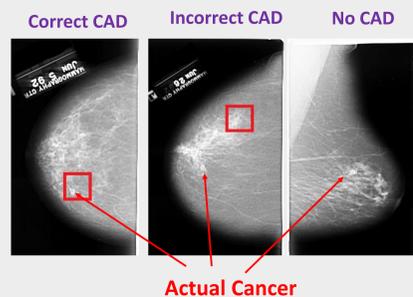
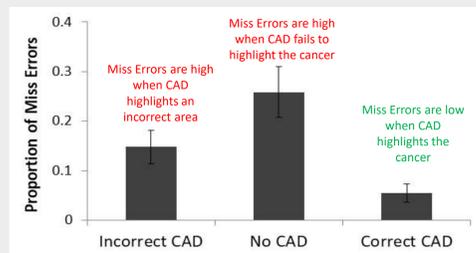


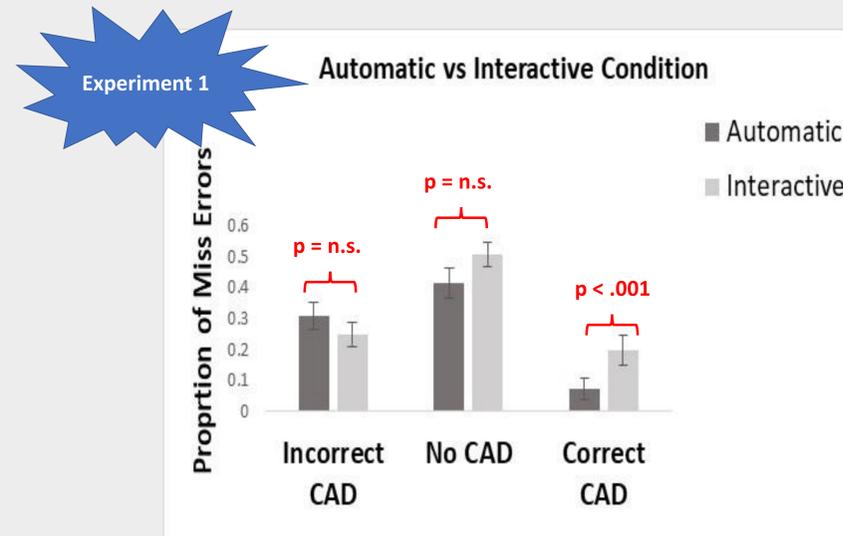
The Optimal Way to Use Computer Aided Detection in Low Prevalence Search

Melina Kunar

- People miss a high proportion of targets that only appear rarely (Wolfe et al., 2005)
- This Low Prevalence Effect occurs when searching a mammogram for a cancer
- Computer Aided Detection (CAD) has been used to highlight potential cancers to help readers find them
- Kunar et al. (2017) found that when the CAD cues were correct cancer detection was improved
- However, when CAD cues were incorrect or failed to appear cancer detection was impaired



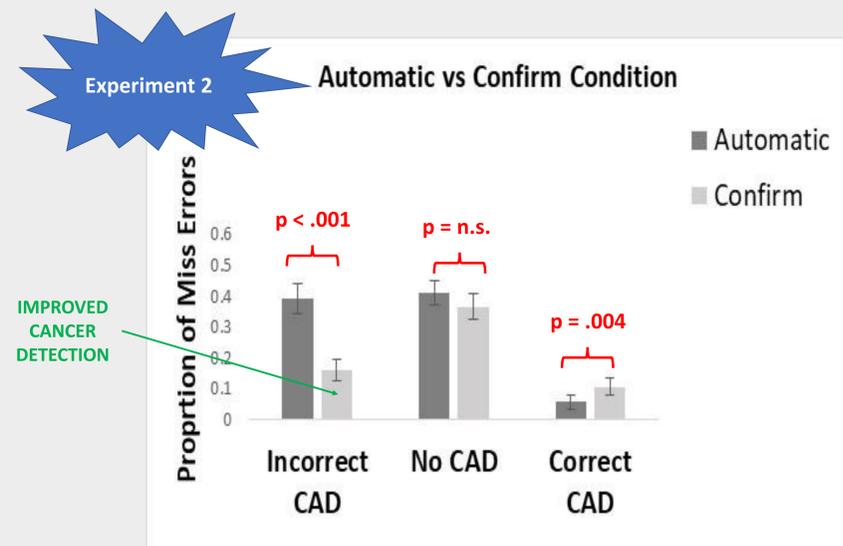
- Can we improve cancer detection by changing the way we present CAD?
- Three conditions were tested (Cancer Prevalence = 10%):
 - 1) Automatic Condition – CAD cues were presented simultaneously with the mammogram (baseline condition, replicating previous research)
 - 2) Interactive Condition – People searched the mammogram first without CAD and then could choose to check CAD (Experiment 1)
 - 3) Confirm Condition – People searched the mammogram first without CAD, then searched the display with CAD to confirm (or change) their response (Experiment 2)



People chose to check CAD on only 34% of trials in the Interactive condition

More Miss Errors in the Interactive Condition with Correct CAD

Overall Miss Errors: Automatic = 26% vs Interactive 32% ($p = 0.04$)



IMPROVED
CANCER
DETECTION

More Miss Errors in the Confirm Condition with Correct CAD

Fewer Miss Errors in the Confirm Condition with Incorrect CAD

Overall Miss Errors: Automatic = 29% vs Confirm 21% ($p < .001$)

Conclusions

- Overall, fewer cancers were missed in the Confirm Condition compared to the Automatic and Interactive Conditions
- Given the choice readers only interacted with CAD on approximately a third of trials

Was there a benefit of Interactive CAD?

- **No**
- Interactive CAD led to *more* missed cancers when CAD was correct
- There were fewer miss errors in the Confirm Condition than in the Automatic Condition when the CAD cue was incorrect

Was there a Benefit when CAD was used to confirm responses?

- **Some**
- Search was improved when CAD was used to confirm response on trials where CAD was incorrect
- However, more cancers were missed when the CAD cues were correct.

References and Acknowledgements

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Wolfe J.M., Horowitz T.S., Kenner N.M. (2005). 435-439-440. Rare items often missed in visual searches. *Nature*. 2005

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