Cal-(IT)^2 Seminar
Dr. Ewin Boer
Nissan
January 28, 2002

BEHAVIORAL VARIABILITY IS MORE THAN JUST NOISE: THE MEANING OF BEHAVIORAL ENTROPY

This talk can viewed at: http://earth.ucsd.edu:8080/ramgen/calit2/boer.smi

ABSTRACT
Optimality is meaningful in reference to specifications. Satisfaction is meaningful in reference to operations. Human operator performance is generally quantified in reference to an optimal standard. Whereas this approach has proven highly successful in the aviation domain with highly trained and well motivated operators, its generalization to other domains such as driving offers limited success. The source of this disconnect between our ability to model and quantify pilot and driver behavior is the degree to which noise can explain deviations from normative performance as well as the degree to which the assumption of stable normative performance is warranted. Pilots are well characterized by a relatively stable normative model and any deviations between model predictions and observable pilot behavior are well captured by perceptual and motor control noise. Drivers exhibit behavioral variability beyond what can be reasonably explained by perceptual and motor control limitations. This shortcoming in our modeling formalism calls for an augmented approach to characterize human operator functioning. Satisficing decision theory (SDT) offers a mathematical formalism in which certain performance measures are deemed acceptable if they exceed certain aspiration levels while simultaneously other performance measures do not drop below certain rejection levels. By modeling drivers using SDT, performance variability is no longer only tied to the lowest operational level in the hierarchy of human behavior but also to the tactical and strategic levels. This approach leads to a more integrated understanding of driver functioning and to more accurate and practical performance metrics.

In this presentation, Boer will present the satisficing modeling framework and use it to motivate the use of behavioral entropy as a measure of driver performance that captures how drivers respond to non-satisficing situations. This work is presented in the context of his current research focus: the design of human centered intelligent driver support systems.

BIOGRAPHY
Erwin Boer has been active in the area of human-machine-interaction (HMI) since 1990 when he received his "Ingenieurs" degree in Electrical Engineering from Twente University of Technology in The Netherlands. He continued his research activities in the aviation domain at the University of Illinois in Chicago where he received his Ph.D. in Electrical Engineering in 1995. During that time he also began working as a data visualization specialist at the Center for Clouds Chemistry and Climate at Scripps Institution of Oceanography at the University of California in San Diego. He continues to be closely involved in a number of their research and data integration activities today. He broadened his research focus to the driving domain when he joined Nissan's Cambridge Basic Research in Cambridge Massachusetts as a research scientist in 1995. There he primarily focused on driver modeling, human centered automation, situation and driver adaptive human machine interaction, as well as the quantification of driver distraction, fatigue, and vigilance. In the spring of 2001, he joined Wingcast to lead their human factors team to explore Telematics related driver distraction issues in an effort to guide the design of safer human machine interaction systems. In December 2001, Nissan offered Dr. Boer the opportunity to conduct, direct, and facilitate Nissan supported research in the area of intelligent driver support systems at a number of free-to-choose universities worldwide. To initiate this multi-disciplinary effort, he started his own consulting company in January 2002 and is currently working closely with universities in the US, the Netherlands, and Japan.