



Australian Government

Department of Defence  
Science and Technology

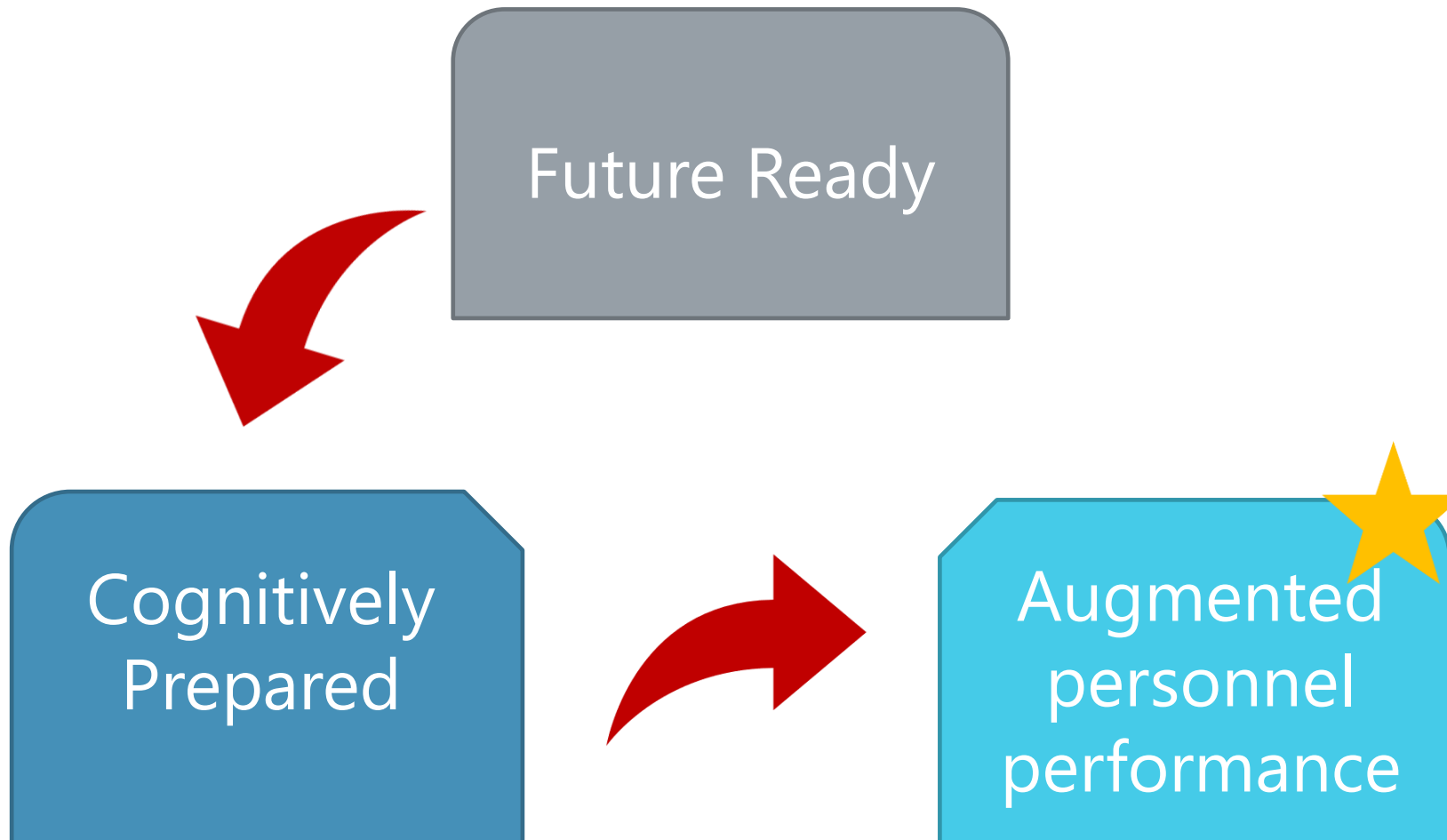


## One size fits one: The benefits of customizing automation to accommodate differences in operator multitasking

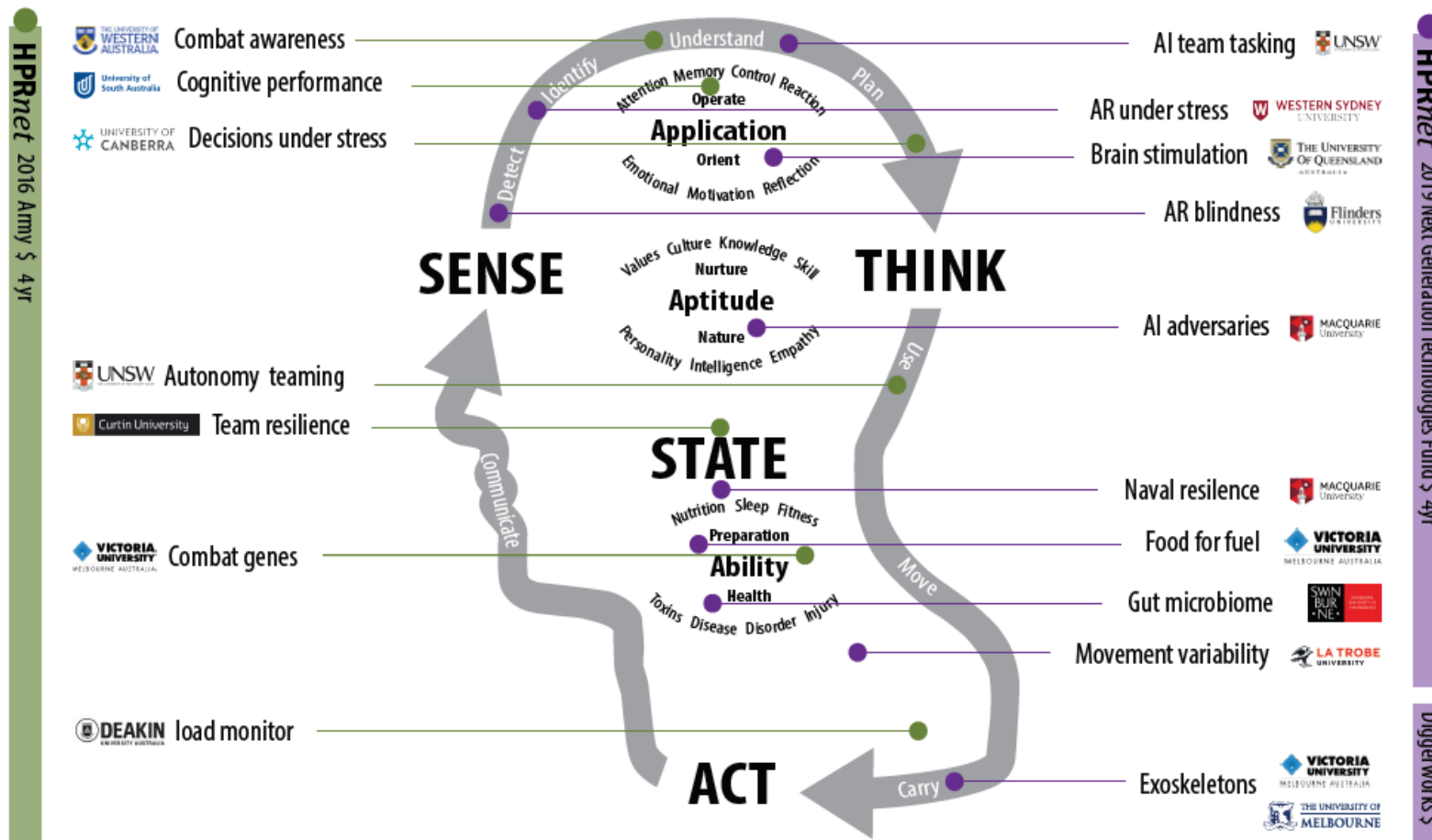
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# ARMY'S ENHANCED HUMAN PERFORMANCE REQUIREMENTS



# ENHANCING WARFIGHTER SITUATION AWARENESS PROJECT



# INDIVIDUAL DIFFERENCES IN COGNITIVE ABILITIES

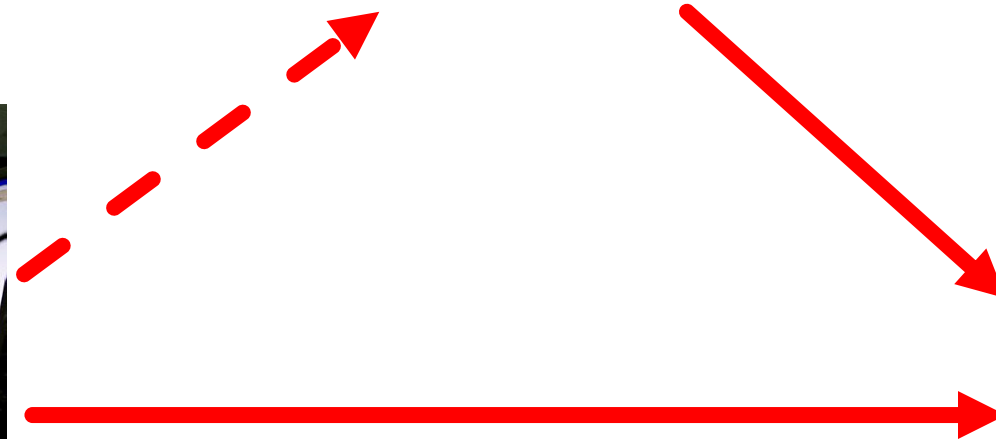


Situation  
Awareness

Multitasking



Task



# PERFORMANCE AND AUTOMATION

- Cognitive resources are limited (Schamcher et al, 2001)
- Automation can help (one size fits all?) (Onnasch, Wickens, Manzey, 2014)
- But, individual differences in cognitive abilities may impact automation benefits (one size fits one?)

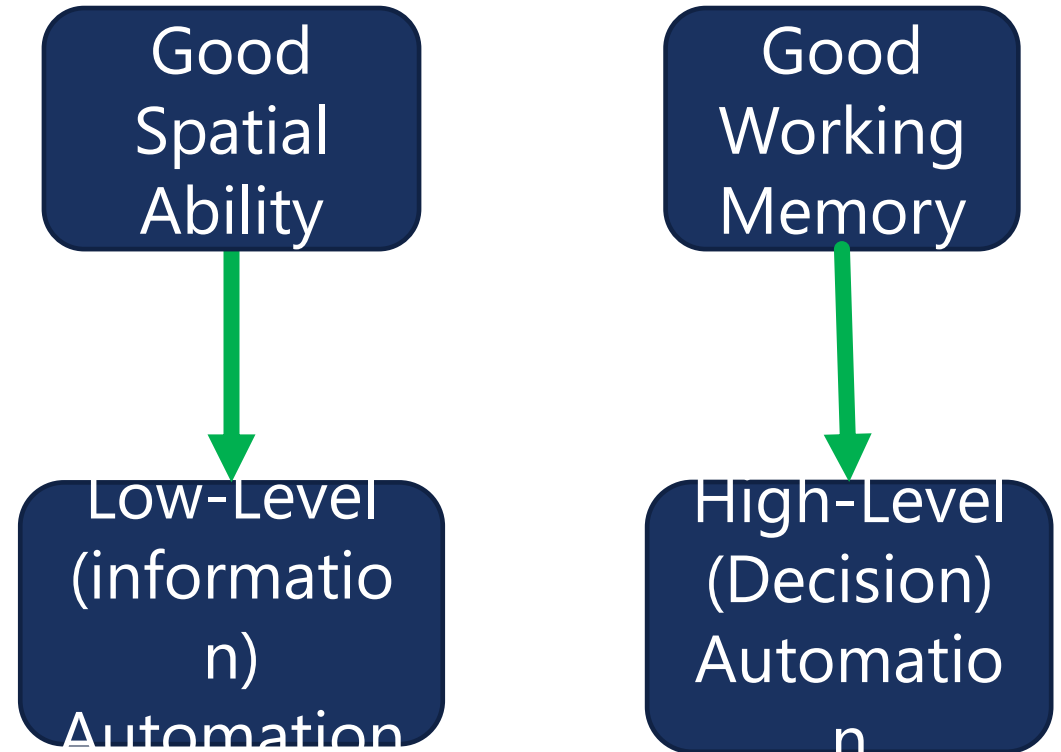


# PERFORMANCE AND AUTOMATION

- Few studies have examined how cognitive abilities relate to automation effectiveness
- Some inconsistent relationships obtained
- Studies do not identify *why* relationships exist because automation was not tied to cognitive ability being related

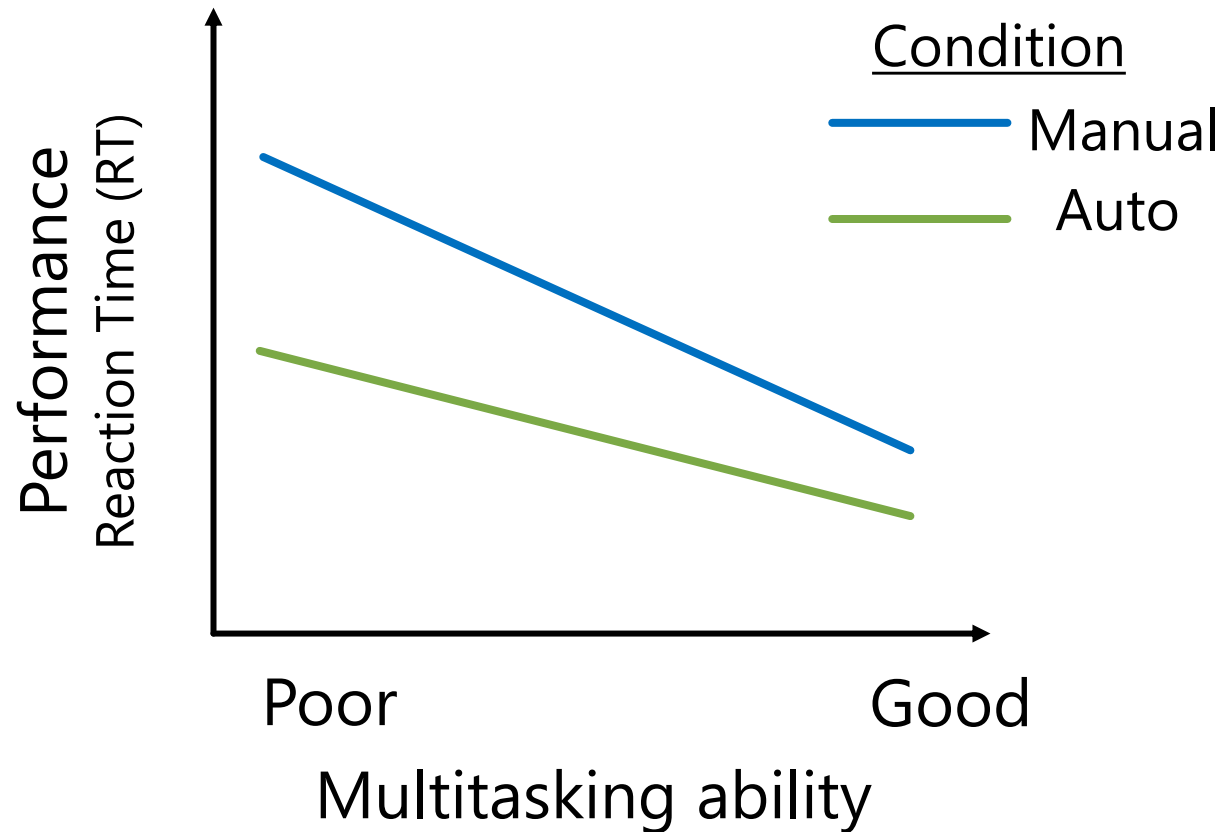
(Wright, Chen & Barnes, 2018)

(Jipp & Ackerman, 2016)

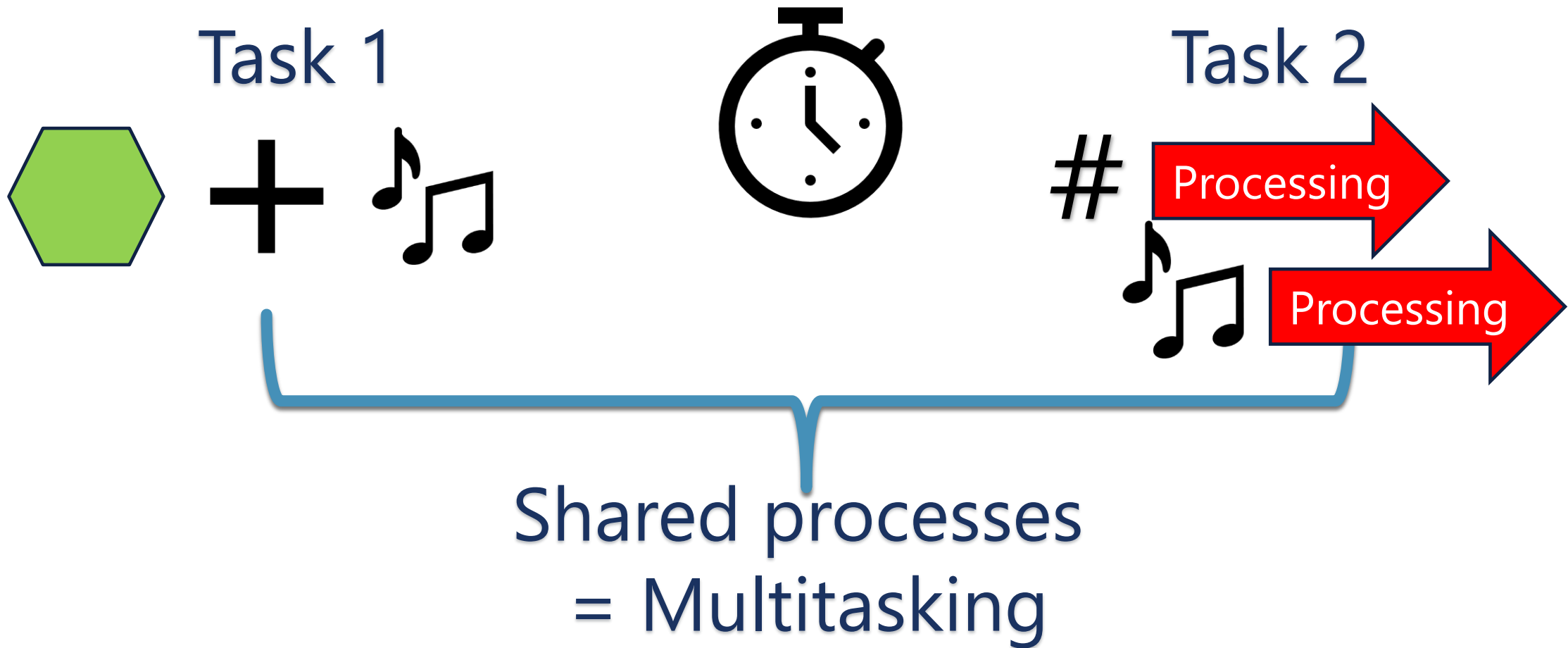


# HYPOTHESIS

Prediction: *Multitasking automation benefit will be moderated by level of multitasking ability*

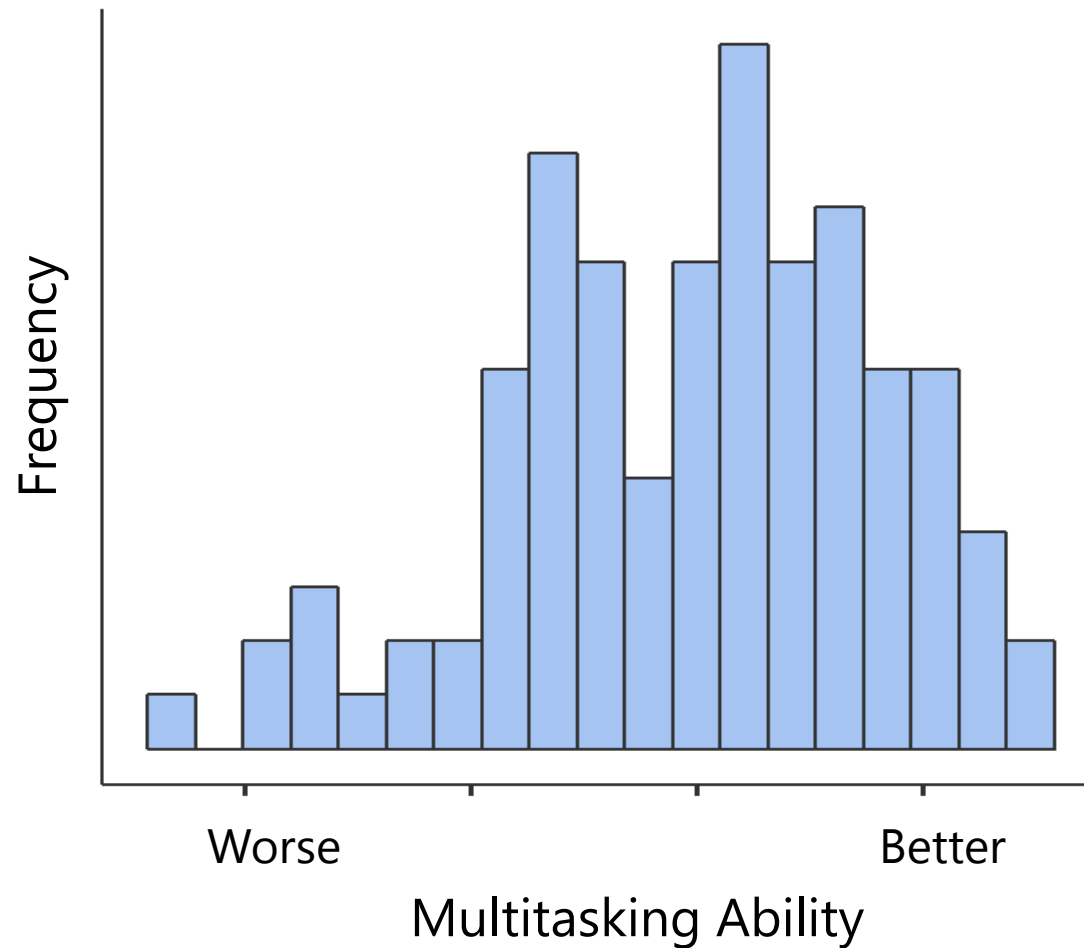


# METHODS 1 – COGNITIVE TASKS





# RESULTS: MULTITASKING ABILITY FACTOR



“What aircraft is on the same flight level as aircraft SQ48?”

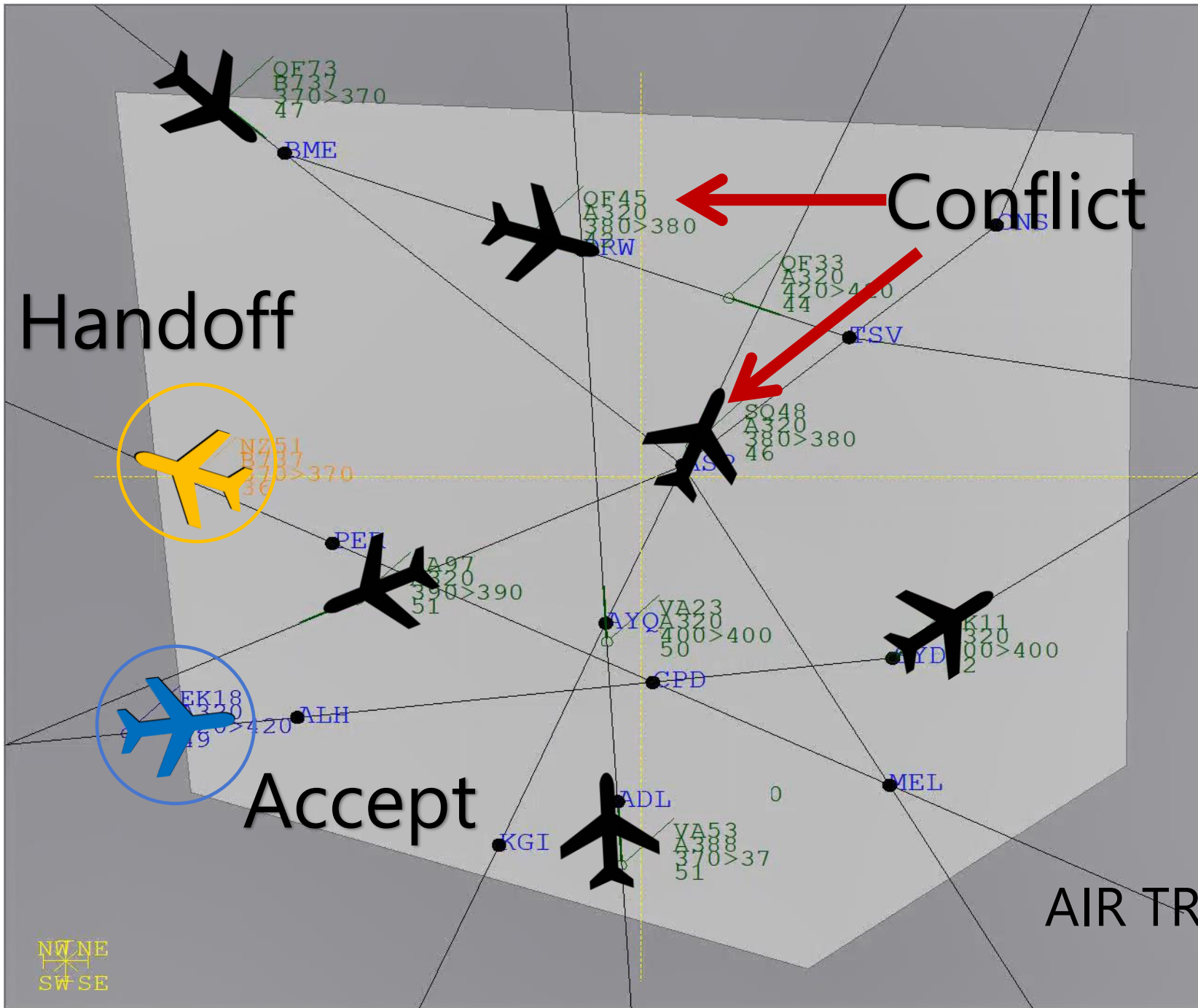
- a) QF45
- b) QF33
- c) EK11
- d) VA23

Handoff

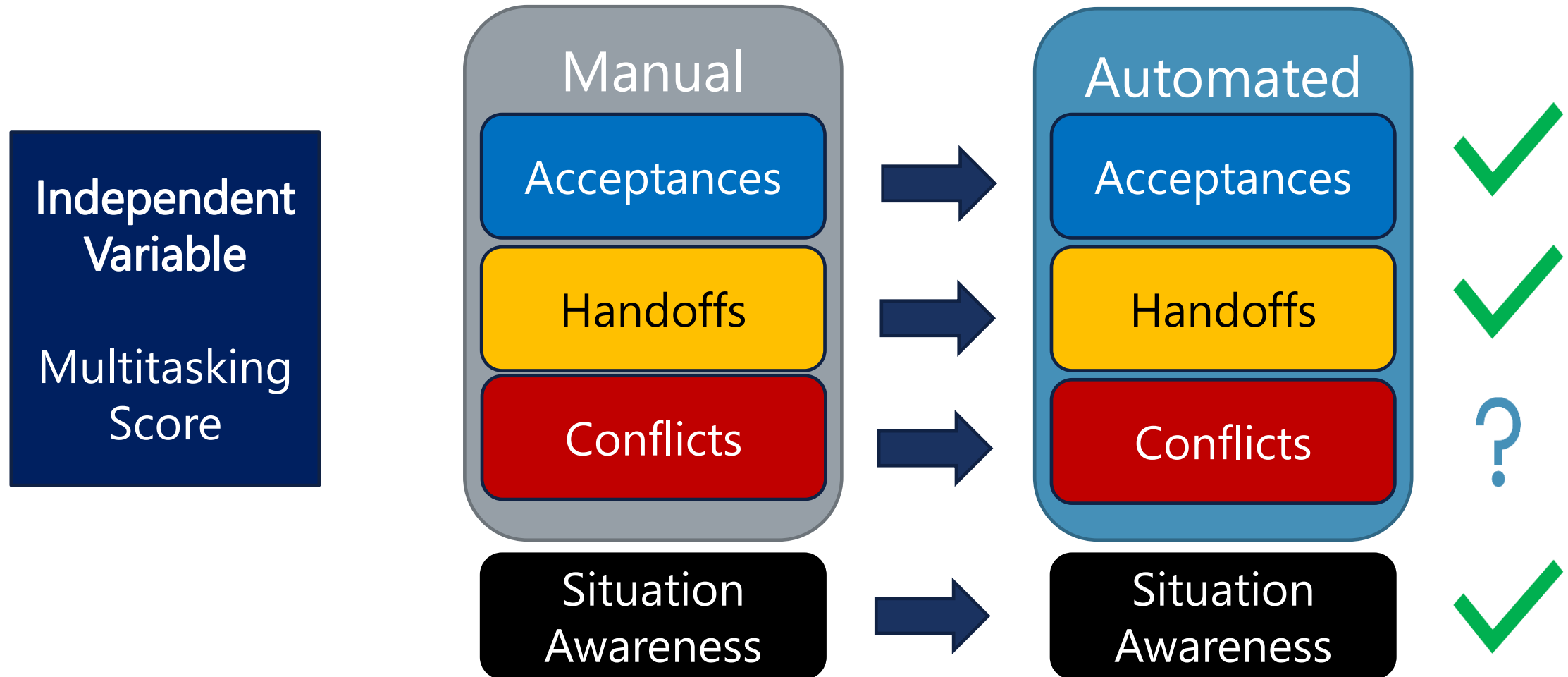
Conflict

Accept

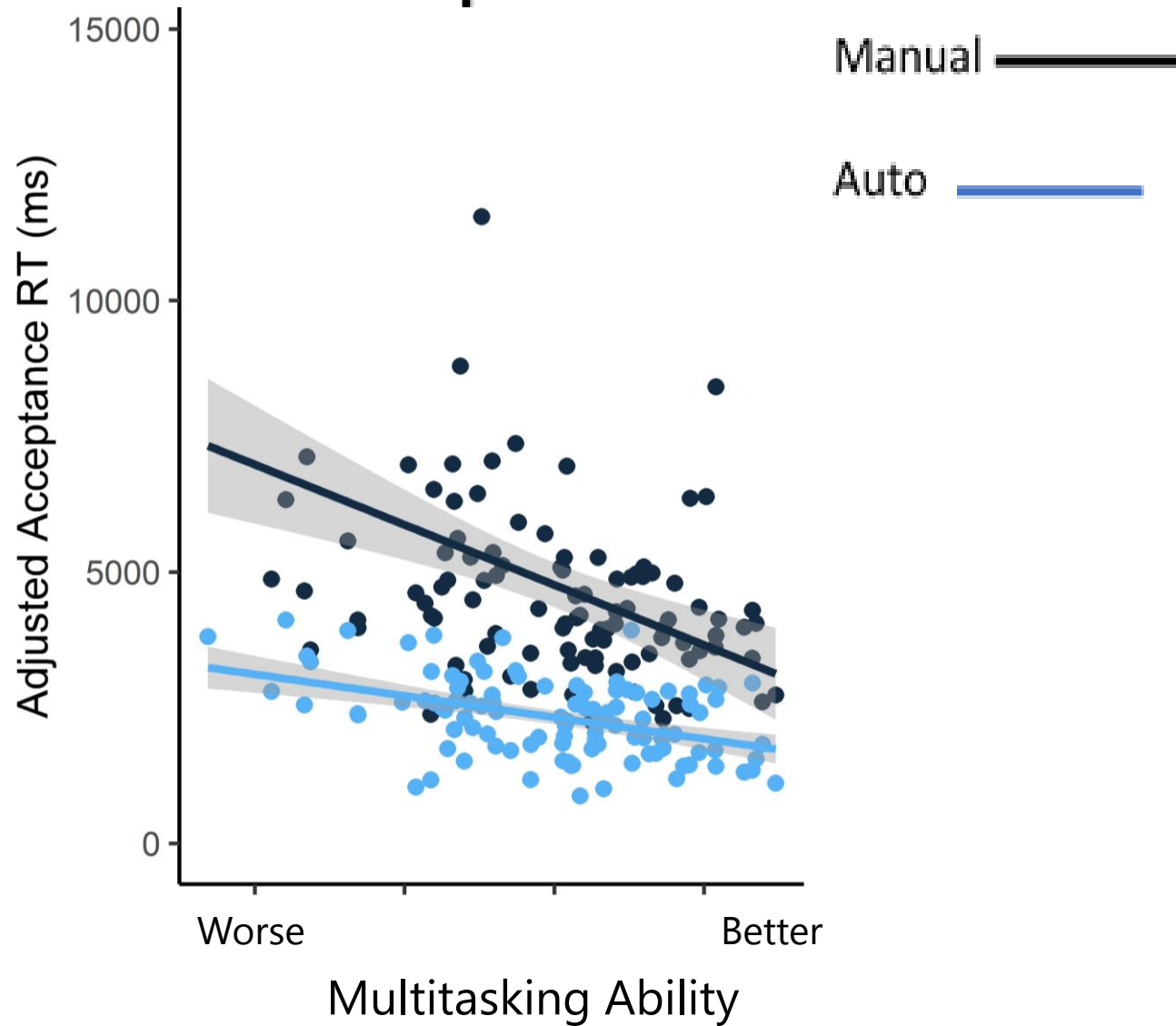
AIR TRAFFIC CONTROL TASK



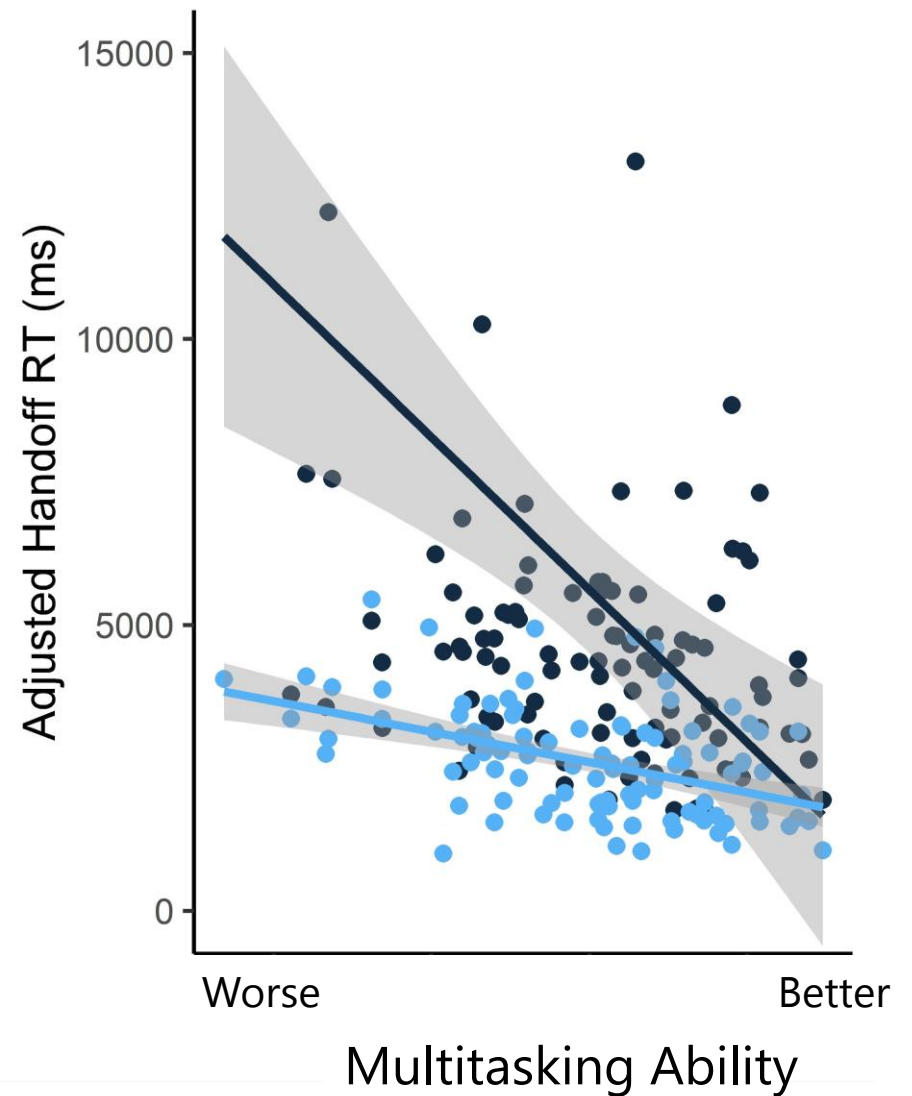
# DESIGN AND PREDICTIONS



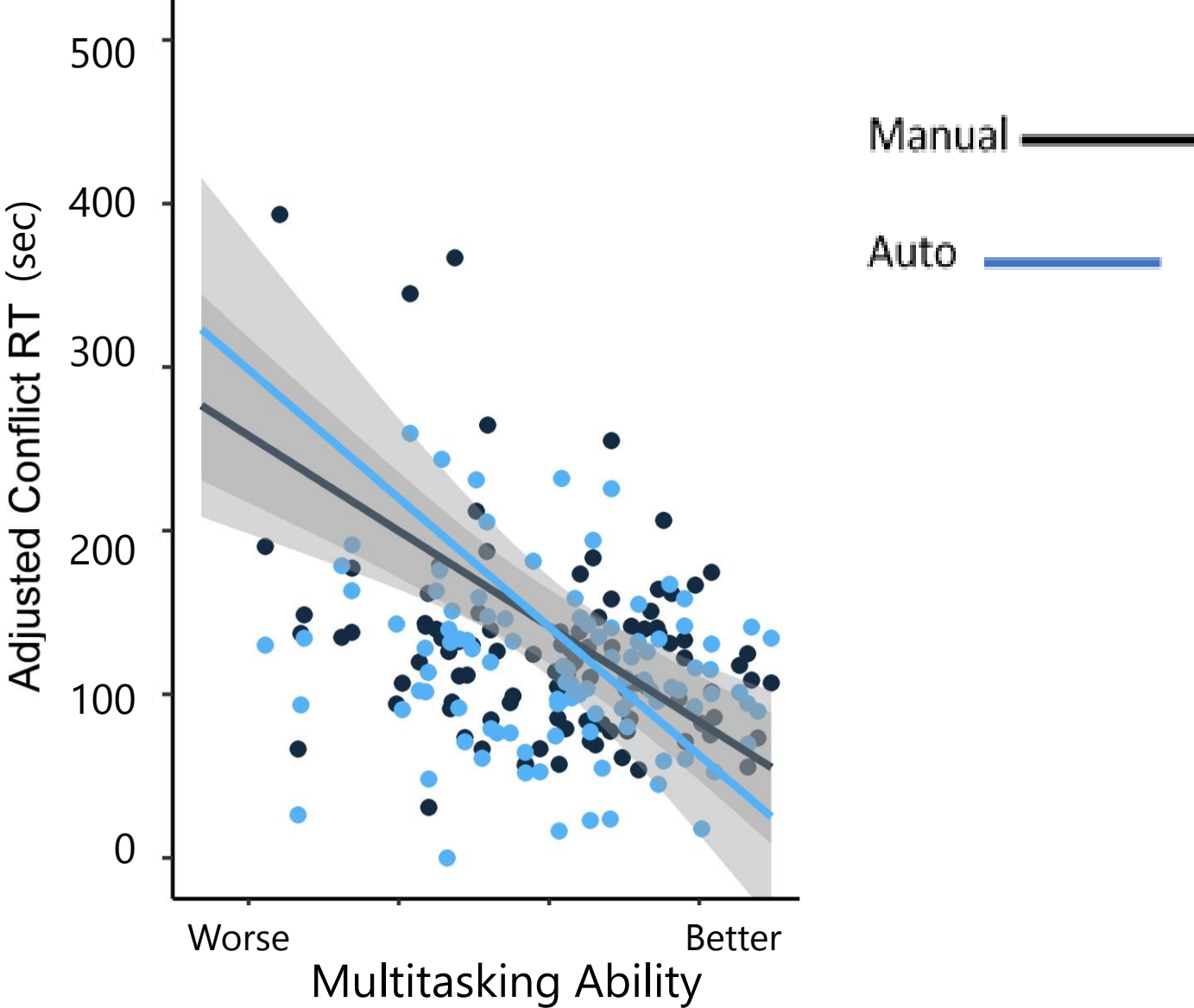
# Acceptances



# Handoffs



# Conflict Detection





## RESULTS SUMMARY

- ✓ Multitasking ability interacted with automation condition to predict acceptances & handoffs
- ✓ Multitasking ability predicted conflicts detection and situation awareness
- ✗ Automation did not benefit conflict detection or situation awareness
- ✗ Multitasking did not interact with condition to predict conflict detection or SA

# IMPLICATIONS



Benefits of multitasking automation can be augmented by matching it to individual differences in multitasking ability.

Army may benefit through better alignment of personnel to roles and tasks.



# FUTURE DIRECTIONS

Automation is not 'one size fits all'

- Matching capable operators to task may not require automation
- Profile personnel to match with optimal automation





THANK YOU

