TURNING ON “ACCESSIBLE MODE” FOR USERS WITH MOTOR IMPAIRMENTS

W3C Workshop on Web Games
27 June 2019
Redmond, WA USA
LUIS D. RODRIGUEZ

PRESENTER

ARTIFICIAL INTELLIGENCE PRODUCT DESIGNER
AI, ML and IoT Experience

USER EXPERIENCE AND USER RESEARCHER

CO-FOUNDER
Teknolog IO, LLC & humanwin.ai
More than 13 percent of non institutionalized adults have some sort of physical disability. The most common physical disabilities are trouble hearing, moving around or doing day-to-day tasks like getting dressed. About 70 percent of non institutionalized adults with physical disabilities are over age 60.

Another type of disability is learning disability, a term used to describe a range of academic difficulties. Dyslexia, a reading disability, is one example.

While some interventions focus on teaching stress management and other coping skills, others focus on the disability itself.
MAKE WEB GAMES USABLE BY AS MANY PEOPLE AS POSSIBLE
“Accessible” Mode

Making sure all views, interactions are clickable / tappable by keyboard, ability switches or voice enabled... provide alternate to gestures
ABILITY SWITCHES

REQUIRE ONLY THE SLIGHTEST TOUCH FOR ACTIVATION, EASILY WITHSTAND BODY MOVEMENTS OR SEVERE BLOWS.
VOICE ENABLED

ULTRA-SENSITIVE AND PERSONALIZED: RESPOND TO WHISPERS OR LOUD CLAPS AND SET THE SOUND SENSITIVITY TO RESPOND.
Motor Impairments

**CEREBRAL PALSY**
A congenital disorder of movement, muscle tone, or posture. Due to abnormal brain development, often before birth.

Includes: exaggerated reflexes, floppy or rigid limbs, and involuntary motions.

**NEURAL TUBE DEFECTS**
Birth defects of the brain, spine, or spinal cord.

Includes: upper body weakness and trouble breathing and swallowing, not being able to move legs, torso, or arms, also might include learning disabilities.

**MUSCLE AND JOINT CONDITIONS**
Discomfort, pain or inflammation from cartilage, bone, ligaments, tendons or muscles. Most commonly refers to arthritis or arthralgia.

Includes: pain that can be mild, causing soreness or it can be severe, making even limited movement extremely painful.

**HEAD AND SPINE TRAUMA**
Injuries or accidents to the brain and/or spinal cord such as concussions, blood clots and fractures.

Includes: confusion, loss of consciousness, nausea, loss of movement or sensation, trouble with balance or walking, pain or pressure in the back, neck or head.
Presentations are communication tools that can be used as demonstrations, lectures, speeches, reports, and more.

Anxiety

- Being Watched Working
- Being Criticized
- Speaking in Public
- Entering a Room Where People Are Seated
- Losing Control
- Feeling Rejected
- Failure
- Making Mistakes
- “Looking-Staring”
Presentations are communication tools that can be used as demonstrations, lectures, speeches, reports, and more.

**Stress**

- Disruptive Behavior
- Social Norms
- Functional Limitations

- Adaptive Limitations
- Coordination
- Communication

- Chronic Health
- Relatives & Caretakers
- Seek Independence
## Coping Strategies

<table>
<thead>
<tr>
<th>Information Seeking</th>
<th>Wish-Fulfilling</th>
<th>Medical Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Apps &amp; Internet</td>
<td>Other Sources</td>
<td>Plan of Action</td>
</tr>
<tr>
<td>Cognitive Efforts</td>
<td>Escapism</td>
<td>Adjustment</td>
</tr>
</tbody>
</table>
Experiments

*Please note: Due to a reporting error, we have discovered that NEW DATA generated through the Lexical Decision, Muller-Lyer Illusion, Self-Reference, and Social Balance studies are not accurate at this time. Although the experiments themselves work for students to have the experience of participating, we regret that the data reports are not showing accurate results. You can still download data reports from the OLD DATA files to have your students run analyses.

Cognition

- Be A Juror
- Numerical Memory
- Object Location Memory
- Pitch Memory
- Word Recognition
- Facial Recognition
- Lexical Decision*

Individual Differences
Müller-Lyer Illusion
Learning and Memory

Which design is hiding the coin?

Design on the Left

Design on the Right
First Woman Earns Psychology PHD

Margaret Floy Washburn becomes the first woman to earn a doctoral degree in American psychology and the second woman, after Mary Whiton Calkins, to serve as APA president. After graduating from Vassar in 1891, she wants to attend Columbia University but women were not generally permitted in graduate programs so she sits in on classes as an observer. She later attends the Sage School of Philosophy at Cornell to work with experimental psychologist E.B. Titchener, who founds the theory of psychological structuralism.
OPPORTUNITY

“IN THE ZONE”

FOCUS  CONCENTRATION  DETERMINATION
RETHINK INPUTS AND OUTPUTS

TURN OFF:

Specific targets with mouse pointer
Specific key presses
Exact touch targets
DEVICE WEIGHT

HANDHELD

Don’t require holding devices such as mobile phone for too long to interact with web game.
RETHINK MOVEMENTS

WIDEN

Mouse areas

Touch targets

UI controls
RETHINK MOVEMENTS CONT’D

ELIMINATE

- Selecting text
- Right clicking text
- Small precise movements
RETHINK FEEDBACK

REEVALUATE

- Requiring time based interactions
- Requiring movement
- Other mechanisms?
RETHINK ENGAGEMENT

ACCESSIBILITY FROM THE START
RETHINK IMPACT

FOR DESIGNERS AND DEVELOPERS

Standards
Limitations
Testing
Statement
Building Voice Capability Into Web Games

Ceases fine-motor control interactions with hands and opens new opportunities.
## OPPORTUNITIES

### BENEFITS FAR OUTWEIGH THE RISKS FOR ACCESSIBILITY

<table>
<thead>
<tr>
<th>LOCALIZATION AND PERSONALIZATION</th>
<th>MULTI-DEVICE SESSION</th>
<th>MIC USAGE DISCOVERY</th>
<th>WIN OVER USERS</th>
<th>NEW TERRITORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapting to a specific locale or market</td>
<td>Experience across many devices</td>
<td>Leads to engagement</td>
<td>More access than just one channel</td>
<td>And many, many more</td>
</tr>
</tbody>
</table>
COSTS, BENEFITS, RISKS AND OPPORTUNITIES

BUILDING THE CASE FOR VOICE UX

Should you design a VUI and experience to your web game or as a capability?
Will people want to talk to your web game?

YES OR NO?
## PEOPLE WILL WANT TO ENGAGE

<table>
<thead>
<tr>
<th>RELATIONSHIP</th>
<th>VALUE</th>
<th>POTENTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form a connection or bond with your company or organization.</td>
<td>They’ll look for you in the future.</td>
<td>Leverage all the interesting and sophisticated things of VUI. Manage the flow of information just like websites or apps.</td>
</tr>
</tbody>
</table>
Speech analytics tools that can spot spoken keywords or phrases, either as real-time alerts on live audio or as a post-processing step on recorded speech.
VOICE UX ANALYTICS CREATES OPPORTUNITIES

ITERATIONS
Based on usage, data emphasizes which features were more popular

INTERRUPTIONS
Detect where in the voice interactions users get stuck and give up

PERFORMANCE
Adjust server limits in real time as usage spikes happen
Do You Use Voice Commands To Accomplish Tasks in Daily Life?
Remember that adding a voice capability work best in a specific context only and when we break this rule or not prepare to adapt for additional contexts the experience fails tremendously.
TRADITIONAL ACCESSIBLE SOLUTION

PROGRAMMERS UNDERSTAND WHAT THEY ARE DOING

Understand accessibility tasks

Code libraries with useful behaviors

Formulate Explicit solution
AI FINDS ACCESSIBLE SOLUTION

OFFLOADING COGNITIVE LABOR

Accessibility criterion → Heuristics, Discovery methods & Solution Structures → Accessible web game
TURNING ON “ACCESSIBLE MODE” FOR USERS WITH MOTOR IMPAIRMENTS
THANK YOU!

W3C Workshop on Web Games
27 June 2019
Redmond, WA USA
QUESTIONS FOR DISCUSSION

OPEN FLOOR
ARE CONSTANT FEEDBACK LOOPS BEING CONSIDERED WHEN SUBMITTING NEW INFORMATION TO A PLAYER?
IS TRUE ECOLOGICAL VALIDATION BEING APPLIED EARLY ON TO A WEB GAME IN DEVELOPMENT?
DOES IT ACCOUNT FOR TRUE TO LIFE CONDITIONS OF THE WIDER WORLD AND POPULATION?
IF THE WEB GAME IS ACCESSIBLE TODAY WILL IT BE TOMORROW?
DOES AN ACCESSIBLE EXPERIENCE MEAN A GREAT GAMING EXPERIENCE?