CUE COMBINATION OF VISUAL LANDMARKS AND PATH INTEGRATION IN HUMAN SPATIAL POSITIONING

Lei Zhang
Doctoral Candidate, Virtual Environments and Spatial Cognition Lab
Department of Psychology

Friday, November 3
3:00 PM - 4:30 PM
BS P - 319 N

Previous studies showed that visual landmarks and path integration (PI) cues, due to movement, jointly determine human homing behaviors. This study investigated whether the interaction of these two cues occurs in individuals' homing or in estimating positioning (position/heading) that then determines homing. In Experiment 1, the participants learned the locations of five objects (one located at the learning position) in the presence of distal landmarks before walking a two-leg path without viewing the landmarks and objects. At the end of the path, the participants replaced the objects in four cue conditions: 1) PI cue only (PI), 2) landmarks only (LM) where the participants were disoriented and the landmarks reappeared, 3) both the PI cue and the reappearing landmarks (BO), and 4) both the PI cue and conflicting landmarks rotated 45° (CO). The participants' heading, position, and homing estimations were calculated from the response locations of the objects. The ratio of the length of the second leg to that of the first leg (L2/L1) could be 0.5, 1, or 2. The results showed evidence of cue combination in heading estimations in all leg ratios, but evidence of cue combination in homing estimations only occurred in the leg ratio of 0.5. The following experiments, using the leg ratio of 2 only, demonstrated that there was no evidence of cue combination in homing estimation in a typical homing task where the participants walked paths and pointed to the origin without learning the objects (Experiment 2). However, there was evidence of cue combination in heading estimations rather than in homing estimations when proximal landmarks replaced distal landmarks (Experiments 3 and 4). A mathematical model stipulating that cue combination occurs in positioning rather than homing estimations is proposed to explain these findings.