Exocentric Distance Judgments in Computer Generated 2D Images
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Introduction:

- The quality and detail of computer graphics has been shown to influence distance judgments in interactive virtual environments
- Kunz, et al. (2009) found that the quality of graphics influenced the accuracy of distance judgments in a 3-dimensional virtual environment
- Cue Theory states that we combine depth cues (such as texture and shadows) in order to perceive depth (Cutting and Vishton, 1995)
- High quality graphics include important depth cues such as shadows and surface textures that may be missing in low quality graphics
- The importance of shadows as a depth cue was demonstrated in a study by Hu, et al. (2002) that suggests that the presence of shadows improved spatial judgment accuracy in interactive 2D images
- The proposed experiment will investigate whether distance judgments between objects (exocentric) are more accurate in a high quality graphics condition than a low quality condition

Method:

- Overview: Participants will view a high or low quality computer-generated versions of the desktop and objects shown below. They will be asked to judge the distances between objects depicted in the computer-generated scenes.
- Materials: Each scene will consist of a computer-generated desktop and 5-10 computer-generated objects positioned on the desktop in various arrangements
- Two conditions:
  - High quality scene
    - Shadow information
    - Correct texture information
  - Low quality scene
    - No shadows
    - Incorrect textures
- Procedure: For each trial, participants will:
  - View a high or low quality scene
  - Be prompted to judge the distance between two objects
  - Verbally report the perceived distance using an arbitrary, standard unit
- Eye tracking during the task will provide information about which visual cues are most utilized when making distance judgments

Predictions:

- Shadow and texture information are useful distance cues in 2-dimensional computer-generated images
- Distance judgments will be more accurate when shadow and texture depth cues are available (high quality condition)
- Participants will fixate more often and longer on shadows, when available

Implications and Future Directions:

- The predicted results will demonstrate the importance of shadows and textures for accurate perception of spatial layout in 2D computer-generated images
- Accurate perception of spatial layout in computer-generated images is important for:
  - Architecture/design
  - Interpreting satellite imagery
  - Medical Field
- Future studies will investigate the roles of other depth cues (e.g. familiar size, height in the picture plane) in perceiving spatial layout in computer generated images

References:

