



The MultiMemoHome Project

A Subjective Evaluation of Multimodal Notifications


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<http://MultiMemoHome.com>



The MultiMemoHome Project

What is the MMH Project?

- Improve home reminder systems, allowing for independent living
- Consider the user's needs
- Consider the home environment
- Multimodal Interaction

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Sensory Impairment

“As well as chronic illness, older people are also more likely to have a disability. Nearly half of disabled people are aged 65 or older. The most common problems relate to movement and to vision and hearing. Sensory impairments become increasingly common as people age: around 80% of people over 60 have a visual impairment, 75% of people over 60 have a hearing impairment, and 22% have both a visual and hearing impairment.”

-Department of Health

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Multimodal Notifications

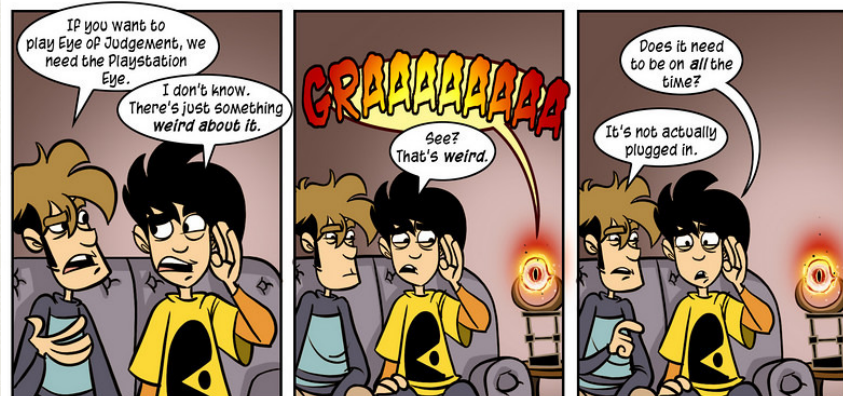
- Notifications typically Visual/Audio
- Tactile Notifications increasingly in popularity, but limited to phones
- Olfactory notifications extremely rare, but some basic ones do exist

Changing Attitudes to Technology

- Playstation Eye
- Released 2003
- Sold 10.5 Million Units in 5 years




Penny Arcade - 2007



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Kinect

- Microsoft Kinect
- Released 2010
- Sold 10 Million Units in 6 months



The image shows the Kinect sensor for Xbox 360, a black horizontal device with three lenses and a microphone array. Below it is the Kinect logo and the text 'KINECT for Xbox 360'.

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Penny Arcade - 2010



The comic strip consists of three panels. In the first panel, a character in a yellow shirt says, 'Xbox, next. Xbox, previous!' and another character replies, 'Xbox, Last.P.M.'. The character in yellow then says, 'I can't believe that worked.' In the second panel, the character in yellow is sitting at a desk with a computer monitor displaying the Kinect logo. He says, 'Xbox?'. In the third panel, a close-up of a character's face shows a wide, toothy grin and a speech bubble saying 'kill.'.

WWW.PENNY-ARCADE.COM ©2010 MIKE KRAHLER AND JERRY HOLKINS

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Multimodal Notifications

- Multiple Modalities can provide flexibility in the face of Sensory Impairment and Changing Requirements
- Also provides options for delivering delicate information privately
- But not being used...

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Two Experiments

- Subjectively evaluate a range of notification modalities over 2 experiments
- Used NASA TLX
- 8 Interaction Modalities tested

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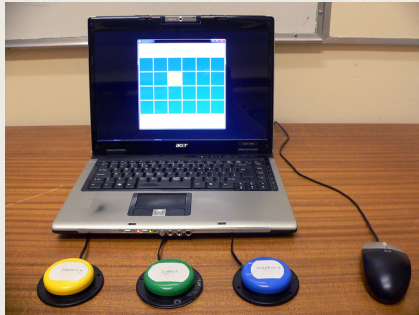
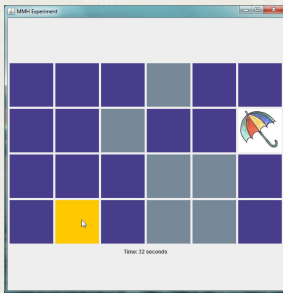
Notification Modalities

- Considered Visual, Auditory, Tactile and Olfactory (smell) notifications
- Visual represented by Text, Pictogram and Abstract Visual methods
- Auditory represented by Speech, Earcons and Auditory Icons
- Totalling 8 Notification Modalities

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Experiment Method

- Card matching game is primary task
- Pressing buttons secondary task



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Experiment Hardware



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Experiment 1 - Hypothesis

With *interrupting* notifications, the notifications (grouped by sensory apparatus) will have different subjective workload ratings measured by NASA-TLX.

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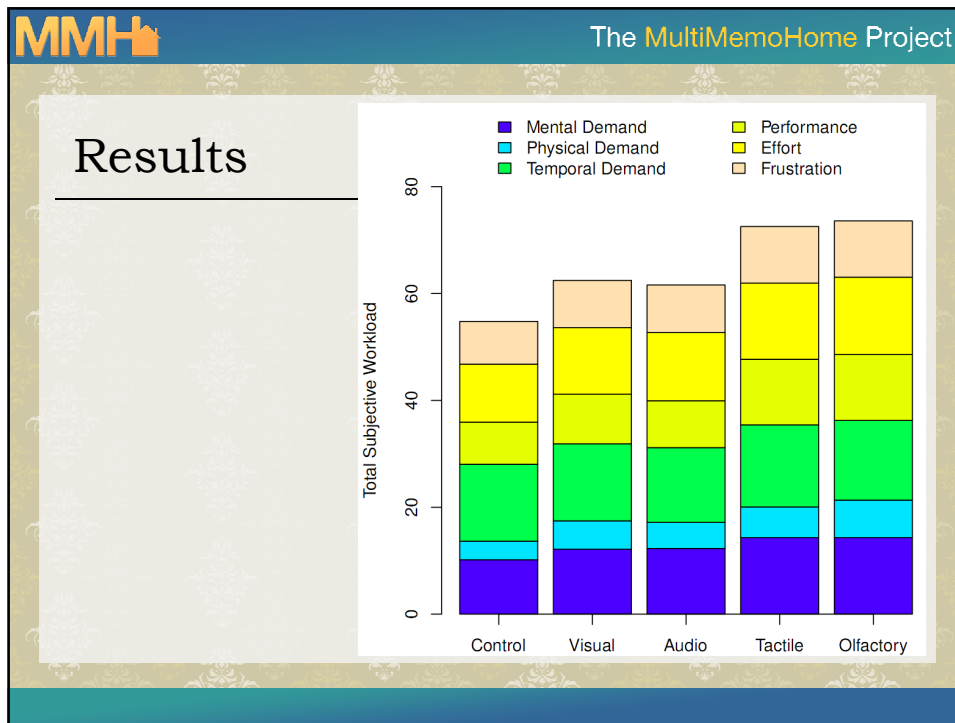
Experiment 1 - Design

- Notifications grouped by Visual, Auditory, Tactile and Olfactory
- 3 Notifications per game
- 5 Games per Condition
- TLX questionnaire after each condition
- Included Control condition without notifications

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Experiment 1 - Participants

- 27 Participants
- 14 Male, 13 Female
- 20 Aged 18-30, 4 Aged 31-45, 3 Aged 46-60



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Experiment 2 - Hypothesis

With *distracting* notifications, the notifications will have different subjective workload ratings measured by NASA-TLX.

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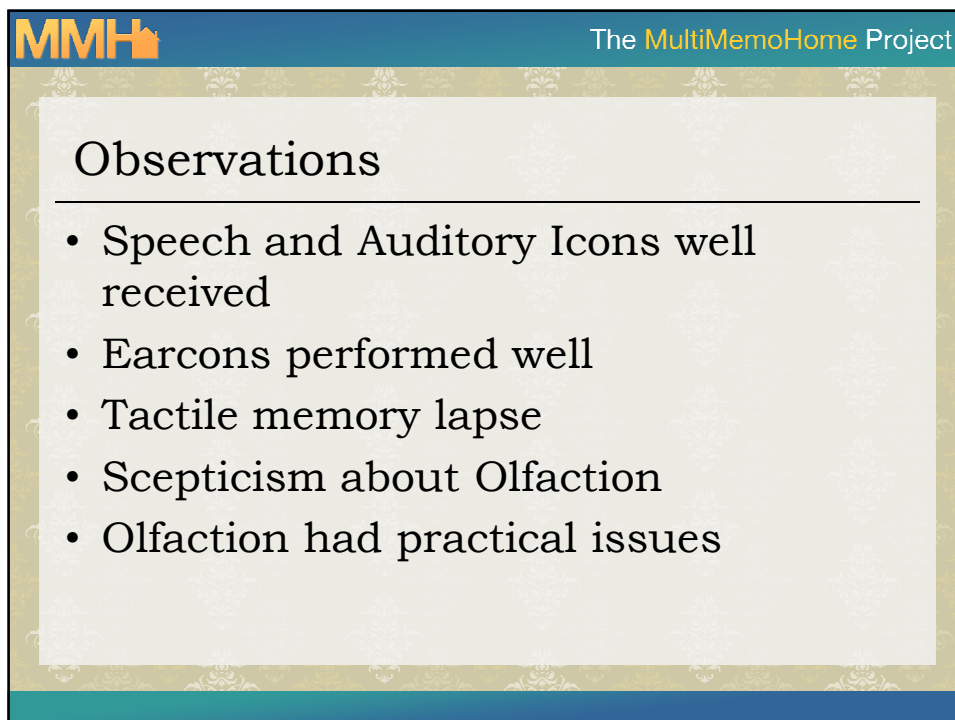
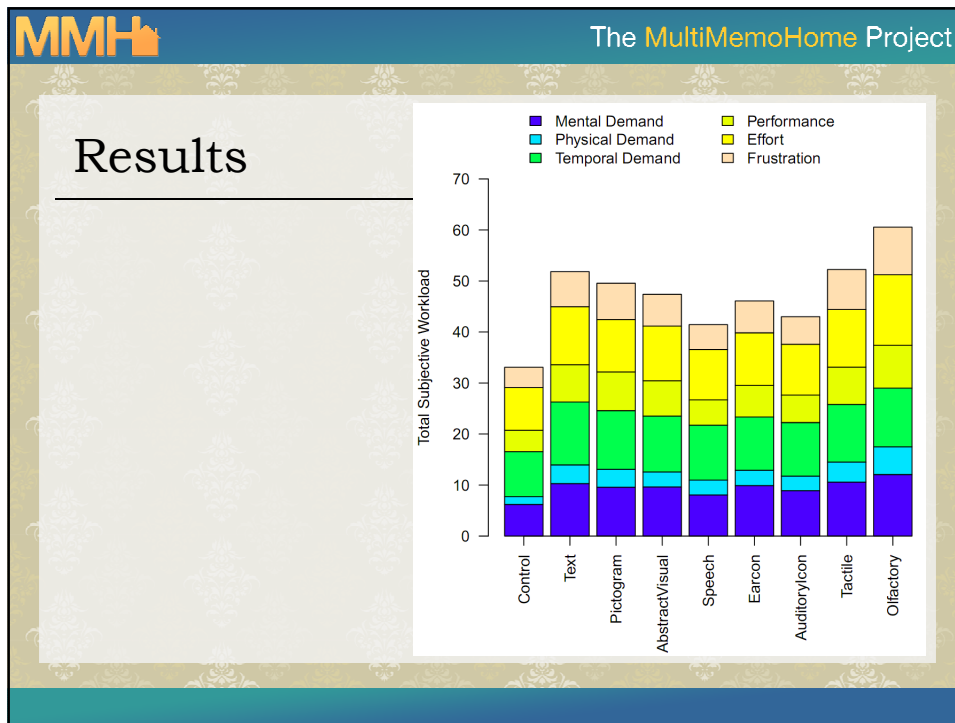
Experiment 2 - Design

- 8 Conditions, one per Notification Modality
- Plus Control condition without notifications
- 3 Notifications per game
- Notifications may or may not require a response
- 4 Games per Condition
- TLX questionnaire after each condition

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Experiment 2 - Participants

- 18 Participants
- 12 Male, 6 Female
- 17 Aged 18-30, 1 Aged 31-45



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Other Interesting Findings

- Lack of Significant Differences between Control and Experimental conditions
- Subjective performance correlated with primary task performance

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In Conclusion

- Even 'gimmick' modalities like smell could have a use in the home
- Can be done without much cost
- Guidelines and Models needed to help developers include additional modalities
- More work needed



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Questions?

<http://MultiMemoHome.com>

The image is a presentation slide for 'The MultiMemoHome Project'. It features a teal header with the 'MMH' logo (where the 'H' is a house icon) and the project name. The main content area has a light beige background with a repeating floral pattern and the text 'Questions?'. A teal footer contains the website URL 'http://MultiMemoHome.com'.