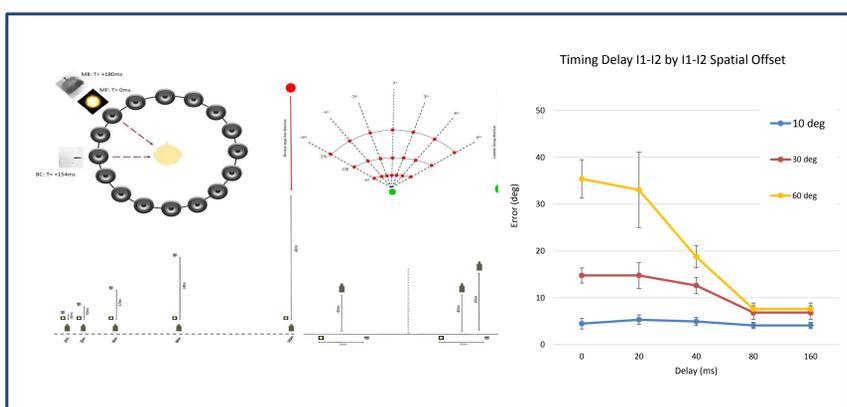
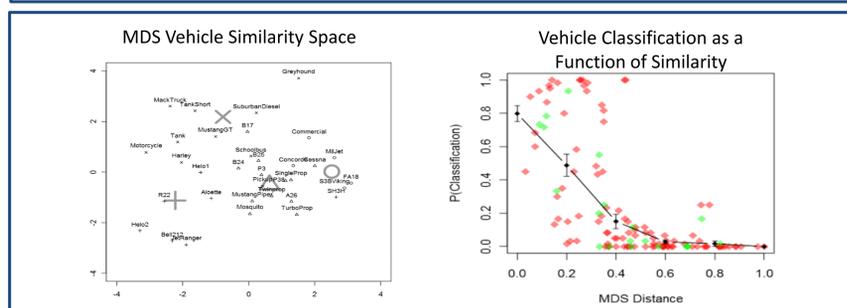
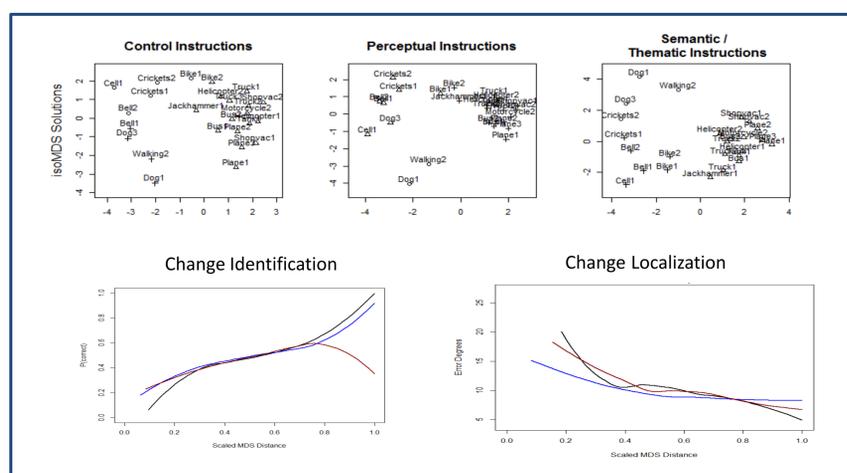


S&T Campaign: Human Sciences
Integration of Humans and Systems
Integration Technologies

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Research Objective

- Perception in the real-world is complex, dynamic, and multisensory.
- Measuring similarity among low-level spatial and temporal features, as well as higher-order semantic features, is one way to capture real-world complexity and dynamic stimulus relationships.



Across multiple behavioral paradigms and a wide variety of environmental sounds we have demonstrated that similarity between both semantic and low-level features has a profound impact on performance.

Challenges

- Systematic, normative, and well-matched audio-visual stimuli with ecologically-valid but modifiable parameters.
- Objective behavioral and neuroimaging measures to evaluate the validity of selected parameters.

ARL Facilities and Capabilities Available to Support Collaborative Research

- **Environment for Auditory Research (EAR)**
 - One-of-a-kind, world-class capabilities
 - Multiple, reconfigurable spaces
 - Unique stimulus arrays, suitable for visual and auditory, as well as tactile displays
- **Multi-aspect real-world measurement capabilities**
 - Wearable, un-tethered operation
 - Flexible, fully customizable user interface
 - Multiple modalities: EEG, EKG, EDA, respiration, blood pressure, motion, posture, and others
- **Multisensory augmented reality testbed platform**
 - Wearable, head-mounted
 - Highly immersive
 - Flexible, reconfigurable sensor arrays
 - High-resolution, wide field, stereoscopic visual displays
 - Embedded eye tracking capabilities
 - Depth sensing, including hand and finger tracking
- **Unique ARL expertise includes:**
 - Sensory & perceptual processes
 - Adaptive mechanisms in multisensory integration & perception
 - Real-world experimental design and analysis

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- **Additional expertise needed in:**
 - Sensor-level fusion for multisensory displays
 - Systems and adaptive control theory modeling and controls systems engineering
 - Hardware/software integration and modeling for real-time applications and predications.
- **Innovative new research approaches sought in:**
 - Novel sensor systems and multi-sensor fusion concepts
 - Alternative displays and interfaces for multisensory user interactions
 - Biofeedback applications for optimizing human performance