

Human Factors Psychology PSY 5370 2006 T-R 12:30-1:50 PSY 201
 Dr. DeLucia Psychology Department, Rm B-8, 742-3711 x259 Office hrs: T-R 12:00-12:30 or by
 appt

Course Summary: The objective of this course is to provide students with problem-solving exercises similar to that required of consultants. Each week, students will try to solve hypothetical design problems in human-factors. The remainder of the course is devoted to discussions of human-factors literature. This course will benefit students of all disciplines.

Required Text: *Human Factors in Engineering and Design* by Sanders and McCormick

**IMPORTANT CLASS MATERIALS ARE POSTED AT WWW4.TLTC.TTU.EDU/PDELUCIA
 STUDENTS ARE EXPECTED TO BRING THESE MATERIALS TO CLASS**

Grading

- * Two exams: 40% of grade
- * Attendance/participation in exercises and discussion: 40% of grade
- * Paper: 20% of grade

Course Outline

Topic 1: Introduction and Background to HF

Topic 2: Research Methods

Night Vision Goggles; Buckling Up; Patient Waiting Times: Discussions of real-world problems

Topic 3: Human-Machine Interaction

Controls and Displays

Topic 4: Health & Medicine I

Topic 5: Human-Machine Interaction

Human-Computer Interaction I & II

Topic 6: Visual Performance and Applied Cognition

Ground Transportation and Locomotion

Telecommunications Interfaces

Teleorobotics; Warnings

Topic 7: Aviation & Aerospace

Accidents; Air Traffic Control

Night Vision Goggles; Military

Topic 8: Virtual Environments

Topic 9: Professional Issues

Human Factors & Ergonomics Society; BCPE; Accreditation; Training & Employment

Topic 10: Health & Medicine II

Topic 11: Ergonomics

Important Dates

10/17, 10/19 No Class (HFES). Take-Home Computational Exercises

? **AeroCare Tour;** 1:00 pm (I-27 to Exit 9; right turn into Westport entrance of airport. Enter North entrance of hangar to communications center in lobby. Greg Gust is Directory of Operations: 725-1111)

10/5 Take-Home Exam #1 Due

11/9 Take-Home Exam #2 Due

12/7 Paper Due

Any student who, because of a disabling condition, may require some special arrangements in order to meet course requirements should contact the instructor as soon as possible to make necessary

accommodations.

(continued)

PSY 5370 Paper Assignment

The purpose of the paper is to relate what you have learned in PYS 5370 to a topic in which you are keenly interested. It also permits you to provide more in-depth coverage of a particular topic than you have time for with the exercises. Essentially, your task is to develop your own Exercise and then complete it as you have done in class.

Components of the paper include: (1) identify a design problem (2) conduct a task analysis (3) discuss the relevant limits and capabilities of human behavior that are critical for the task (4) based on literature on human behavior and human factors, provide recommendations for a better design; list advantages and disadvantages of the new design (5) describe how you would evaluate your design with an experiment.

Remember to justify everything you say with data, literature, etc, etc

The topics are flexible but they must be approved by me; so stop by to discuss it. Possible examples: design of doors (push vs pull), radio controls in car, phone interfaces, copy machine controls, light switches, faucets....

The paper assignment is "open book" (You can use books, notes, etc). However, it is not "open friend" (You must complete it alone).

The paper is due at the end of the semester.

Reading Assignments: Some Guidelines for Preparation

1. Read all of the articles in each week's assignment. Everyone should bring in at least one question or criticism on each reading each week. For each article, write down any terms, procedures, etc that you do not understand.

2. Be able to summarize the article, i.e., what was done and what was found-- even if you don't understand everything. Practice getting the gist, even if you don't get the details.

3. Answer the following questions about each article:

a. What is the problem being addressed in this article?

Examples: General-- How can we design cockpit displays in order to improve performance? Specific-- Should we use stereopsis cues when we design simulations of cockpit displays?

b. What is the specific objective of this article? **Examples:** Will the presence of stereopsis cues reduce reaction time in a target identification task? Will such an effect of stereopsis cues depend on the availability of other depth cues?

c. Is the experimental design appropriate to complete the objective? Apply your knowledge of design. **Examples:** Did everything remain constant across conditions except for stereopsis cues? Was the dependent measure valid? Did the experimenter measure what he/she wanted to measure? Were the statistical analyses appropriate?

d. Are the conclusions or recommendations warranted? Do the data support the conclusions?

Examples: The author recommends using stereopsis cues to improve performance in reading cockpit displays even though the effect of stereopsis accounts for only 1% of the variance, and interacts with viewing distance.

e. What confounds are there? What is wrong with this experiment? What alternative explanations can fit the data? **Examples:** When stereopsis was manipulated, convergence also may have varied.

f. If the article is not empirical but conceptual, determine whether the arguments follow; are they logical? Also, explain why the reading is important for applications--how could you use it to improve on an application?

IMPORTANT: You will be responsible for leading a discussion on an articles each week or every other week. The outline above should help you prepare. Summarize the article and then provide a critique. Allow 20 minutes for each article, including class discussion.

IMPORTANT: Remember that you will READ ALL the articles listed each week so that you can participate in the discussion.

It is permissible to work in teams. For example, two of you may divide the readings for a particular week; each will prepare a detailed summary and analysis of half of the articles and then swap, and then prepare less detailed summaries of the remaining articles. However both will read and be able to discuss **all** of the articles.

****IMPORTANT: You will be graded on your participation and preparation.**

Please do *not* simply read from the article in class.**

Weekly Readings and Other Resources

Some Recommended Background Resources

- A. Boff, K. R., Kaufman, L., & Thomas, J. P. (1986). Handbook of perception and human performance.
- B. Hochberg, J. (1978). Perception. (2nd Ed). On reserve under PSY 4323.
- C. Bruce, V., Green, P. R., Georgeson, M. A. (1996). Visual Perception.
- D. Wickens, C. & Hollands, J. (2000). Engineering psychology and human performance (3rd Ed). Columbus: Merrill.
- E. Proctor, R. & van Zandt (1994). Human factors in simple and complex systems.
- F. Rubin, J. (1994). Handbook of usability testing.
- G. Woodson, W. E., Tillman, B., Tillman, P. (1992). Human factors design handbook.
- H. Kirwan, B. & Ainsworth, L. K. (1992). A guide to task analysis.
- I. Wilson, J. R. & Corlett, E. N. (1995). Evaluation of human work.
- J. Kirwan, B. (1994). A guide to practical human reliability assessment.
- K. Mital, A., et al. (1997). A guide to manual materials handling.
- L. Gawron, V. J. (2000). Human performance measures handbook.
- M. Reason, J. T. (1990). Human Error
- N. Durso, F., et al (2000). Handbook of Applied Cognition.
- O. *Example Journals*: Human Factors (HF), Ergonomics, Journal of Experimental: Applied (JEPA); The International Journal of Aviation Psychology (IJAP); International Journal of Human Computer Interaction; Human Computer Interaction, International Journal of Man-Machine Studies; International Journal of Computer Studies; Presence

Weekly Readings

NOTE: Text chapters are optional and will not be discussed in class, but they are helpful for exercises and exams

8/29

Week #1: Introduction and Background (ALL ARE BACKGROUND READINGS)

Video: *Human Factors Success Stories*

Text: Chapter 1

1. Meister, D. (1999). The history of human factors and ergonomics. pp. 147-161.
2. Chapanis, A. (1991). To communicate the human factors message, you have to know what the message is and how to communicate it. *HFSB*, 34, 1-4.
3. Singleton, W. T. (1994). From Research to Practice. *Ergonomics in Design*, July, 30-34.
4. Human factors specialists' education and utilization: Results of a survey. Washington, D. C.: National Academy Press. pp. 48-69, *and* Education and Training Survey, *HFES Bulletin*, 2004.

9/5

Week #2: Research Methods (ALL ARE BACKGROUND READINGS)

Text: Chapters 2, 22

1. Vicente, K. J. (2002). Ecological interface design: Progress and challenges. *HF*, 44, 62-78. [philosophy]
2. Rogers, W. A., et al. (2001). Analysis of a simple medical device. *Ergonomics in Design*, p. 6-14. [task analysis]
3. Smith, H., et al. (1992). The ergonomic analysis of a trauma resuscitation room. *Health Bulletin*, 50, 252-258. [link analysis]
4. Cooper, J. B., et al. (1978). Preventable anesthesia mishaps: A study of human factors. *Anesthesiology*, 49, 399-406. [critical incident technique]

9/12

Week #3: Human Machine Interaction *Controls and displays*

Text: Chapters 3-7,10-11

(BACKGROUND READING). Kantowitz, Triggs, & Barnes (1990). Stimulus-response compatibility and human factors. pp. 365-388 in Proctor & Reeve, *Stimulus-response compatibility*.

1. Hsu, S., & Peng, Y. (1993). Control/display relationship of the four-burner stove: a reexamination. *HF*, 35, 745-750.

2. Miller, R. J. & Penningroth, S. (1997). The effects of response format and other variables on comparisons of digital and dial displays. *HF*, 39, 417-424.
3. MacDonald, J. A., et al. (2002). Intelligibility of speech in a virtual 3-D environment, *HF*, 44, 272-286.

Week #4: HF in Medicine
Health & Medicine I

9/19

Video: *The Operation*

Text: Chapters 14-16, 20

(BACKGROUND READING). Institute of Medicine (2000). *To err is human: building a safer health care system*. pp. 1-16. Executive summary.

(BACKGROUND READING). Bogner, M. S. (1994). *Human error in medicine*. Ch 1. Introduction.

1. Cao, C. G. G., & Milgram, P. (2000). Disorientation in minimal access surgery: A case study. *Proceedings of the IEA 2000/HFES 2000 Congress*. p. 4-169 to 4-172.
2. Seagull, F. J. & Sanderson, P. M. (2001). Anesthesia alarms in context: An observational study. *HF*, 43, 66-78.

9/26

Week #5: Human Machine Interaction
Human-Computer Interaction I

Text: Chapter 3-7, 10-11

(BACKGROUND READING): Gerhardt-Powals, J. (1996). Cognitive engineering principles for enhancing human-computer performance. *International Journal of Human-Computer Interaction*. 8, 189-211.

1. Rahman, T. & Muter, P. (1999). Designing an interface to optimize reading with small display windows, *HF*, 41, 106-117.
2. Resnick, M. L., & Sanchez, J. (2004). Effects of organizational scheme and labeling on task performance in product-centered and user-centered retail web sites. *HF*, 46, 104-117.
3. Farris, J. S., Jones, K. S., & Anders, B. A. (2002). Factors affecting the usefulness of impenetrable interface element borders. *HF*, 44, 578-591.

10/3

Week #6: Human Machine Interaction
Human-Computer Interaction II

Text: Chapters 3-7, 10-11

1. Yeh, M., Merlo, J. L, Wickens, D., Brandenburg, D. L. (2003). Head up versus head down: The costs of imprecision, unreliability, and visual clutter on cue effectiveness for display signaling. *Hf*, 45, 390-

407.

2. Stern, S. E., et al (1999). The persuasiveness of synthetic speech versus human speech. HF, 41, 588-595.

3. Meyer, J., Shinar, D., Bitan, Y. & Leiser, D. (1996). Duration estimates and users' preferences in human-computer interaction. Ergonomics, 39, 46-60.

10/10

Week #7: Visual Performance & Applied Cognition

Ground Transportation and Locomotion

Text: Chapters 3-5, 14, 20-21

1. Tyrrell, R. A., Patton, C. W., & Brooks, J. O. (2004). Educational interventions successfully reduce pedestrians' overestimates of their own nighttime visibility. HF, 46, 170-182.

2. Scharine, A. A., & McBeath, M. K. (2002). Right-handers and americans favor turning to the right. HF, 44, 248-256.

3. Lee, J. D., McGehee, D. V., Brown, T. L., & Reyes, M. L. (2002). Collision warning timing, driver distraction, and driver response to imminent rear-end collisions in a high-fidelity driving simulator. HF, 44, 314-334.

OR

4. Lee, J., Caven, B., Haake, S. & Brown, T. (2001). Speech-based interaction with in-vehicle computers: The effect of speech-based e-mail on drivers' attention to the roadway. HF, 43, 631-640.

10/17

Week #8: Visual Performance & Applied Cognition

Telecommunication Interfaces

10/17, 10/19 HFES ANNUAL MEETING

self-directed discussion; take-home exercises

Text: Chapters 3-7

Recommended: Fussell, S. R., Benimoff, N. I. (1995). Social and cognitive processes in interpersonal communication: Implications for advanced telecommunications technologies. HF, 37, 228-250.

1. Driskell, J. E., & Radtke, P. H. (2003). The effect of gesture on speech production and comprehension. HF, 45, 445-454.

2. Moon, Y. (1999). The effects of physical distance and response latency on persuasion in computer-mediated communication and human-computer communication. JEPA, 5, 379-392.

3. Thorn, F. & Thorn, S. (1996). Television captions for hearing-impaired people: A study of key factors that affect reading performance. HF, 38, 452-463.

OR

4. Rudmann, D. S., McCarley, J. S., & Kramer, A. F. (2003). Bimodal displays improve speech comprehension in environments with multiple speakers. HF, 45, 329-336.

10/17 NO CLASS (HFES MEETING): Take-home computational exercises (on reserve)**10/24** **Week #9: Visual Performance & Applied Cognition**
Teleorobotics; Warnings (Tues)

Text: Chapters 3-7, 9-10

1. Massimino, M. J., & Sheridan, T. B. (1994). Teleoperator performance with varying force and visual feedback. HF, 36, 145-157.
2. Edworthy, J., Hellier, E., Morley, N., Gray, C., Aldrich, K., & Lee, A. (2004). Linguistic and location effects in compliance with pesticide warning labels for amateur and professional users. HF, 46, 11-31.
3. Hellier, E., Edworthy, J., Weedon, B., Walters, K., & Adams, A. (2002). The perceived urgency of speech warnings: Semantics versus acoustics. HF, 44, 1-17.

10/31 **Week #10: Aviation & Aerospace**
Accidents; Air Traffic Control

Text: Chapter 20

1. Durso, F. T., Batsakes, P. J., Crutchfield, J. M., Braden, J. B., & Manning, C. A. (2004). The use of flight progress strips while working live traffic: frequencies, importance, and perceived benefits. HF, 46, 32-49.
2. Kraft, C. L. (1978). A psychophysical contribution to air safety: simulator studies of visual illusions in night visual approaches. In H. L. Pick, H. W. Leibowitz, J. E. Singer, Steinschneider, A., & Stevenson, H. W. (Eds.), *Psychology from research to practice*. NY: Plenum, pp. 363-385.
3. Metzger, U., & Parasuraman, R. (2001). The role of the air traffic controller in future air traffic management: An empirical study of active control versus passive monitoring. HF, 43, 519-528.
OR
4. Wilson, G. F., & Russell, C. A. (2003). Operator functional state classification using multiple psychophysiological features in an air traffic control task. HF, 45, 381-389.

11/7 **Week #11: Aviation & Aerospace**
Night Vision Goggles; Military

Text: Chapters 3-5

(BACKGROUND READING). National Research Council (1997). *Advanced technology for human support in space*. pp. 1-9 Executive summary. Chapt 5. *Space Human Factors*

1. Niall, K. et al. (1999). Distance estimation with night vision goggles: A little feedback goes a long way. HF, 41, 495-506.
2. DeLucia, P. R. (1999). Critique of "Distance estimation with...", HF, 41, 507-510.

3. Niall, K., (1999). The art of descreying distance. HF, 41, 511-514.

11/14

Week #12: Virtual Environments
Recommended: Tour of Virtual Reality Theatre at Reese Center

Text: Chapters 3-6

(BACKGROUND READING). National Research Council (1995). Virtual Reality. pp. 1-9. Executive Summary. pp. 395-413: Applications.

1. Bakker, N. H., Passenier, P. O., & Werkhoven, P. J. (2003). Effects of head-slaved navigation and the use of teleports on spatial orientation in virtual environments. HF, 45, 160-169.
2. Witmer, B. W. & Sadowski, W. J. (1998). Nonvisually guided locomotion to a previously viewed target in real and virtual environments. HF, 40, 478-488.
3. Draper, M. H., et al. (2001). Effects of image scale and system time delay on simulator sickness within head-coupled virtual environments. HF, 43, 129-146.

11/21

Week #13: Professional Issues
(NO CLASS THURSDAY)

Video: *Human Factors and Ergonomics: The Profession and the Society*

(BACKGROUND READING). Meister, D. (1999). The history of human factors and ergonomics. Ch 8.

(BACKGROUND READING). National Research Council (1995). Emerging needs and opportunities for human factors research. pp. 1-10. Executive Summary.

1. Shapiro, R. G. (1994). What is it like working in industry? IBM.
2. Lovvoll, D. R. (1997). 1997 HFES Salary Survey. HF, 40, 1-3.
3. Shapiro, R. G. et al (1995). Preparing for the human factors/ergonomics job market. Proceedings of the HFES 39th Annual Meeting, 1-11.

11/28

Week #14: HF in Medicine
Health & Medicine II

Text: Chapters 14-16, 20

(BACKGROUND READING). Helmreich & Schaefer. Team performance in the operating room. Chapt 12 in Bogner.

1. Mykityshyn, A. L., Fisk, A. D., & Roghers, W. A. (2002). Learning to use a home medical device: Mediating age-related differences with training. HF, 44, 354-364.
2. Ho, G., Scialfa, C., Caird, J. & Graw, T. (2001). Visual search for traffic signs: The effects of clutter,

luminance, and aging. HF, 43, 194-207.

3. Sharit, J., Czaja, S. J., Nair, S., & Lee, C. C. (2003). Effects of age, speech rate, and environmental support in using telephone voice menu systems. HF, 45, 234-251.

OR

4. Rogers, W. A., Cabrera, E. F., Walker, N., Gilbert, D., & Fisk, A. D. (1996). A survey of automatic teller machine usage across the adult life span. HF, 38, 156-166.

12/5

Week #15: Ergonomics

Video: *Five Days at IDEO. Redesign of the shopping cart.*

Text: Chapters 8-19

1. Sommerich, C. M., et al. (2001). Effects of computer monitoring viewing angle and related factors on strain, performance, and preference outcomes. HF, 43, 39-55.

2. Cham, & Redfern, M. (2001). Effect of flooring on standing comfort and fatigue. HF, 43, 381-391.

3. Simeonov, P. I., Hsiao, H., Dotson, B. W., & Ammons, D. E. (2003). Control and perception of balance at elevated and sloped surfaces. HF, 45, 136-147.

SUPPLEMENTARY READINGS (NOT REQUIRED, BUT USEFUL FOR EXERCISES)

* denotes articles that are at the reserve desk in the "recommended" binders

Week #1: Introduction and Background

* Vicente, K. J. (1997). Heeding the legacy of Meister, Brunswik, and Gibson: Toward a broader view of human factors research. *HF*, 39, 323-328. [philosophy]

* Meister, D. (1999). The history of human factors and ergonomics. Chapt 1.

Chapanis, A. (1999). The Chapanis chronicles.

* Fisher, D. L. (1992). Cassandra and pollyana: Theory and practice in human factors. *Insight*, 14, 1-3.

* Hoffman, R. R., & Deffenbacher, K. A. (1990). A brief history of applied cognitive psychology. *Applied Cognitive Psychology*.

Rouse, W. B., & Boff, K. R. (1998). Packaging human factors for designers. *Ergonomics in Design*, January 11-17

Shapiro, R. G. (199?). Preparing for a career in human factors/ergonomics: A resource guide. *HFES*.

Leibowitz, L. (1996). The symbiosis between basic and applied research. *American Psychologist*, 51, 366-367.

* Howell, W. (1997). Testimony presented to the US Senate Committee on Appropriations Subcommittee on Defense on the subject of the Fiscal Year 1998 Appropriations for the Department of Defense. June.

Week #2: Methods, Human Processes

Hoffman, R. R., Crandall, B., & Shadbolt, B. (1998). Use of the critical decision method to elicit expert knowledge: A case study in the methodology of cognitive task analyses. *HF*, 40, 254-276.

Payne, D. G. & Blackwell, J. M. (1997). Toward a valid view of human factors research: Response to Vicente (1997). *HF*, 39, 329-331.

* Hendrick, H. W. (1997). Good ergonomics is good economics. *Ergonomics in Design*, 5 (insert)

* Chapanis, A. (1949). How we see. In his book. pp. 67-117.

* Chapanis, A. (19?) *Research Techniques in Human Engineering*. Pub: pp. 253-277. (Chapter 7: The psychophysical methods).

Foley, P., & Moray, Neville (1987). Sensation, perception, and systems design. In *the Handbook of Human Factors*.

* McNicol, D. (19) The use of signal detection theory in the evaluation of information displays. In R.

Easterby, & Zwage, H. (Eds.), Information design, NY: Wiley. pp. 91-98 only.

* Wickens, C. D. (1987). Information processing, decision-making, and cognition. In the Handbook of Human Factors, pp. 73-101.

Week #3: Human Machine Interaction: Controls & displays, auditory and speech devices

Haigh, R., & Rogers, A. (1994). Usability solutions for a personal alarm device. Ergonomics in design. July, pp. 16-21. (excellent example of approach)

Nelson, W., Bolia, R., & Tripp, L. (2001). Auditory localization under sustained +Gz acceleration. HF, 43, 299-309.

* Mumaw, R. J., et al. (2000). There is more to monitoring a nuclear power plant than meets the eye. HF, 42, 36-54.

* Payne, S. J. (1995). Naive judgments of stimulus-response compatibility. HF, 37, 495-506.

Barfield, W., Cohen, M., & Rosenberg, C. (1997). Visual and auditory localization as a function of azimuth and elevation. IJAP, 7, 123-138.

* Begault, D. R., & Wenzel, E. M. (1993). Headphone localization of speech. HF, 35, 361-376.

Caelli, T. & Porter, D. (1980). On difficulties in localizing ambulance sirens. Human Factors, 22, 719-724.

Endsley, M. R., Armida, R. S. (1995). Auditory localization for spatial orientation. Journal of Vestibular Research: Equilibrium & Orientation, 5, 473-485.

Gilson, R. D., Deaton, J. E., & Mouloua, M. (1996). Coping with complex alarms. Ergonomics in Design, 4, 12-18.

* Hellier, E. J., Edworthy, J., & Dennis, I. (1993). Improving auditory warning design: quantifying and predicting the effects of different warning parameters on perceived urgency. HF, 35, 693-706.

Massaro, D. W. & Stork, D. G. (1998). Speech Recognition and sensory integration. American Scientist, 86, 236-244.

* Seminara, J. L. (1993). Taking control of controls. Ergonomics and Design, July, 21-25.

Week #4: Human Machine Interaction: Computer Design I

* Obradovich, J. H. & Woods, D. D. (1996). Users as designers: How people cope with poor HCI design in computer-based medical devices. HF, 38, 574-592.

* Harwood, K., & Foley, P. (1987). Temporal resolution: An insight into the video display terminal (VDT) "problem" HF, 29, 447-452.

* Shinar, D. & Stern, H. I. (1987). Alternative option selection methods in menu-driven computer programs. HF, 29, 453-460.

- * Lansdale, M. W. (1988). On the memorability of icons in an information retrieval task. *Behavior & Information Technology*, 7, 131-151.
- * Thomson, W. D. & Saunders, J. (1997). The perception of flicker on raster-scanned displays. *HF*, 39, 48-66.
- * Scott, D. (1993). Status conspicuity, peripheral vision, and text editing. *Behavior & Information Technology*, 12, 23-31.
- * Anderson, N. S., & Olson, J. (1985). Methods for designing software to fit human needs and capabilities. *Proceedings of the workshop on software human factors*. Washington, D. C.: National Academy Press.
- * Eberts, R. (1987). Human computer interaction. In P. A. Hancock (Ed.) *Human factors psychology*. pp. 249-304.
- Endsley, M. R. (1995). Measurement of situation awareness in dynamic systems. *HF*, 37, 65-84.
- Guastello, S.J., Traut, M. & Korienek, G. (1989). Verbal versus pictorial representations of objects in a human-computer interface. *International Journal of Man-Machine Studies*, 31, 99-120.
- * Helander, M. (1988). (Ed.). *Handbook of Human Computer Interaction*.
- * Sweeney, M., Maguire, M., & Shackel, B. (1993). Evaluating user-computer interaction: A framework. *International Journal of Man-Machine Studies*, 38, 689-711.
- Week #5: Human Machine Interaction: Computer Design II
- Marklin, R. W., et al. (1999). Wrist and forearm posture from typing on split and vertically inclined computer keyboards. *HF*, 41, 559-569.
- Phillips, J., Triggs, T., & Meehan, J. (2001). Cursor orientation and computer screen positioning movements. *HF*, 43, 435-442.
- * Schumacher, R. B., Hardzinski, M. L., & Schwartz, A. L. (1995). Increasing the usability of interactive voice response systems: Research and guidelines for phone-based interfaced. *HF*, 37, 251-264.
- * Ziefle, M. (1998). Effects of display resolution on visual performance. *HF*, 40 (4), 554-568.
- Gillan, D., Holden, K., Adam, S. & Rudisill, M. (1992). How should Fitts' law be applied to human-computer interaction? *Interacting with computers*, 4, 289-313.
- Helander, M. G. (1987). Design of visual displays. In *Handbook of Human Factors*., pp. 507-546.
- Lansdale, M. W., Scrivener, S. A. R., & Woodcock, A. (1996). Developing practice with theory in HCI: Applying models of spatial cognition for the design of pictorial databases. *International Journal of Human Computer Studies*, 44, 777-799.
- Pastoor, S. (1990). Legibility and subjective preference for color combinations in text. *HF*, 32, 157-172.

* Wickens, C. D., Merwin, D. F., & Lin, E. (1994). Implications of graphics enhancements for the visualization of scientific data: dimensional integrality, stereopsis, motion, and mesh. *HF*, 36, 44-61.

Woods, D. D. (1984). Visual momentum: A concept to improve the cognitive coupling of person and computer. *International Journal of Man-Machine Studies*, 21, 229-244.

Week #6: Visual Performance and Applied Cognition, Automobile Safety

Cavallo, V., Colomb, M., & Dore, J. (2001). Distance perception of vehicle rear lights in fog. *HF*, 43, 452-461.

Taieb-Maimon, M. & Shinar, D. (2001). Minimum and comfortable driving headways: Reality versus Perception. *HF*, 43, 159-172.

Shinar, D. (1985). The effects of expectancy, clothing reflectance, and detection criterion on nighttime pedestrian visibility. *HF*, 27, 327-333.

* Shinar, D. (2000). Fleet study evaluation of an advance brake warning system. *HF*, 42, 482-488.

* Ranney, T. A., et al. (2000). The immediate effects of glare and electrochromic glare-reducing mirrors in simulated truck driving. *HF*, 42, 337-347.

* Gugarty, L. (1998). Evidence from a partial report task for forgetting in dynamic spatial memory. *HF*, 40, 498-508.

* Zeitlin, L. R. (1995). Estimates of driver mental workload: A long-term field trial of two subsidiary tasks. *HF*, 37, 611-621.

* Matthews, G. et al (1998). Driver stress and performance on a driving simulator. *HF*, 40, 136-149.

Higgins, K. E., Wood, J. & Tait, A. (1998). Vision and driving: Selective effect of optical blur on different driving tasks. *HF*, 40, 224-232.

Brand, J. L. (1998). Driver out of the loop? *Ergonomics and Design*, January, 26-31.

Dewar, R. (1993). Warning: Hazardous road signs ahead. *Ergonomics and Design*, July, 26-32.

Gugerty, L. J. (1997). Situation awareness during driving: explicit and implicit knowledge in dynamic spatial memory. *JEPA*, 1, 42-66.

* Malliaris, A. C., Nicholson, R. M., Hedlund, J. H., & Scheiner, S. R. (1983). Problems in crash avoidance and in crash avoidance research. In *Crash Avoidance Sp-544 (TR 830-560): Proceedings of the International Congress & Exposition*. pp. 1-20.

* McKnight, A. J., & Shinar, D. (1992). Brake reaction time to center high-mounted stop lamps on vans and trucks. *HF*, 34, 205-214.

* Owens, D. A., Antonoff, R. J., & Francis, E. L. (1994). Biological motion and nighttime pedestrian conspicuity. *HF*, 36, 718-733.

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