

Critical Personality Aspects for Human-Machine Interaction in highly automated Aviation

Solveig C.S. Eschen, Katja Gayraud, Doris Keye-Ehing



Background and Partners



- The current study was part of the HYBRID project.
- HYBRID was conducted by the DLR in cooperation with Lufthansa and DFS and was funded by the German Ministry of Education and Research and the DLR within the German Excellence Cluster Competition.



Deutsches Zentrum
für Luft- und Raumfahrt
German Aerospace Center



Background

Working procedures in aviation are becoming more and more automated.

This will probably lead to...

...a reduction of traditional teamwork.



...an increase of human-machine-interaction.



Background

“Humans [...] will constitute the core of the future European ATM System’s operations. However, to accommodate the expected traffic increase, an advanced level of automation support for the humans will be required. [...] The nature of human roles and tasks within the future system will necessarily change.”

(SESAR Definition Phase D3 - The ATM Target Concept, 2007)



The Human-Machine Team

- Future working procedures have to be performed by a human and an automated system in close interaction.

→ A "hybrid team" is formed!



Core Question

Which personality aspects are critical for human-machine interaction in highly automated aviation?



Hybrid Team Questionnaire (HTQ)

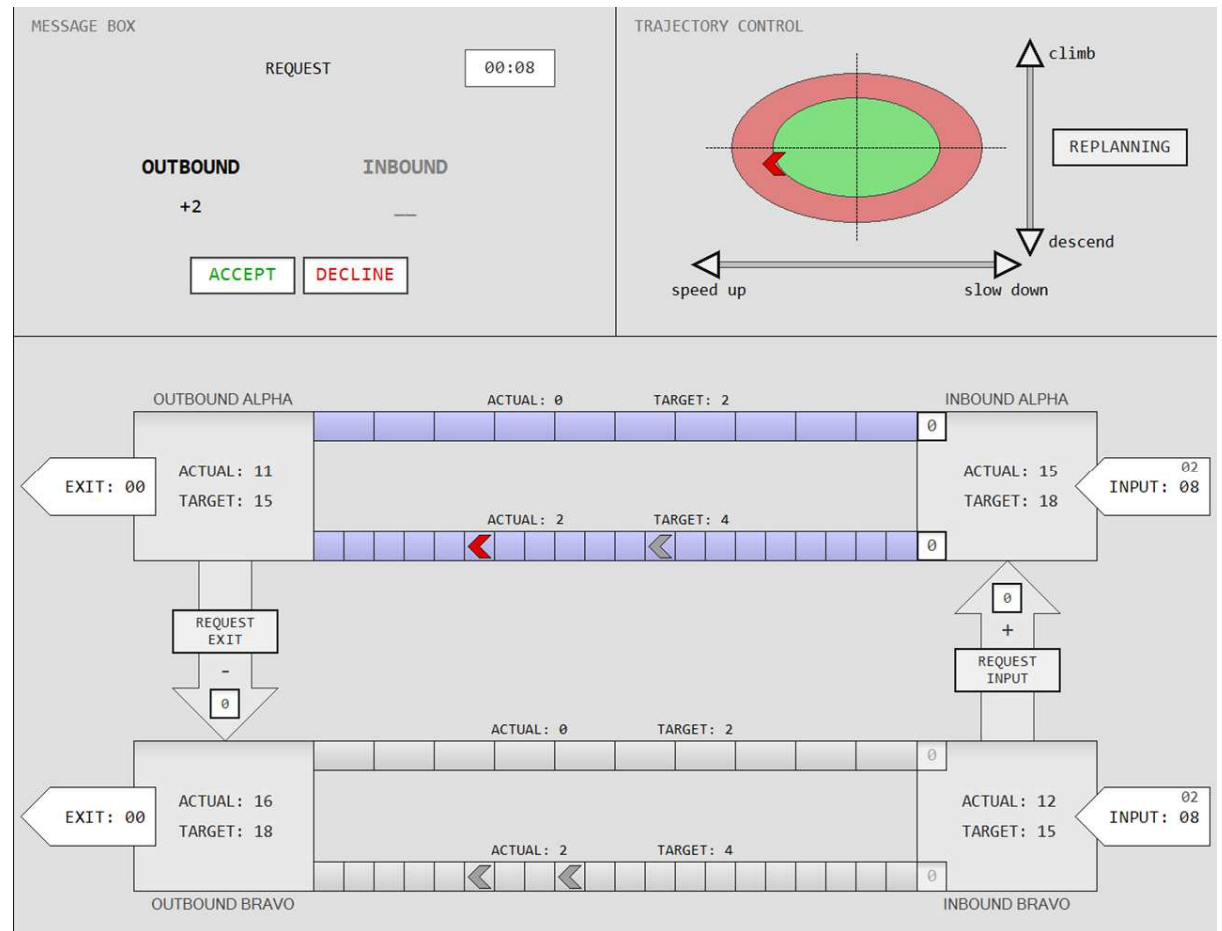


Executing the BART

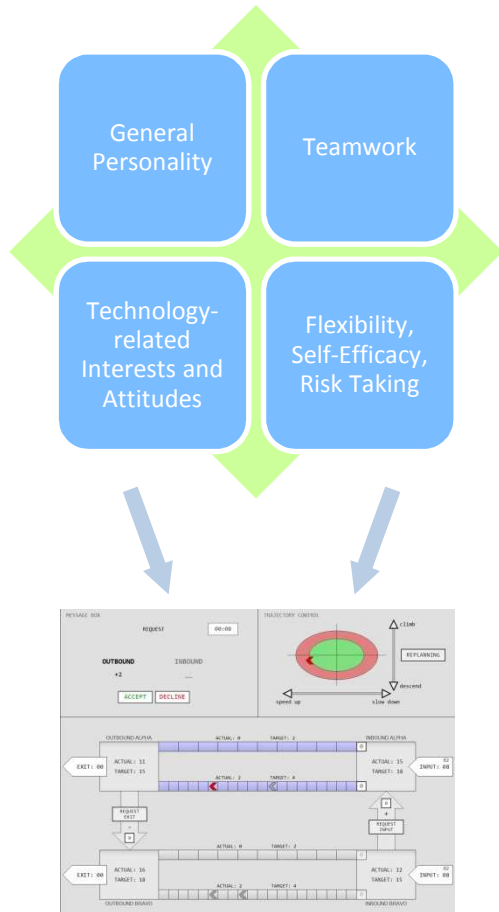


Hybrid Interaction Simulation (HINT)

- Low-fidelity simulation
- Simplified ATM
- No former expertise necessary
- Interaction of a human operator and an automated system



Final Study: HTQ & HINT



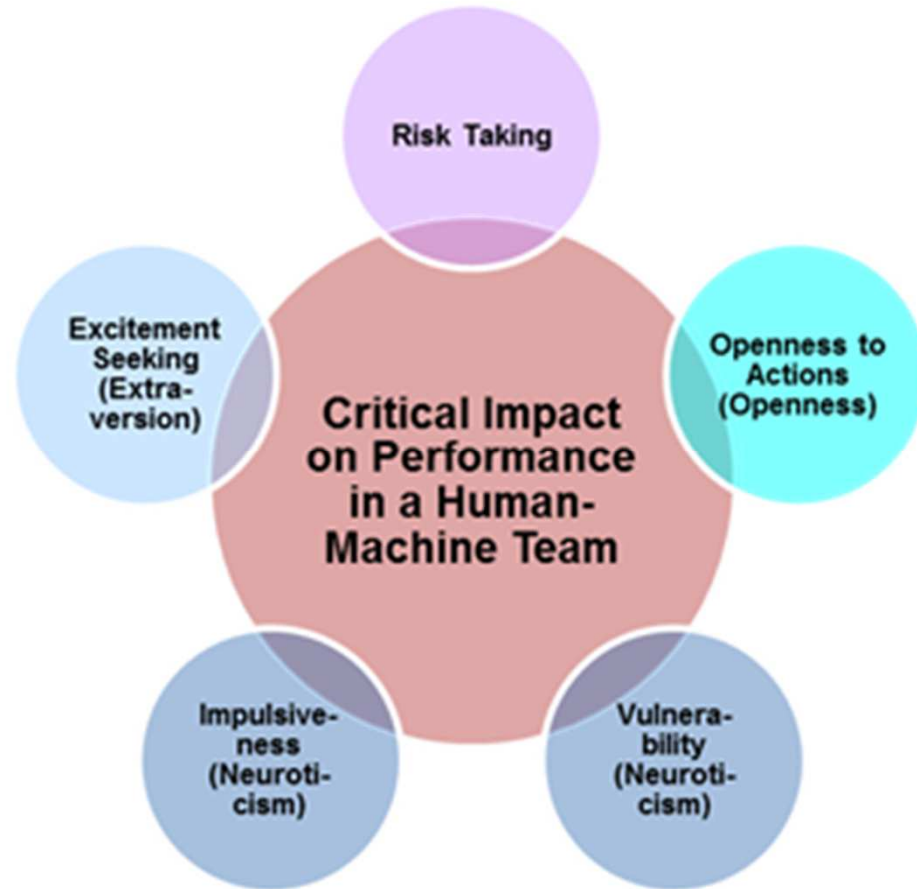
156 ATC & Pilot Applicants
101 DFS Candidates , 55 DLH Candidates
27.6% Female
Age Ø 20.02 Years



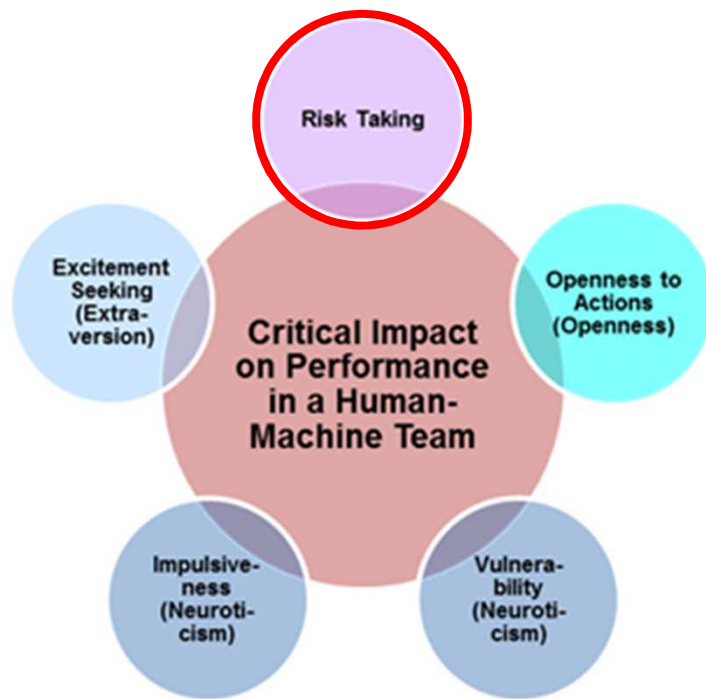
Results: Variables with Critical Impact

Higher values correlate with poorer performance in the HINT simulation

$p = .05 / .01$



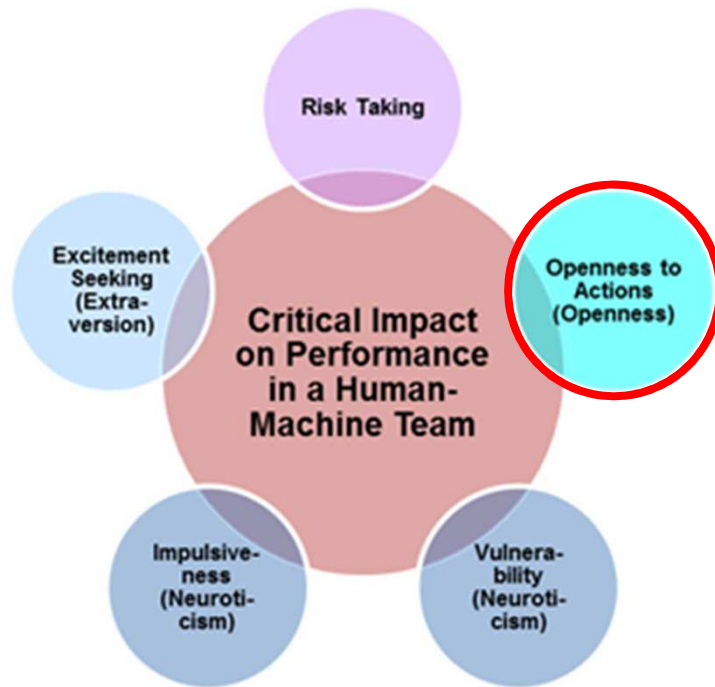
HINT & Risk Taking



Target Deviations : .27*



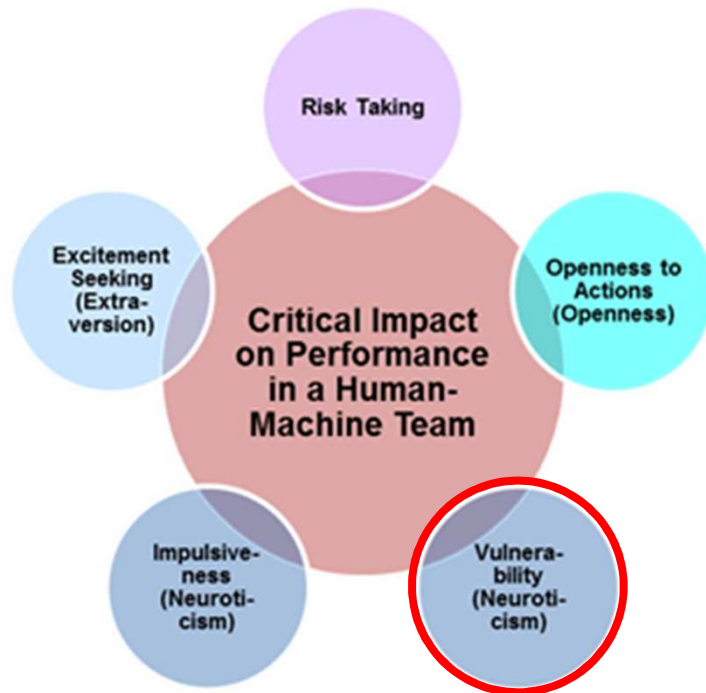
HINT & General Personality



Target Deviations: .24*



HINT & General Personality

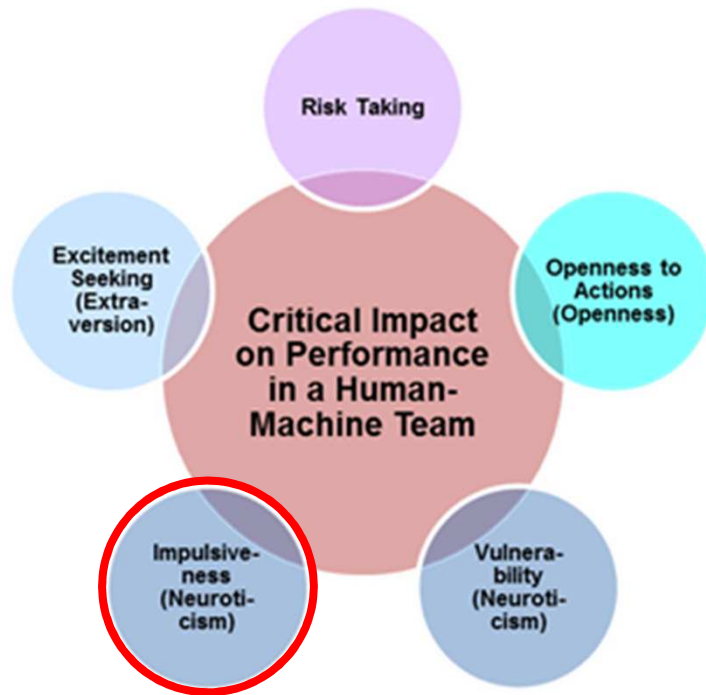


Critical Aircraft Handling: $-.19^*$

Request Acceptance: $-.16^*$



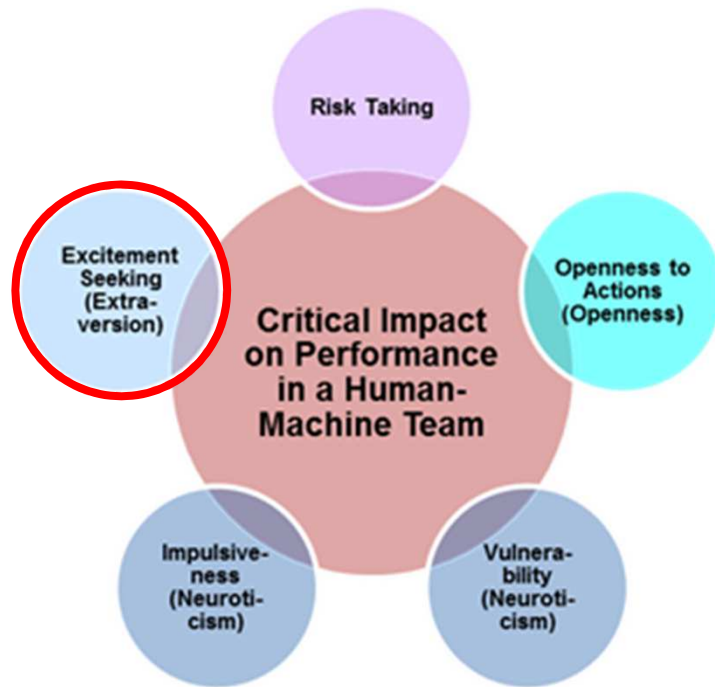
HINT & General Personality



Critical Aircraft Handling: $-.16^*$



HINT & General Personality



Critical Aircraft Handling: $-.18^*$

Target Deviations: $.25^*$



Discussion (I)

- The personality area around **disinhibiting, spontaneous behaviour and sensation seeking** shows several correlations with poorer performance:
 - Only small effect sizes → typical for personality research,
BUT personality is and will be an important part of aptitude for aviation.
- Personality testing adds to performance testing



Discussion (II)

- Former automation research focused on handling of errors of commission and omission (complacency).
 - Lack of research concerning human-automation cooperation with reliable automated systems.
- Explorative design of HYBRID is a first step in this field of research.
 - Hypothesis-based designs should be the next step.



Thank you!

Questions?

Comments?

