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)

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


This work was a result of an Experimental Psychology Society Small Grant awarded to M.K.