Did you see that thing?

An eye tracking study on the reliability of self-reported awareness measures

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Research Questions

- Usability professionals often asked participants if they noticed a particular object
  - Is this feedback reliable?
  - If so, are there certain situations in which it is more/less reliable?

- Implications for how we ask participants questions, and the need for eye tracking technology as part of basic usability testing

Background Research

- Guan et al (2006)
  - RTA was validated with eye movement data
  - Omissions occurred 47% of the time
- Johansen & Hansen (2006)
  - Participants recollection of elements were valid about 70% of the time
  - Images, text, and navigation was recollected more than 70% of the time, logos only 30% of the time

Methods

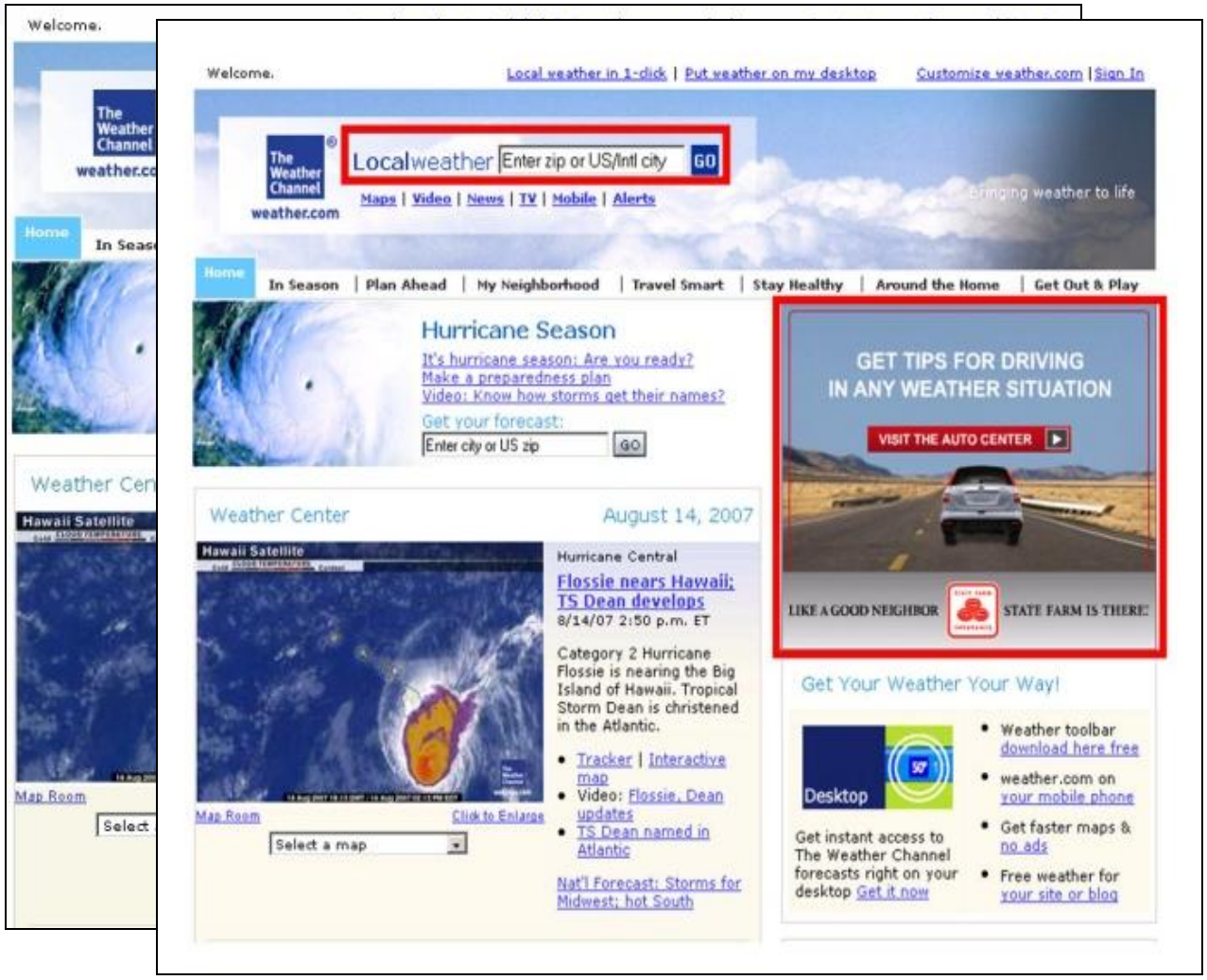
- Half of the participants (n=40) were calibrated with eye tracker, the other half (n=40) were not
  - Is there an impact of the technology on what people report?
- Shown a series of popular website home pages for 7 seconds (study page), followed by a test page
- Test page includes two objects highlighted
  - Objects are images, navigation, or functional based

Experiments

- Experiment 1
  - 40 participants asked "Did you notice this object"?
  - 3-point scale (1 = definitely did not notice; 2 = not sure; 3=definitely noticed)
  - Half were eye tracked (n=20); half not eye tracked (n=20)
- Experiment 2
  - 40 participants asked "How much time did you spend looking at this object?"
  - 5-point scale (1 = no time looking at object … 5 = a long time looking at object)
  - Half were eye tracked (n=20); half not eye tracked (n=20)

Eye Tracking Condition	Expt. 1 ("Did you notice")	Expt. 2 ("How much time")
Yes (ET)	20 participants	20 participants
No (NET)	20 participants	20 participants

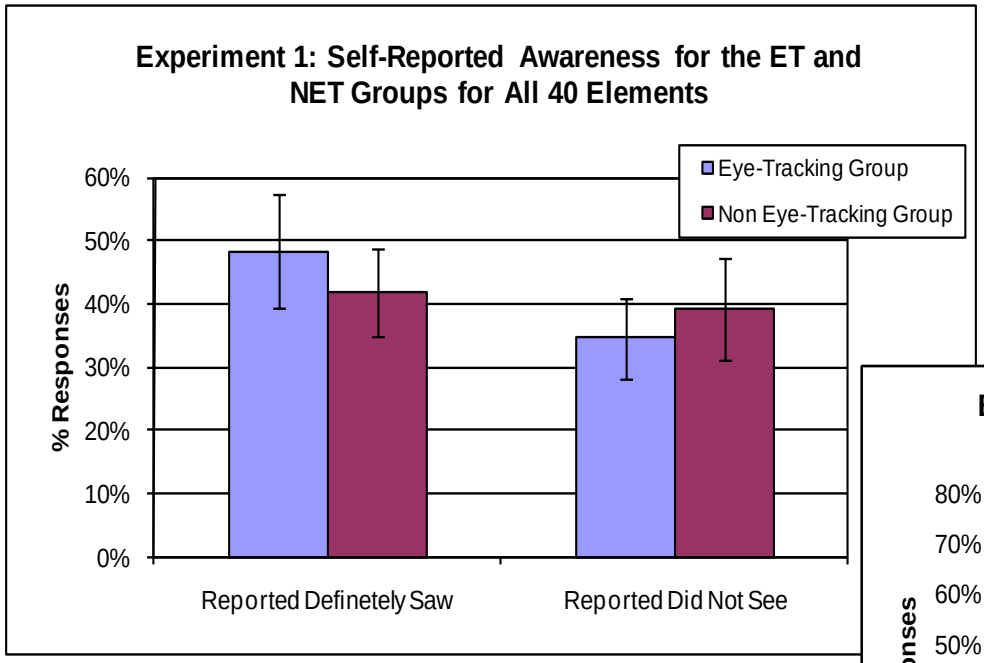
Example of Study/Test Page



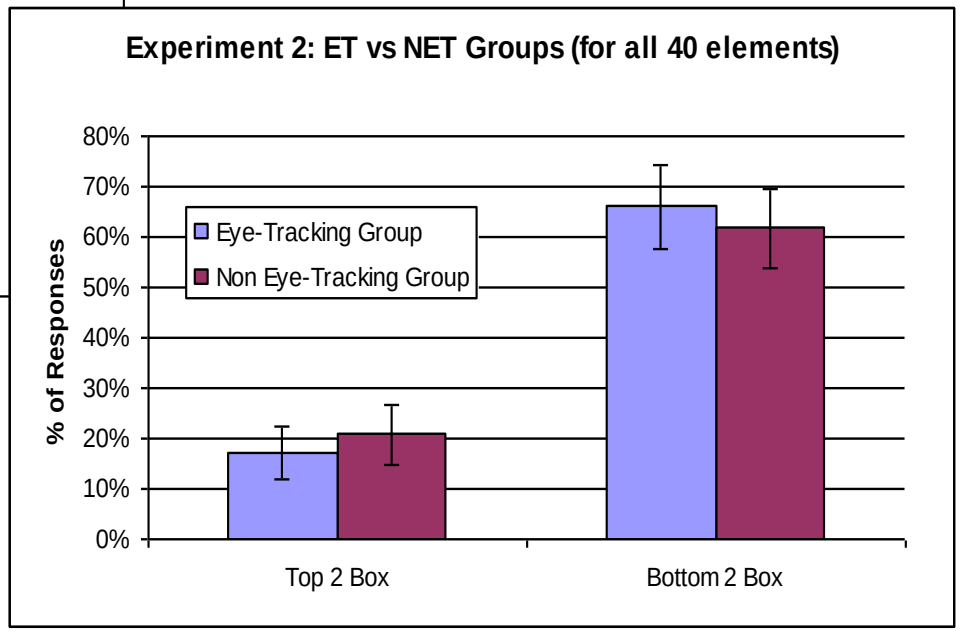
Memory Test


Buy Sell My eBay Community Help
Hello! Sign in or register.
Site Map
All Categories
Search
Advanced Search
Categories ▾ Motors Express Stores
Live help
Whatever it is...you can get it on ebay
My Favorite Searches: Sign in to view your Favorite Searches.
Specialty Sites
eBay Express
eBay Motors
eBay Stores
eBay Business
Half.com
Apartments on Rent.com
StubHub Tickets
Categories
Antiques
Art
Baby
Books
Business & Industrial
Cameras & Photo
Cars, Boats, Vehicles & Parts
Cell Phones & PDAs
Clothing, Shoes & Accessories
Coins & Paper Money
Collectibles
What's your BAG?
Class
Adventure
Glam
Wild
I'm NOT A Plastic Bag
Eco Friendly
In the News
Comic Con Batmobi
SOLD OUT TICKETS
My eBay at a Glance
Sign in for a snapshot of your personalized information on the homepage.
Not Just for Kids
Dolls & Bears
Get Ready to Rock
Musical Instruments
Collect them all
Coins

Impact of Eye-Tracking

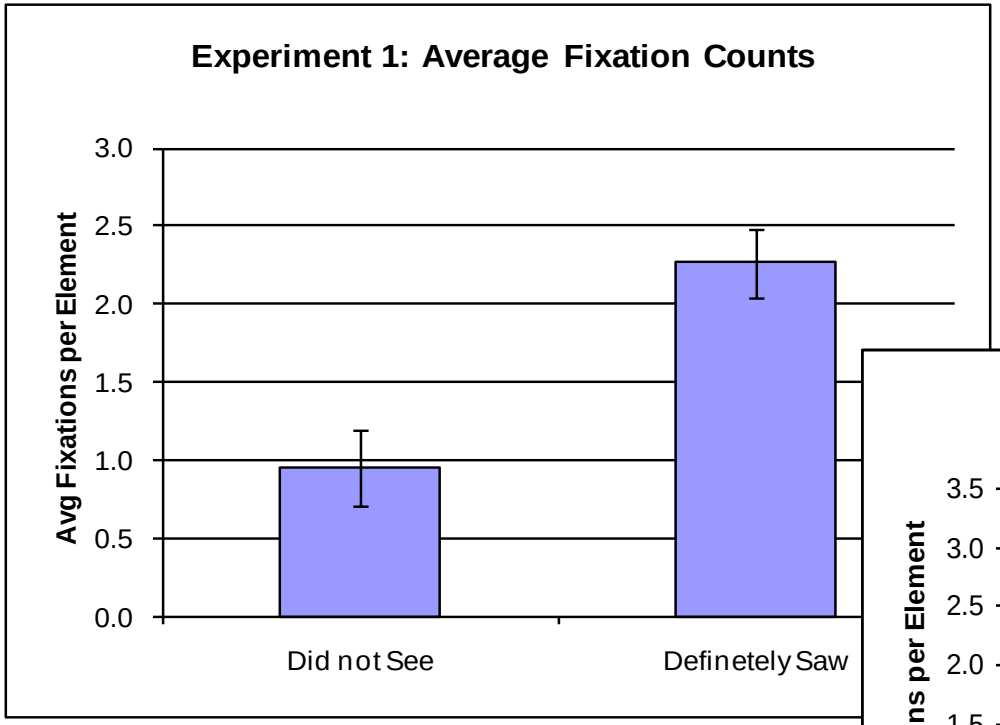


There was no impact of using eye tracking technology on self-reported measures

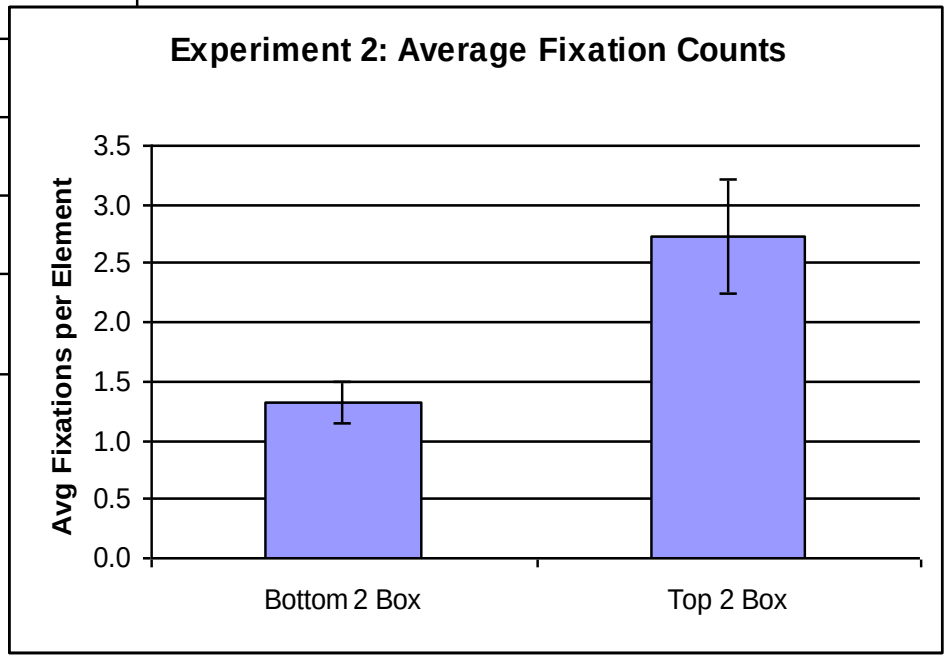


No statistical difference between the ET (n=40) and NET groups (n=40)

Fixation Counts

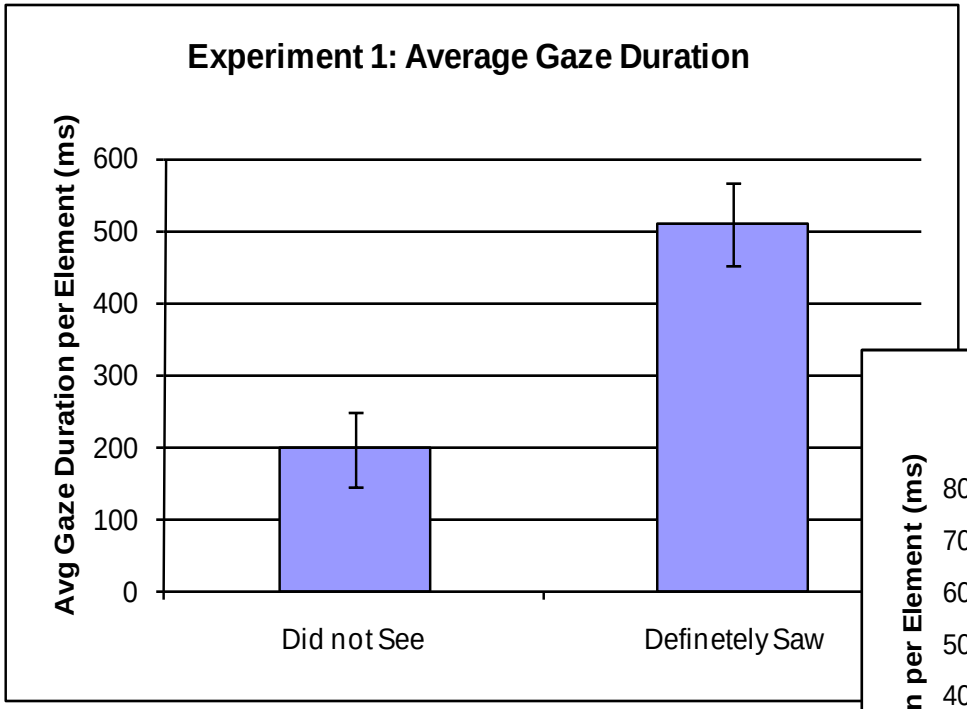


There were significantly more fixations for those that reported "definitely saw" top-2 box

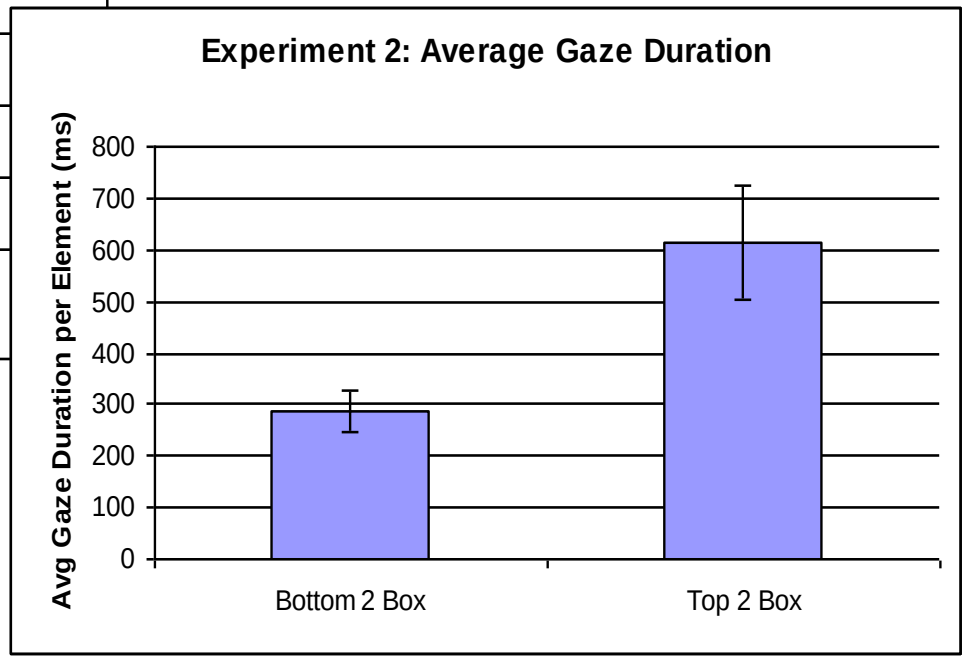


Results indicate that what participants report is initially supported by eye movement data

Gaze Duration



Significantly longer time spent looking for those that reported "definitely saw" or were top-2 box



Consistent with fixation counts, self-reported awareness has some basis in the eye movement data

Response Outcomes

Responses	Errors	Success
Definitely saw (Expt. 1) or top 2 box (Expt. 2)	False alarm (gaze duration = 0ms)	Hit (gaze duration > 250 ms)
Definitely did not see (Expt. 1) or bottom 2 box (Expt. 2)	Miss (gaze duration > 500 ms)	Correct rejection (gaze duration < 250 ms)

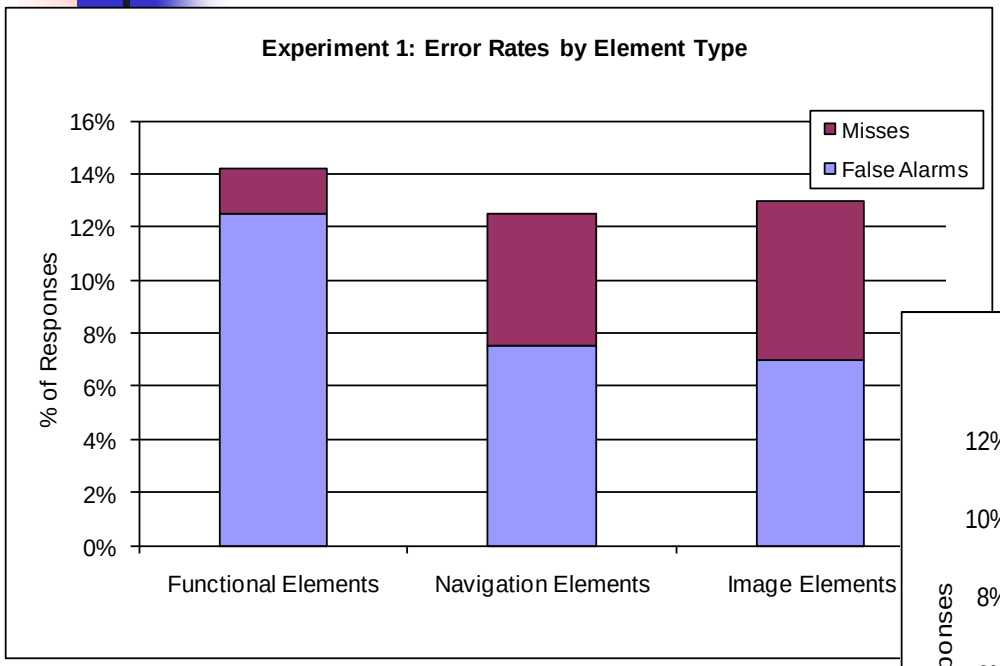
Experiment 1

Responses	Errors	Success
Definitely saw	10.2% (false alarm)	28.2% (hit)
Definitely did not see	4.8% (miss)	27.0% (correct rejection)

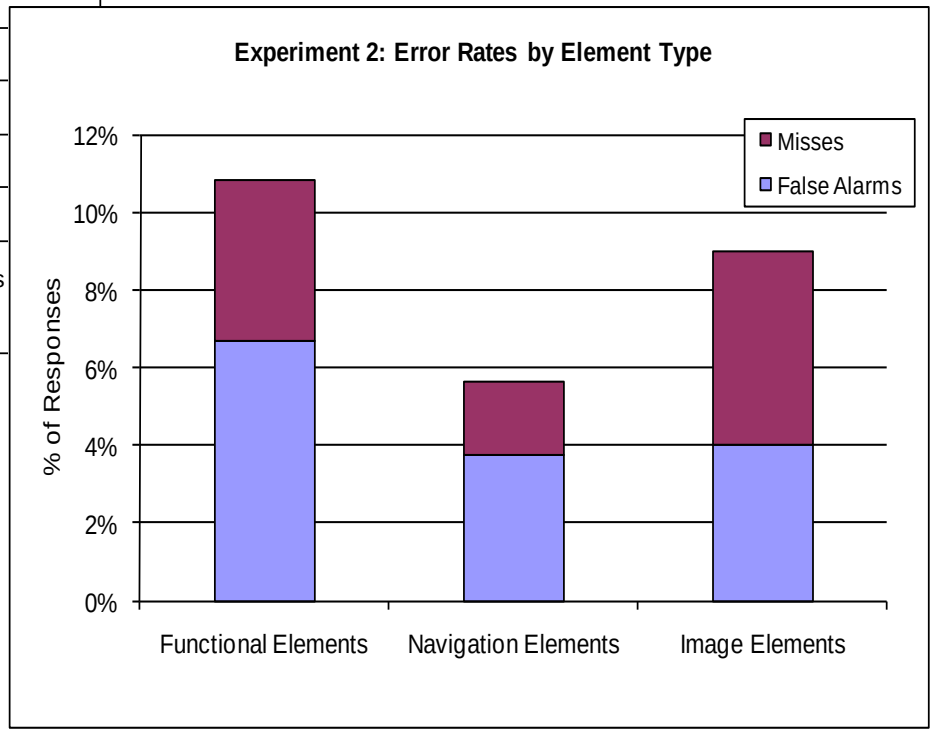
Experiment 2

Responses	Errors	Success
Top 2 box	4.8% (false alarm)	11.7% (hit)
Bottom 2 box	12.6% (miss)	22.1% (correct rejection)

Object Types



No statistical differences between the three types of elements (Expt 1)



Functional-based elements have higher false alarm rates than other element types

Results of Memory Test

Surprising how many participant had a false recollection

But, a more continuous question gives participants more leeway in how they respond

Response	**Percent**
Definitely saw (Experiment 1)	26.8%
Top 2 box (Experiment 2)	8.9%

False Alarms Make Sense

- A *false alarm* scenario
  - The design team wants to test if a particular object is noticed
  - During a usability evaluation they ask participants whether or not they noticed a particular object
  - Some participants may say they noticed the object, but did not
  - The design team incorrectly concludes that the object is visually prominent enough, and no steps are required to increase its visual prominence
- False alarm scenarios happen and should be avoided

Misses Don't Make Sense

- A*miss* scenario
  - The design team wants to make sure an object is NOT noticed
  - They run a usability evaluation, and ask the participants if they noticed a particular object
  - Some of the participants report not seeing the object, whereas they actually did notice it
  - The design team incorrectly concludes that the object is well hidden, and they don't need to make it less prominent
- How common is this?

False Alarms Give Us Hope

- In Experiment 1, there was a false alarm rate of about 10%
- In Experiment 2, there was a false alarm rate of 5%
- Navigation and image-based elements had a lower false alarm rate in both experiments

- Is this an acceptable error rate?

Other Side of Coin

- Experiment 1 confirmed 55% of responses
  - 28% hit rate (said they saw when they really did)
  - 27% correct rejection (said they did not see, when they did not look)
- Experiment 2 confirmed only 34% of responses
  - 12% hit rate
  - 22% correct rejections
- If you want to be sure they saw something, ask a more discrete question about awareness

Study Limitations

- Mind's-eye hypothesis
- No tasks were given, only orientation to the home pages
- Did not control for level of familiarity

Study Conclusions

- Usability practitioners should feel confident in collecting self-reported awareness measures from participants. They will not draw an incorrect conclusion more than 10% of the time.
- If a practitioner wants to minimize the chance of making an incorrect conclusion, they should use a continuous (5- or 7-point) scale for self-reported awareness
- If a practitioner wants to maximize the likelihood of confirming that a participant did or did not see an element, they should use a discrete set of questions for self reported awareness
- Participants are more reliable in their self-reported awareness for navigation and image elements, than functional elements, regardless of question structure.

Take Home Message

- Think about how you ask an awareness question
- Be careful how you interpret their response
- Eye tracking still **VERY** useful as part of UX research - it all depends on the question you are asking!

Thank You!

Full article:

Reliability of Self-Reported Awareness Measures Based on Eye Tracking, Journal of Usability Studies, 5(2), 50-64

http://www.upassoc.org/upa_publications/jus/

Questions or praise

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