Risks to Human Subjects

Human Subject Involvement, Characteristics, and Design

The proposal involves human subjects recruited from the Northeastern University community. There are no selection criteria except normal or corrected-to-normal vision and no motor impairments. There are no predictions in the design of the experiment relative to gender or ethnicity, so we will do our best to recruit participants which reflect the general population, sampling the diverse ethnic and gender backgrounds of students at Northeastern University.

Testing will take place in either Dr. Matthis's laboratory (Aims 1-2; the BIG lab) at Northeastern University, or in a to be determined outdoor location (Aim 3, such as the Blue Hills Preserve, Milton MA). Participants will be recruited through word of mouth and on-campus fliers, in compliance with our IRB protocol.

Study Procedures, Materials, and Potential Risks

Data will be collected either within the tracking space in the BIG lab (14x3m Augmented Reality walking space), where participants will wear a mobile eye tracker and a full body motion capture maker suit, or outside in to-be-determined locations which will be scouted prior to the experiment (e.g., Blue Hills Preserve, Milton MA), where participants will wear a mobile eye tracker, a mobile IMU-based motion capture system, and a lightweight tablet backpack for data processing outdoors. The identity of subjects involved in the studies will remain confidential. Each subject will be allocated a unique identifier code, that will be used on all electronic raw data, electronic data in spreadsheets and to label data recorded in hard copy format. Only research personnel in our labs, or in collaborating sites at which data collection is performed on--site, who have completed NIH--mandated human subjects training, will have access to subject identities. All records that contain personally identifiable data will be kept in locked cabinets at Northeastern.

The risks of these experiments are similar to those in normal behavior: there is no additional risk to participants than would otherwise exist walking alone on the street (Aim 1 & 2) or light hiking activity (Aim 3). There are no known risk of wearing eye trackers, motion capture equipment, or of the Augmented Reality Projector space. In all experiments, participants will be watched by experimenters who will be close by in case of an unlikely emergency. For Aim 3, when collecting data in outdoor environments, researchers will investigate the walking space to ensure there are no hazardous places where participants might walk, e.g. loose or wet rocks. Equipment will be inspected before participants start their participation (in all three Aims) to ensure that everything is fit comfortably, and secure.

Adequacy of Protection Against Risk

Informed Consent and Assent

Participants will be given a consent form prior to the start of the experiment, including the donning of any experimental equipment. Participants will be informed that their participation is entirely voluntary, and if they wish to refuse participation at any time they may do so without penalty or loss of benefits to which they are otherwise entitled. Refusal to participate will not impact future relationships with the Matthis lab, or any other organization within Northeastern. Participants will be told that they can simply tell the experimenter if they would like to stop at any point in time, and participants will be given a copy of the consent form for their own personal records. Participants will complete a consent form on paper, as approved by the IRB, and the Matthis lab will keep a copy of the participant's consent form locked up in the lab. Any questions that the participant has about the experiment, the consent form, or their privacy, may be answered at any point during the experiment, but they will be encouraged to ask questions before they sign their consent form.

Protections Against Risk

During all three experiments (Aims 1-3), as participants will walk both indoors and out, experimenters will be standing by and maintaining a visual on subjects as they walk. If for any reason participants need to take a break, they will be allowed to do so, and a break will be implemented half-way through data collection to ensure that subjects don't suffer from unexpected fatigue. When outdoors, drinking water for subjects will be provided when necessary, and experimenters will investigate outdoor terrain for any potentially hazardous terrain. The terrain will be pre-vetted so that the walking area is known to be safe for participants. There are no medical or professional interventions, and there is no opportunity for incidental findings.

Potential Benefits of The Proposed Research to The Subject and Others

There are no direct benefits to the participants in these studies other than the intellectual experience and light exercise that one would receive from walking for 1-1.5 hours. Insights gained from each aim of this proposal however will increase our understanding of the role of biomechanical information in visual search, thus improving our knowledge of the visuo-locomotor system. This knowledge stands to benefit anyone who might be suffering from a visual or motor disability or disease, as a greater basic science understanding might pave the way for more effective intervention or treatment. The risks involved are no greater than participants might experience from walking alone on pavement (Aims 1 and 2) or during light hiking activity (Aim 3). Relative to the risk, the potential benefit to others is massive, as improving our basic science understanding of the visuo-locomotor system is critical for potential clinical intervention in human vision as it relates to mobility.

Importance of the Knowledge to be Gained

The knowledge to be gained is an understanding of the role of biomechanical information in visual search. This will provide greater insight into the visuo-locomotor system as a whole, potentially providing the inspiration for more experimental work using a similar paradigm to answer more questions about the relationship between visual and motor neuroscience during locomotion. There is no risk to participants that they would not experience walking alone on pavement (Aims 1 and 2) or during light hiking (Aim 3). The knowledge to be gained from their participation is great.