Force Feedback in Video Games

Wooseob Jeong
School of Information Studies
University of Wisconsin - Milwaukee
Beyond Visualization

- Multimodal information representation is natural.
  - We use all the senses, not only vision.
- What about information system?
  - Sound: alarms except for digital music
  - Feeling?
    - Not yet, but used already in video game
    - Force feedback (haptic)
Haptic applications

- Uni-, Bi- and Tri-variate thematic maps in GIS (Geographic Information Systems) represented by different forces for different values [with Dr. Myke Gluck]

- Touchable Online Braille Generator
  - 2005 ALA Diversity Research Grant

- Touchable Online Graphic Generator
  - Prototype in development
Tri-Variate Thematic Map (1)

Color Only Display by RGB Combinations
Tri-Variate Thematic Map (2)

Multimodal Display (Color-Auditory-Haptic)
Touchable Online Braille Generator (1)
Touchable Online Braille Generator (2)
It is rather for us to be here dedicated
than to be here spoken of.
We must learn to appreciate
what we can do.
From these honored dead we take
increased devotion to that cause for
which they gave the last full measure of
devotion— that we here highly resolve
that these dead shall not have died in
vain.
That this nation, under God, shall
have a new birth of freedom— and that
Government of the people, by the people,
for the people, shall not perish from th
Expensive Touchable Graphic
Inexpensive Touchable Graphic
Force Feedback in Video Games

Feel the recoil after firing a laser gun
Experience centrifugal forces as you circle the racetrack
Feel your heart pound as you’re being chased

IMMERSION TOUCHSENSE TECHNOLOGY IS INSIDE MANY TYPES OF GAMING CONTROLLERS, SUCH AS GAMEPADS, WHEELS, JOYSTICKS AND MICE
Problem Statement

- Watching people play video games, I wondered how much the force feedback effect affects gamers’ performances.
- Different controllers seemed to have different impacts from the force feedback effect.
- “Complement vs. Interference” in multimodality
Experiment Setting (1)

- Let students play a video game in my office!
  - PlayStation 2 with Gran Turismo 3.
  - Two controllers: wheel vs. game pad
  - Force feedback on/off
  - Only “gamers” are considered in data analysis
Experiment Setting (2)
Data Analysis (n=42) – 1

Force Feedback vs. Controller Type

<table>
<thead>
<tr>
<th>CONTROLLER</th>
<th>WheelGame Pad</th>
<th>Competition Time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORCE With</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>FORCE Without</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>FORCE With</td>
<td>220</td>
<td></td>
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<tr>
<td>FORCE Without</td>
<td>210</td>
<td></td>
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<tr>
<td>FORCE With</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>FORCE Without</td>
<td>190</td>
<td></td>
</tr>
</tbody>
</table>
Data Analysis (n=42) - II

Is Force Feedback Helpful?

Completion Time (seconds)

MODE

- No Force Wheel
- Force Wheel
- No Force Pad
- Force Pad

HELP
- Not Helpful
- Helpful
Data Analysis (n=42) - III

Is Force Feedback Annoying

Completion Time (seconds)

MODE

- Force Pad
- No Force Pad
- Force Wheel
- No Force Wheel

ANNOYING

- No
- Yes
Data Analysis (n=42) - IV

Does Force Feedback Add More Fun

Completion Time (seconds)

MODE

FORCE PAD

MODE

FORCE WHEEL

FUN

No Difference

More Fun
Steven Johnson, author of *Everything Bad Is Good for You: How Today's Popular Culture Is Actually Making Us Smarter*, has argued that today's action video games can help players learn to prioritize, improve their hand-eye coordination and teach them how to organize virtual resources and teams to pursue a shared goal. Studies conducted on military recruits and surgeons have supported some of those claims. ([http://www.dfw.com/mld/dfw/living/12771184.htm](http://www.dfw.com/mld/dfw/living/12771184.htm))

- Really?
- Next Project
  - How much the gamer remember what they see during their game session? (almost nothing …)
  - Old ping pong game or Pac Man game.