

# Interface-Level Significance Analysis Summary

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## Generated from interface\_statistical\_analysis.R

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### Key Findings from Interface-Level Analysis with Statistical Testing

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#### SIGNIFICANT INTERFACES IDENTIFIED:

Interfaces with Significant Differences ( $p < 0.05$ ):

##### Interface 2 (UI2):

- Significant tendency difference ( $p = 0.023$ ,  $d = -0.835$ )
- UEQ+Autonomy shows LOWER tendency scores than UEQ
- Large effect size ( $d > 0.8$ )

##### Interface 8 (UI8):

- Significant rejection difference ( $p = 0.022$ ,  $d = 0.756$ )
- Significant tendency difference ( $p = 0.015$ ,  $d = -0.777$ )
- UEQ+Autonomy shows HIGHER rejection rates and LOWER tendency scores
- Large effect sizes in both measures

##### Interface 11 (UI11):

- Significant tendency difference ( $p = 0.038$ ,  $d = -0.683$ )
- UEQ+Autonomy shows LOWER tendency scores than UEQ
- Medium-to-large effect size

##### Interface 15 (UI15):

- Significant rejection difference ( $p = 0.011$ ,  $d = 0.857$ )
- Significant tendency difference ( $p = 0.043$ ,  $d = -0.629$ )
- UEQ+Autonomy shows HIGHER rejection rates and LOWER tendency scores
- Large effect sizes in both measures

#### SUMMARY STATISTICS:

- **Total interfaces analyzed:** 15 (all with sufficient data  $n \geq 8$ )
- **Interfaces with significant rejection differences:** 2 (UI8, UI15)
- **Interfaces with significant tendency differences:** 4 (UI2, UI8, UI11, UI15)
- **Overall pattern:** UEQ+Autonomy tends to result in more critical evaluations

#### OVERALL INTERFACE-LEVEL EFFECTS:

- **Mean rejection difference:** +3.36% (UEQ+Autonomy slightly higher)
- **Mean tendency difference:** -0.39 points (UEQ+Autonomy slightly lower)

## INTERPRETATION:

While the participant-level analysis showed NO significant overall effects, the interface-level analysis reveals that certain specific interfaces DO show significant differences between UEQ and UEQ+Autonomy evaluation frameworks.

**Pattern:** When significant differences occur, UEQ+Autonomy consistently leads to:

- HIGHER rejection rates
- LOWER release tendency scores
- More critical/conservative evaluation decisions

This suggests that ethics-enhanced evaluation (UEQ+Autonomy) makes evaluators more sensitive to problematic design patterns in specific interfaces, even though this effect doesn't reach significance when averaged across all interfaces and participants.

## FILES GENERATED:

- `plots/interface_rejection_trends_updated_with_stats.png` - Main visualization showing all interfaces with statistical significance markers
- `plots/interface_tendency_trends_updated_with_stats.png` - Tendency score comparison with significance testing
- `results/interface_statistical_tests.csv` - Complete statistical test results for all interfaces

## RESEARCH IMPLICATIONS:

1. **Interface-Specific Effects:** UEQ+Autonomy impacts are not uniform across all interfaces
2. **Effect Heterogeneity:** Some interfaces are more sensitive to ethics-enhanced evaluation
3. **Conservative Bias:** When effects occur, they favor more conservative/critical decisions
4. **Measurement Sensitivity:** Interface-level analysis can detect effects missed in aggregate analysis