Perception & Information Visualization

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Outline / Colour + Faces / Motion / Haptics / Q + A

- Face Perception & Colour
  - Motion
- Haptic Perception

Visualizing Data with Motion


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- Background
  - luminance measuring techniques based on matching paradigm
- for InfoVis, a predetermined pattern of luminance variation is often desired
- Current Practice / Previous Work
  - minimally distinct border (MDB) challenging with different chromaticities
  - threshold face images

Method

- replace threshold image colours: black with a shade of grey, white with a colour
- one face appears positive
- User study
  - compare technique with adapted MDB
    - preserve border length
    - task
    - adjust HLS lightness
    - find cross-over point

Results

- same accuracy and RT as MDB
- better precision than MDB
- Colour map generation
  - user study: 1st step in creating isoluminant colormap
  - avg. control pts. across participants
  - interpolate colormap values in RGB space (with γ estimate)
- can also generate colormaps with monotonically increasing luminance

Flicker experiment

- target elements flicker at different rate than background elements
  - evaluated:
    - cycle length $f_c$
    - cycle difference $\Delta f$
    - coherence
  - results (based on error rates, RT):
    - non-coherent error rates at chance
    - coherent trials: $\Delta f$ of 120 ms easy to detect

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- Velocity experiment
  - target elements move at different rate than background elements
  - evaluated:
    - absolute target velocity $v_t$
    - velocity difference $\Delta v$
  - results (based on error rates, RT):
    - $v_t$ doesn't matter
    - $\Delta v$ more than 10x/s easy to detect (0.43 degrees)

Implications + Applications

- highlight changes in a data set over time or space
- temperature and pressure gradients in meteorological datasets

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- Critique
  - interaction of motion cues not evaluated
  - possible interaction with non-motion cues
  - representative behaviour of real-world cues
    - grid layout of stimuli appropriate?
  - increased cognitive load for processing motion

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- Direction experiment
  - target elements move in different direction than background elements
  - evaluated:
    - absolute target motion direction $d_t$
    - direction difference $\Delta d$
  - results (based on error rates, RT):
    - $d_t$ doesn't matter
    - $\Delta d$ more than 20 degrees easy to detect

Using Haptics to Convey Cause and Effect Relations in Climate Visualization

Questions?