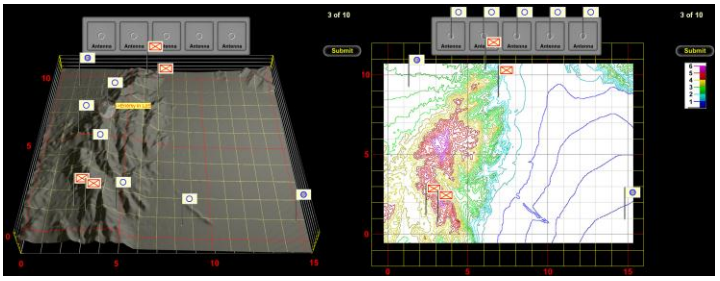
3D Displays and Naïve Realism

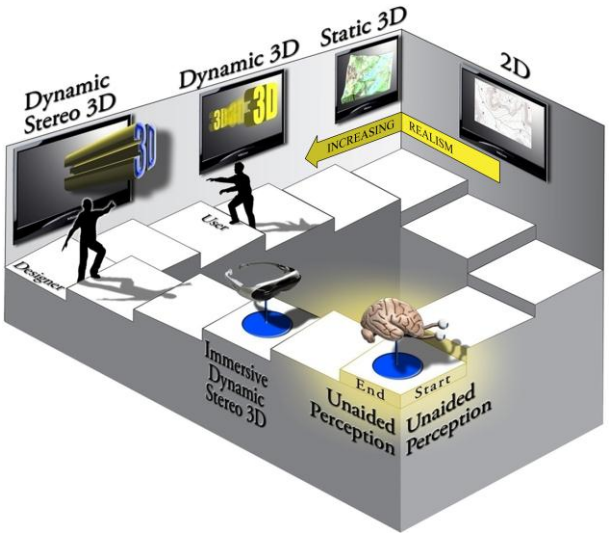
PROGRAM DESCRIPTION

This award winning, research project investigated (1) when to use and when not to use 3D displays for command and control tasks, (2) what symbology should populate 3D displays, (3) why and when people misinterpret 3D displays, and (4) why some people still prefer 3D displays, in spite of performing certain tasks consistently worse with them.



OPERATIONAL GAP

Many command and control tasks require geospatial situation awareness. 3D displays of many varieties are increasingly viewed as the display of choice for vividly portraying space and the objects within it. But do 3D displays actually improve task performance?



VALUE TO THE WARFIGHTER

Understanding when to use 3D displays and when to use well designed 2D displays can lead designers to displays that are effective for each task at hand. Grounding this understanding in the mechanisms of perception places design on a firm footing. Identifying why 3D displays appeal to which users, when and why, enables the smart application and training of new 3D display technology.

APPROACH

Using both field observations, controlled laboratory studies and research expertise in human vision, we empirically investigated 2D and 3D displays across a wide range of tasks, 2D and 3D interface designs, and display manipulation tools. We investigated display design principles, the perceptual and cognitive sources of misperceptions, naïve user preferences, and the role of individual differences in spatial ability in these effects.

RESULTS

Academically, the project has resulted in numerous journal articles and conference papers, including the 2002 Ely award for *Human Factors* journal article of the year that have been cited hundreds of times. The work has led to the development of a framework for pairing 2D and 3D display format to task type (2D for relative position; 3D for shape understanding). We developed a quantitative, *Cross-Scaling* model to predict misperception of 3D views, and we created a *Naïve Realism* theory to explain user intuitions about 3D views. In application, our new *Symbicons* – caricatured realistic icons – are part of the DoD's MIL-STD2525C, and are the topic of ongoing research by FAA and other agencies.

This effort is funded by a series of research contracts from the Office of Naval Research.