAI Press.</i> 	
Oct. 31	<p>Applications</p> <ul style="list-style-type: none"> - Chan, Agnes S; Salmon, David P; Butters, Nelson; Johnson, Shannon A. Semantic network abnormality predicts rate of cognitive decline in patients with probable Alzheimer's disease. <i>Journal of the International Neuropsychological Society</i>. Vol 1(3) May 1995, 297-303. - Chan, Agnes S; Salmon, David P; De La Pena, Jody. Abnormal semantic network for "animals" but not "tools" in patients with Alzheimer's disease. <i>Cortex</i>. Vol 37(2) Apr 2001, 197-217. - Chan, Agnes S; Butters, Nelson; Salmon, David P. The deterioration of semantic networks in patients with Alzheimer's disease: A cross-sectional study. <i>Neuropsychologia</i>. Vol 35(3) Mar 1997, 241-248 - Chan, Agnes S; Butters, Nelson; Salmon, David P; Johnson, Shannon A; et al. Comparison of the semantic networks in patients with dementia and amnesia. <i>Neuropsychology</i>. Vol 9(2) Apr 1995, 177-186. - Paulsen, Jane S; Romero, Ramon; Chan, Agnes; Davis, Amy V; et al. Impairment of the semantic network in schizophrenia. <i>Psychiatry Research</i>. Vol 63(2-3) Jul 1996, 109-121. 	
Nov. 7	<p>Applications</p> <ul style="list-style-type: none"> - Mohammed, Susan; Klimoski, Richard; Rentsch, Joan R. The measurement of team mental models: We have no shared schema. <i>Organizational Research Methods</i>. Vol 3(2) Apr 2000, 123-165. - Cooke, Nancy J; Neville, Kelly J; Rowe, Anna L. Procedural network representations of sequential data. <i>Human-Computer Interaction</i>. Vol 11(1) 1996, 29-68. - Rowe, Anna L; Cooke, Nancy J; Hall, Ellen P; Halgren, Tracy L. Toward an on-line knowledge assessment methodology: Building on the relationship between knowing and doing. [References]. <i>Journal of Experimental Psychology: Applied</i>. Vol 2(1) Mar 1996, 31-47. - Vortec, O. U; Edwards, Mark B; Manning, Carol A. Sequences of actions for individual and teams of air traffic controllers. <i>Human-Computer Interaction</i>. Vol 9(3-4) 1994, 319-343. 	

Nov. 14	Applications <ul style="list-style-type: none"> - Manguno-Mire, Gina M; Geer, James H. Network knowledge organization: Do knowledge structures for sexual and emotional information reflect gender or sexual orientation? <i>Sex Roles. Vol 39(9-10) Nov 1998, 705-729.</i> - Geer, James H. Gender differences in the organization of sexual information. <i>Archives of Sexual Behavior. Vol 25(1) Feb 1996, 91-107.</i> - Gomez, Rebecca L; Schvaneveldt, Roger W; Staudenmayer, Herman. Assessing beliefs about "environmental illness/multiple chemical sensitivity." <i>Journal of Health Psychology. Vol 1(1) Jan 1996, 107-123.</i> - Stephan, Walter G; Ageyev, Vladimir S; Stephan, Cookie W; Abalakina, Marina A; et al. Measuring stereotypes: A comparison of methods using Russian and American samples. <i>Social Psychology Quarterly. Vol 56(1) Mar 1993, 54-64.</i> 	
Nov. 21	Conveying Structural Knowledge <ul style="list-style-type: none"> - Textbook Chapters 13-19. 	Branaghan
Nov. 28	Learning Strategies for Structural Knowledge <ul style="list-style-type: none"> - Textbook Chapters 20-24. 	
Dec. 5	Final Presentations	Everyone

Note: The dates and the readings for particular topics may change depending on our discussions.