
# Heuristic Evaluation and Usability Testing of Ohio Area Agency on Aging Websites for Older Adults

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# Introduction

- Human Computer Interaction (HCI)
  - Studies the interaction between people and computer interfaces
  - Subsection of “Cognitive Ergonomics”
  - Goal is to make computer interfaces more usable and specific to users’ needs
- Our research focuses on computer interface design for older workers.
  - Evaluating websites aimed at seniors and performing usability tests

# How does this fit in to Safety?

- Controls
  - Increasing automation in factories, warehouses, etc
  - Controls for machinery need to be as intuitive and easy to use as possible
- Automobiles
  - More technologies are being introduced into cars
  - HCI researchers look into conveying the appropriate information to the drivers with minimum distraction

# Aging Workforce

- “Baby Boomer” generation (76 million) starts to turn 65 next year
- Nearly 24% of the working population will be 55+ by 2018
- Normative aging includes changes in hearing, eyesight, motor skills, balance, fatigue, cognitive function, and memory

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# Aging Workers and HCI

- Older workers can have challenges interacting with computer systems if they are not thoughtfully designed for them
- Several guidelines exist for software designed for older users.
  - Readability – Large font, high contrast, spacing
  - Navigation – Clear organization, large buttons
  - Content – Standard layouts, appropriate white space, data density
  - Accessibility – Color Deficient accessible, text equivalents for audio and video.

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# Methodology

- Our research had 3 main objectives:
  1. Develop a modified heuristic model for evaluating website usability for older adults
  2. Perform Usability tests on 3 of the Ohio AAA sites to validate heuristic
  3. Using results, provide recommendations for website design for older adults (for both work and consumer applications)

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# Developing the Model

- Most website usability evaluation techniques involve a heuristic checklist, which is used to point out vital usability errors in the site
- Our model aims to assign a usability score to each site
  - This has been done in the past; however typically each heuristic has the same weight
- We developed a model that assigns a weighted score for each heuristic and composes a final score

# Model Screenshots

## Example of Model

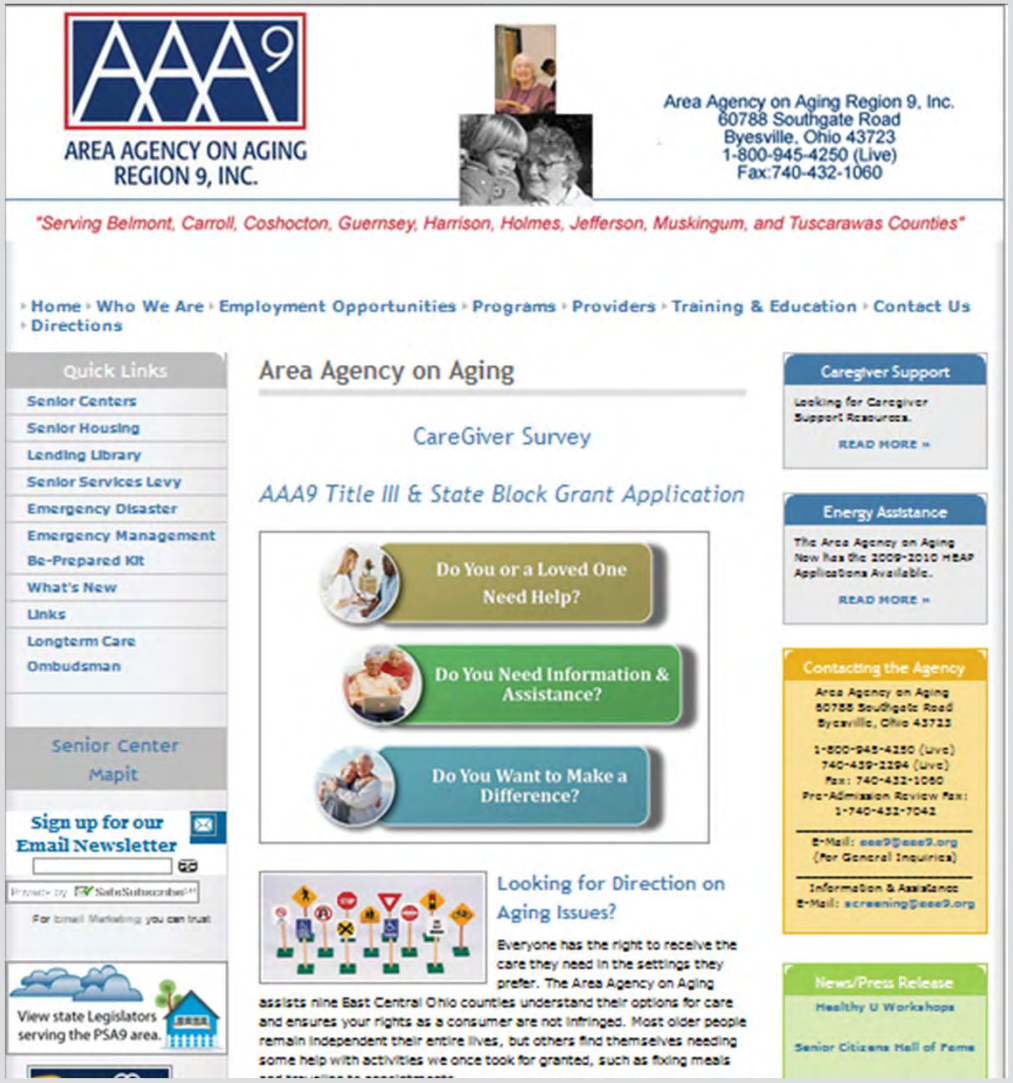
| Navigation | Present? | Weight | Score |
|---|---|---|---|
| It is clearly defined where you are on the website (in relation to the homepage and other sections) | 2 | 4 | 8 |
| There is a standard layout for each page on the website (each page on the website uses the same layout and formatting) | 2 | 2 | 4 |
| There is a clear, easy to find menu with links to different areas of the website | 2 | 4 | 8 |
| Hyperlinks are consistent and easy to identify | 2 | 4 | 8 |
| There is no underlined text that isn't a hyperlink (the only text that is underlined are the links) | 2 | 3 | 6 |
| Hyperlinks show that they have been previously clicked | 0 | 3 | 0 |
| The appearance of hyperlinks changes when the cursor is hovering over them | 2 | 3 | 6 |
| There is an easy-to-use internal search feature on the website | 2 | 4 | 8 |
| The site uses static menus (not drop-down or other complex menu structures) | 2 | 1.5 | 3 |
| The buttons are large and easily clickable | 2 | 2.5 | 5 |
| The buttons are clearly labeled | 2 | 4 | 8 |

| | |
|---|---|
| Total Navigation Score: | 64 |
| Navigation Usability Rating: | 91.43% |

## Evaluation Results

| | District 1 | District 2 | District 3 | District 4 | District 5 | District 6 | District 7 | District 8 | District 9 | District 10A | District 10B | District 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Readability | 75.00% | 90.63% | 84.38% | 81.25% | 62.50% | 75.00% | 81.25% | 90.63% | 68.75% | 68.75% | 84.38% | 50.00% |
| Navigation | 83.57% | 52.14% | 64.29% | 61.43% | 58.57% | 84.29% | 50.71% | 91.43% | 62.86% | 65.71% | 85.71% | 65.00% |
| Content | 100.00% | 88.71% | 79.03% | 85.48% | 67.74% | 90.32% | 85.48% | 85.48% | 53.23% | 69.35% | 95.16% | 83.87% |
| Accessability | 82.76% | 100.00% | 100.00% | 100.00% | 89.66% | 100.00% | 100.00% | 89.66% | 89.66% | 100.00% | 89.66% | 79.31% |
| Total | 87.31% | 77.46% | 77.72% | 78.24% | 66.84% | 87.05% | 74.35% | 89.12% | 66.32% | 72.54% | 89.12% | 70.73% |

# District 9


AAA9
AREA AGENCY ON AGING
REGION 9, INC.
Area Agency on Aging Region 9, Inc.
60788 Southgate Road
Byesville, Ohio 43723
1-800-945-4250 (Live)
Fax:740-432-1060
"Serving Belmont, Carroll, Coshocton, Guernsey, Harrison, Holmes, Jefferson, Muskingum, and Tuscarawas Counties"
Home Who We Are Employment Opportunities Programs Providers Training & Education Contact Us Directions
Quick Links
Senior Centers
Senior Housing
Lending Library
Senior Services Levy
Emergency Disaster
Emergency Management
Be-Prepared Kit
What's New
Links
Longterm Care Ombudsman
Senior Center Mapit
Sign up for our Email Newsletter
View state Legislators serving the PSA9 area.
Area Agency on Aging
CareGiver Survey
AAA9 Title III & State Block Grant Application
Do You or a Loved One Need Help?
Do You Need Information & Assistance?
Do You Want to Make a Difference?
Looking for Direction on Aging Issues?
Everyone has the right to receive the care they need in the settings they prefer. The Area Agency on Aging assists nine East Central Ohio counties understand their options for care and ensures your rights as a consumer are not infringed. Most older people remain independent their entire lives, but others find themselves needing some help with activities we once took for granted, such as fixing meals
Caregiver Support
Looking for Caregiver Support Resources.
READ MORE »
Energy Assistance
The Area Agency on Aging Now has the 2009-2010 HEAP Applications Available.
READ MORE »
Contacting the Agency
Area Agency on Aging
60788 Southgate Road
Byesville, Ohio 43723
1-800-945-4250 (Live)
740-439-2294 (Live)
Fax: 740-432-1060
Pre-Admission Review Fax:
1-740-432-7042
E-Mail: aaa9@aaa9.org
(For General Inquiries)
Information & Assistance
E-Mail: screening@aaa9.org
News/Press Release
Healthy U Workshops
Senior Citizens Hall of Fame

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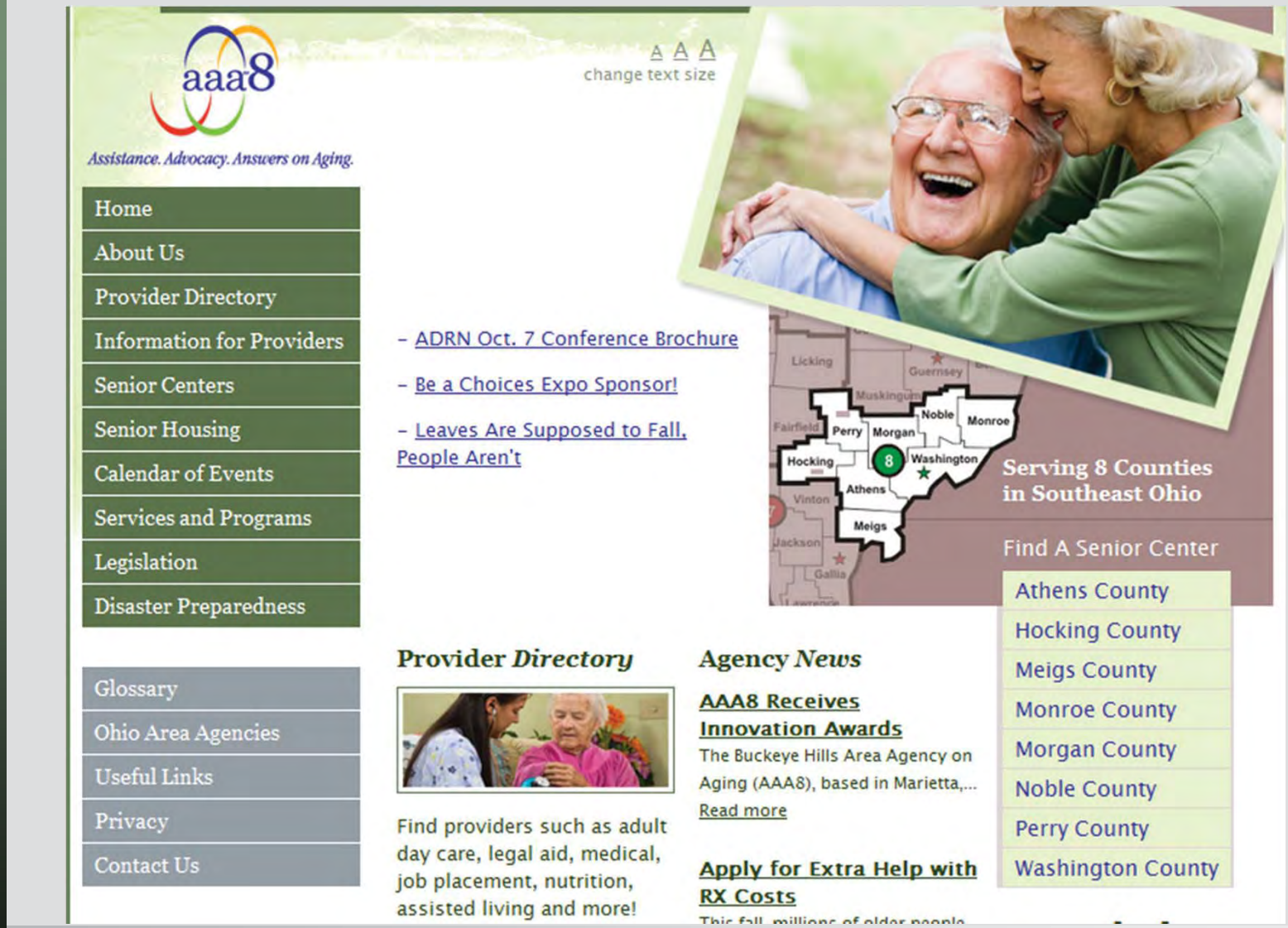
# District 3

# District 8


aaa8
Assistance. Advocacy. Answers on Aging.
A A A
change text size
Home
About Us
Provider Directory
Information for Providers
Senior Centers
Senior Housing
Calendar of Events
Services and Programs
Legislation
Disaster Preparedness
Glossary
Ohio Area Agencies
Useful Links
Privacy
Contact Us
- ADRN Oct. 7 Conference Brochure
- Be a Choices Expo Sponsor!
- Leaves Are Supposed to Fall, People Aren't
Licking
Guernsey
Muskingum
Fairfield
Perry
Morgan
Noble
Monroe
Hocking
8
Washington
Athens
Vinton
Meigs
Jackson
Gallia
Serving 8 Counties in Southeast Ohio
Find A Senior Center
Athens County
Hocking County
Meigs County
Monroe County
Morgan County
Noble County
Perry County
Washington County
Provider Directory
Find providers such as adult day care, legal aid, medical, job placement, nutrition, assisted living and more!
Agency News
AAA8 Receives Innovation Awards
The Buckeye Hills Area Agency on Aging (AAA8), based in Marietta,...
Read more
Apply for Extra Help with RX Costs

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# Experiment

- 31 subjects from the community participated
- Each subject completed 5 tasks on each of the 3 selected websites.
- They were evaluated by 3 metrics
  - Time on Task
  - Number of Mouse Clicks
  - Number of Errors
- After the study, they were asked to evaluate the websites themselves using the System Usability Scale (SUS)

# System Usability Scale (SUS)

| | Strongly disagree | | | | Strongly agree |
|---|---|---|---|---|---|
| 1. I think that I would like to use this system frequently | 1 | 2 | 3 | 4 | 5 |
| 2. I found the system unnecessarily complex | 1 | 2 | 3 | 4 | 5 |
| 3. I thought the system was easy to use | 1 | 2 | 3 | 4 | 5 |
| 4. I think that I would need the support of a technical person to be able to use this system | 1 | 2 | 3 | 4 | 5 |
| 5. I found the various functions in this system were well integrated | 1 | 2 | 3 | 4 | 5 |
| 6. I thought there was too much inconsistency in this system | 1 | 2 | 3 | 4 | 5 |
| 7. I would imagine that most people would learn to use this system very quickly | 1 | 2 | 3 | 4 | 5 |
| 8. I found the system very cumbersome to use | 1 | 2 | 3 | 4 | 5 |
| 9. I felt very confident using the system | 1 | 2 | 3 | 4 | 5 |
| 10. I needed to learn a lot of things before I could get going with this system | 1 | 2 | 3 | 4 | 5 |

# Participants

Demographic Information

- Mean age was 66.94 years (50, 87)
- Mean time spent on internet per week was 9.19 hours (1, 25)

# Heuristic Scores for Websites

**Readability Navigation Content/Organization Access * Website**

| Website | | Readability | Navigation | Content/ Organization | Access |
|---|---|---|---|---|---|
| 1 | Mean | 90.6300 | 91.4300 | 85.4800 | 89.6600 |
| | N | 155 | 155 | 155 | 155 |
| | Std. Deviation | .00000 | .00000 | .00000 | .00000 |
| 2 | Mean | 68.7500 | 62.8600 | 53.2300 | 89.6000 |
| | N | 155 | 155 | 155 | 155 |
| | Std. Deviation | .00000 | .00000 | .00000 | .00000 |
| 3 | Mean | 84.3800 | 64.2900 | 79.0300 | 100.0000 |
| | N | 155 | 155 | 155 | 155 |
| | Std. Deviation | .00000 | .00000 | .00000 | .00000 |
| Total | Mean | 81.2533 | 72.8600 | 72.5800 | 93.0867 |
| | N | 465 | 465 | 465 | 465 |
| | Std. Deviation | 9.21193 | 13.15810 | 13.94860 | 4.89379 |

# Correlations

**Correlations**

| | | SUS | time | click | Errors | Age |
|---|---|---|---|---|---|---|
| SUS | Pearson Correlation | 1.000 | -.242** | -.201** | -.169** | -.217** |
| | Sig. (2-tailed) | | .000 | .000 | .000 | .000 |
| | N | 465.000 | 465 | 465 | 465 | 465 |
| time | Pearson Correlation | -.242** | 1.000 | .803** | .759** | .169** |
| | Sig. (2-tailed) | .000 | | .000 | .000 | .000 |
| | N | 465 | 465.000 | 465 | 465 | 465 |
| click | Pearson Correlation | -.201** | .803** | 1.000 | .764** | .225** |
| | Sig. (2-tailed) | .000 | .000 | | .000 | .000 |
| | N | 465 | 465 | 465.000 | 465 | 465 |
| Errors | Pearson Correlation | -.169** | .759** | .764** | 1.000 | .150** |
| | Sig. (2-tailed) | .000 | .000 | .000 | | .001 |
| | N | 465 | 465 | 465 | 465.000 | 465 |
| Age | Pearson Correlation | -.217** | .169** | .225** | .150** | 1.000 |
| | Sig. (2-tailed) | .000 | .000 | .000 | .001 | |
| | N | 465 | 465 | 465 | 465 | 465.000 |

**. Correlation is significant at the 0.01 level (2-tailed).

# Descriptive Statistics: Task Time

**1. Web**

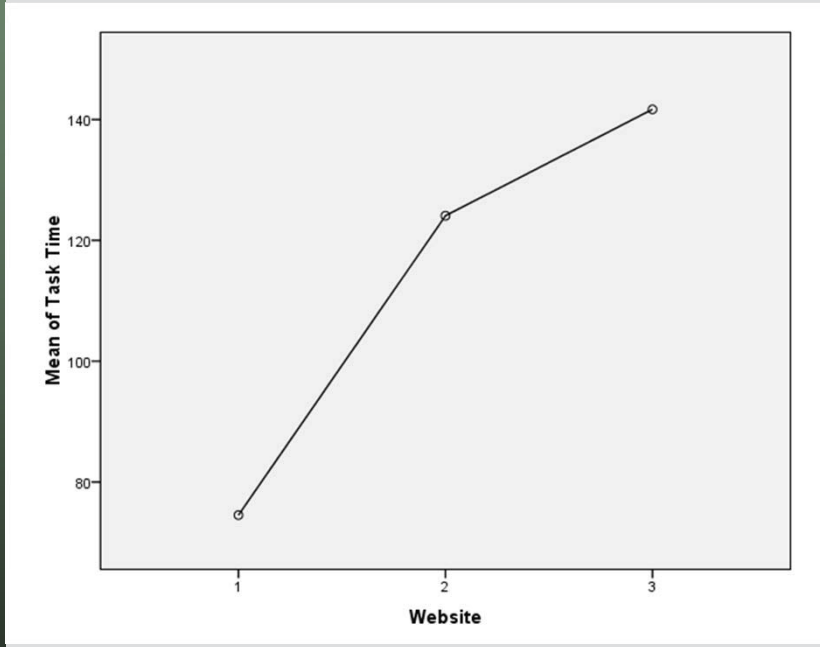
Measure: timew

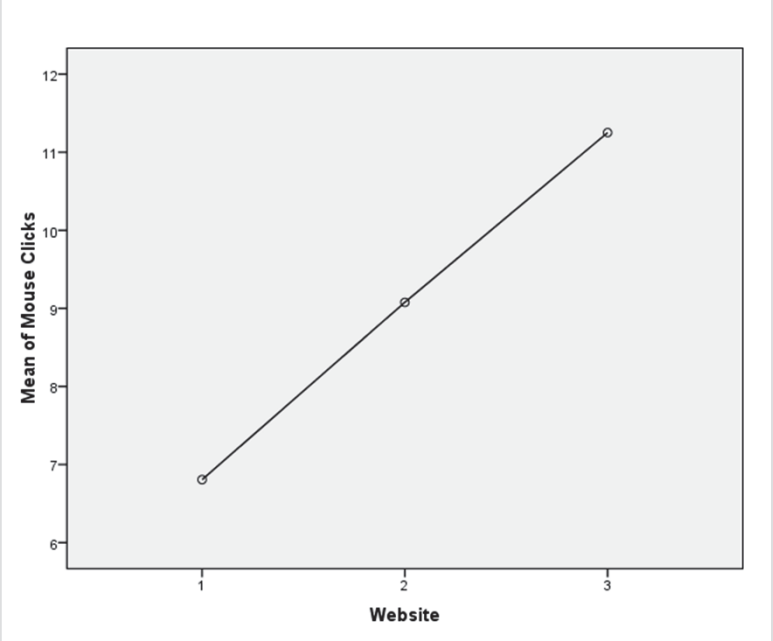
| Web | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 74.515[a] | 7.397 | 59.815 | 89.214 |
| 2 | 124.074[a] | 7.397 | 109.374 | 138.774 |
| 3 | 141.681[a] | 7.397 | 126.982 | 156.381 |

a. Covariates appearing in the model are evaluated at the following values: Age = 66.94, Hrs Online/Wk = 9.19.

# Website Differences

- A significant difference was found between each website for time on task and number of clicks
  - More usable websites had the best performance metrics



# ANOVA: Task Time

**Tests of Between-Subjects Effects**

Measure: timew

Transformed Variable: Average

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Intercept | 278.053 | 1 | 278.053 | .033 | .857 |
| Age | 149687.243 | 1 | 149687.243 | 17.650 | .000 |
| Hrs | 6638.065 | 1 | 6638.065 | .783 | .379 |
| Web | 376006.171 | 2 | 188003.085 | 22.168 | .000 |
| Error | 746302.899 | 88 | 8480.715 | | |

Interaction effect for Web X task; ($F=21.660$, $p < 0.001$)

# Descriptive Statistics: Clicks

**Web**

Measure: clicks

| Web | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 1 | 6.806[a] | .830 | 5.157 | 8.455 |
| 2 | 9.077[a] | .830 | 7.428 | 10.726 |
| 3 | 11.252[a] | .830 | 9.603 | 12.901 |

a. Covariates appearing in the model are evaluated at the following values: Age = 66.94, Hrs Online/Wk = 9.19.

# Analysis of Variance: Clicks

**Tests of Between-Subjects Effects**

Measure: clicks

Transformed Variable: Average

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Intercept | 392.098 | 1 | 392.098 | 3.674 | .059 |
| Age | 2835.968 | 1 | 2835.968 | 26.575 | .000 |
| Hrs | 695.913 | 1 | 695.913 | 6.521 | .012 |
| Web | 1531.600 | 2 | 765.800 | 7.176 | .001 |
| Error | 9391.056 | 88 | 106.717 | | |

Interaction factor for Web x Task was significant ($F=13.567$, $p < 0.001$)

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# Discussion

- Our Weighted Heuristic Model was validated by comparing it to usability metrics
- Results demonstrated that statistically significant differences were found between different websites for task times and clicks
  - The website rated highest had the best performance
- Older users tended to find websites less usable than younger users

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# Further Research

- Sensitivity Analysis on the heuristic evaluation and its effects on performance metrics
- More in-depth analysis on components of heuristics
- Research on usability and adoption of technologies for work and for home
- Applications beyond websites
  - machinery controls, car dashboards, etc.

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# Thank you!

# University of Cincinnati
# 11th Annual
# Pilot Research Project Symposium
## October 14-15, 2010

## Main Menu

Hosted by: The University of Cincinnati Education and Research Center Supported by: The National Institute for Occupational Safety and Health. (NIOSH) Grant #: T42/OH008432-05

- Welcome and Opening Remarks
- Keynote Speakers
- Podium Presentations
- Poster Presentations
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- Problems Viewing the Videos

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