VP-A-382-1047 Bot or Not: A Study of the Turing Test in Automated Driving with Affective Transition Modelling
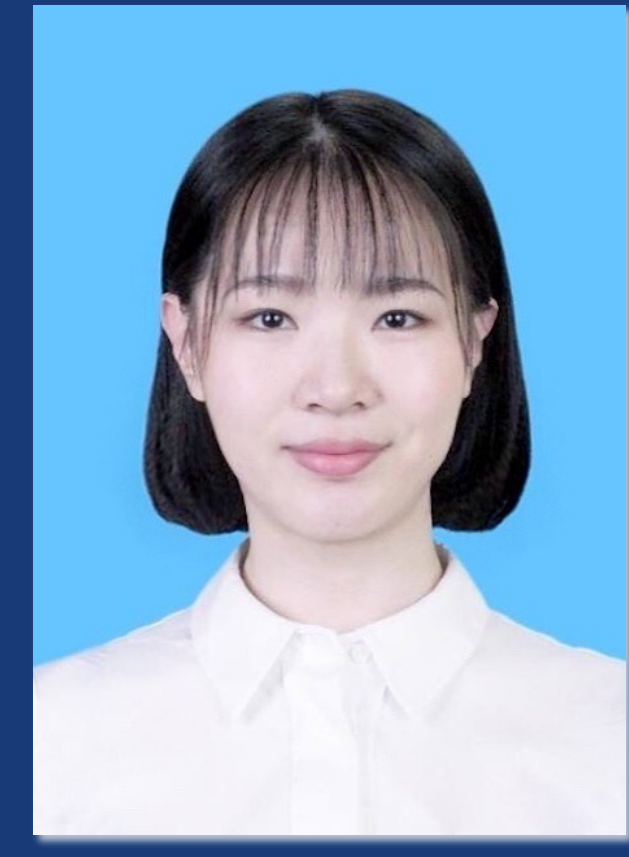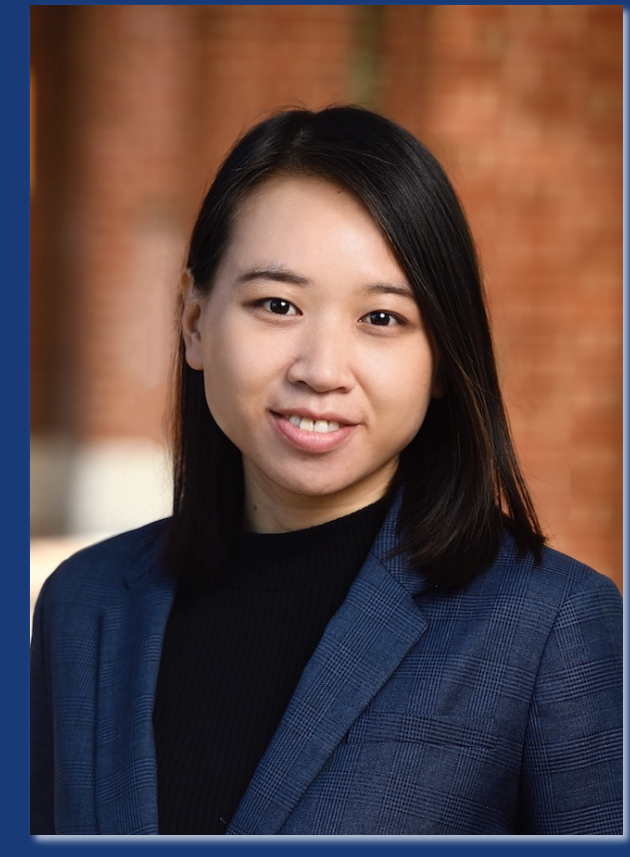
University of Macau — Affective Neuroscience and Decision-making Lab

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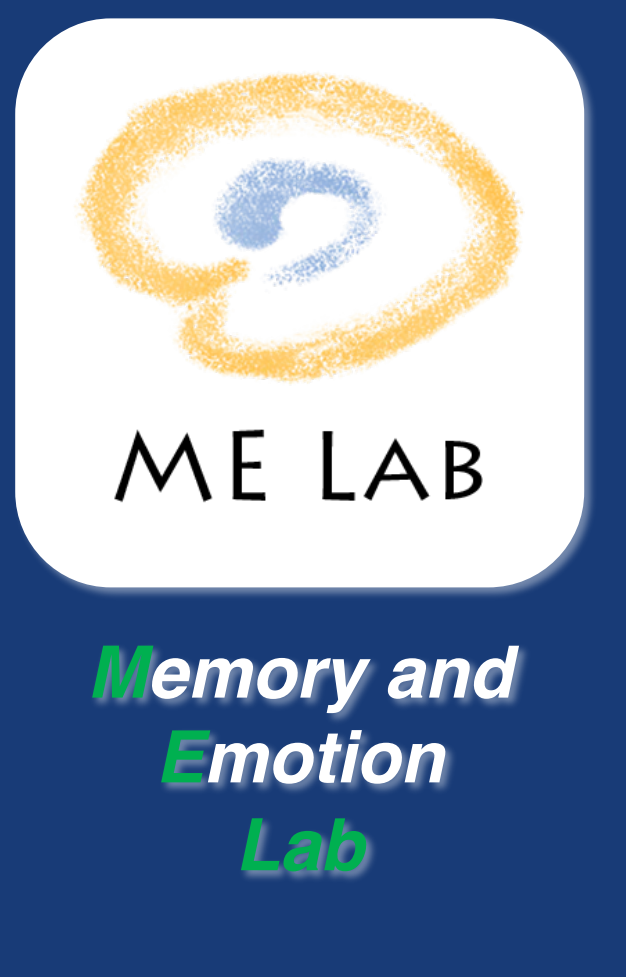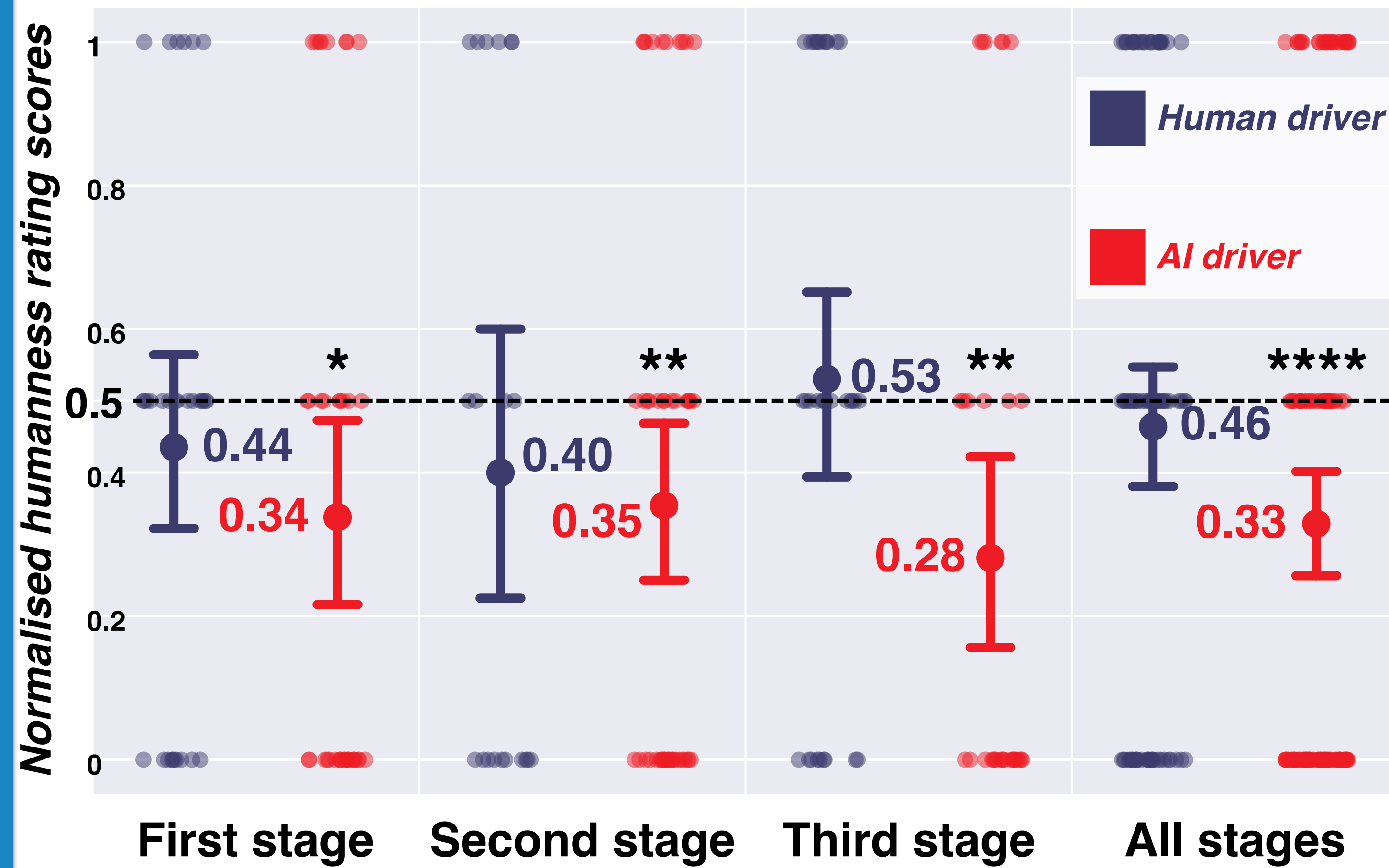
Memory and Emotion Lab — *Sun Yat-sen University*

I. Research Question

RQ1:
How to offer the naturalistic experience from a passenger's seat perspective to measure the humanness of current autonomous cars?
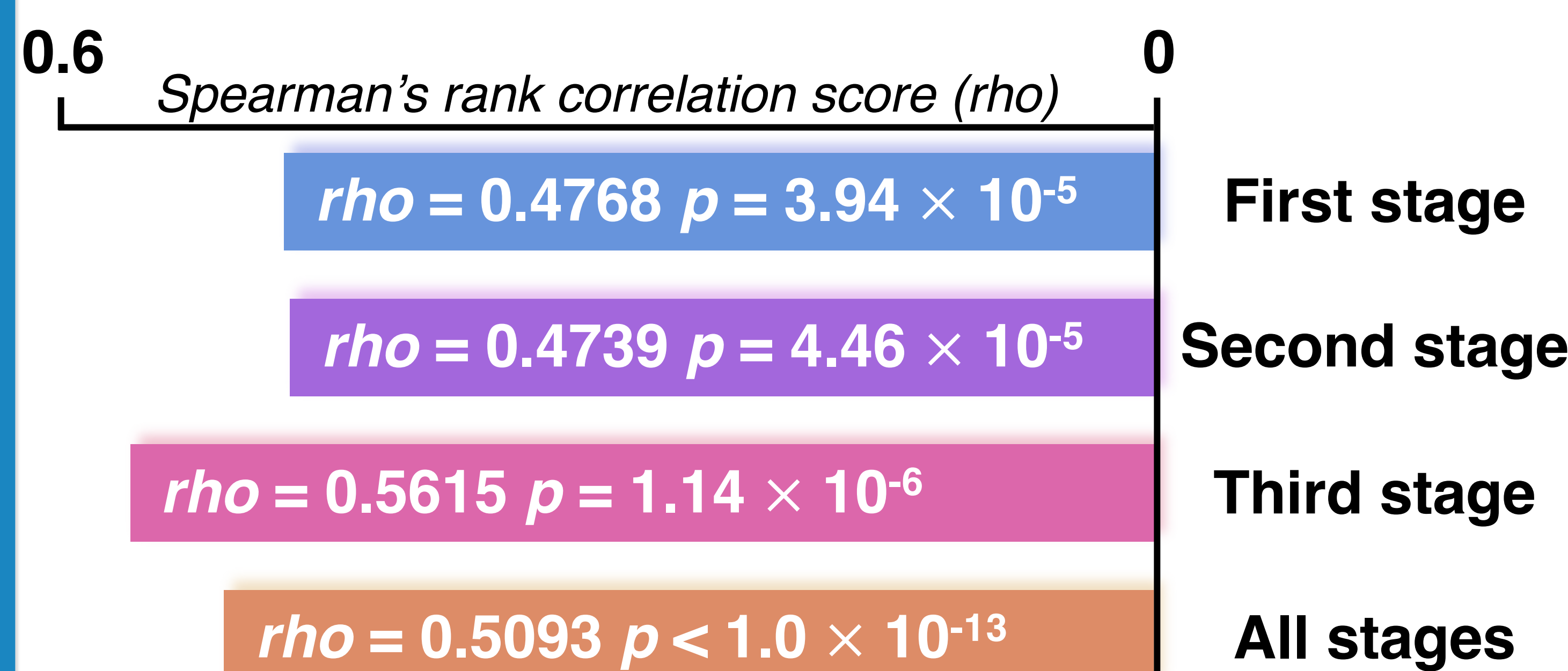
III. AI Driver Failed to Pass the Test

II. Non-verbal Variation of the Turing Test for Automated Driving

IV. Research Question

RQ2:
How do human passengers ascribe humanness in the non-verbal variation of the Turing test?

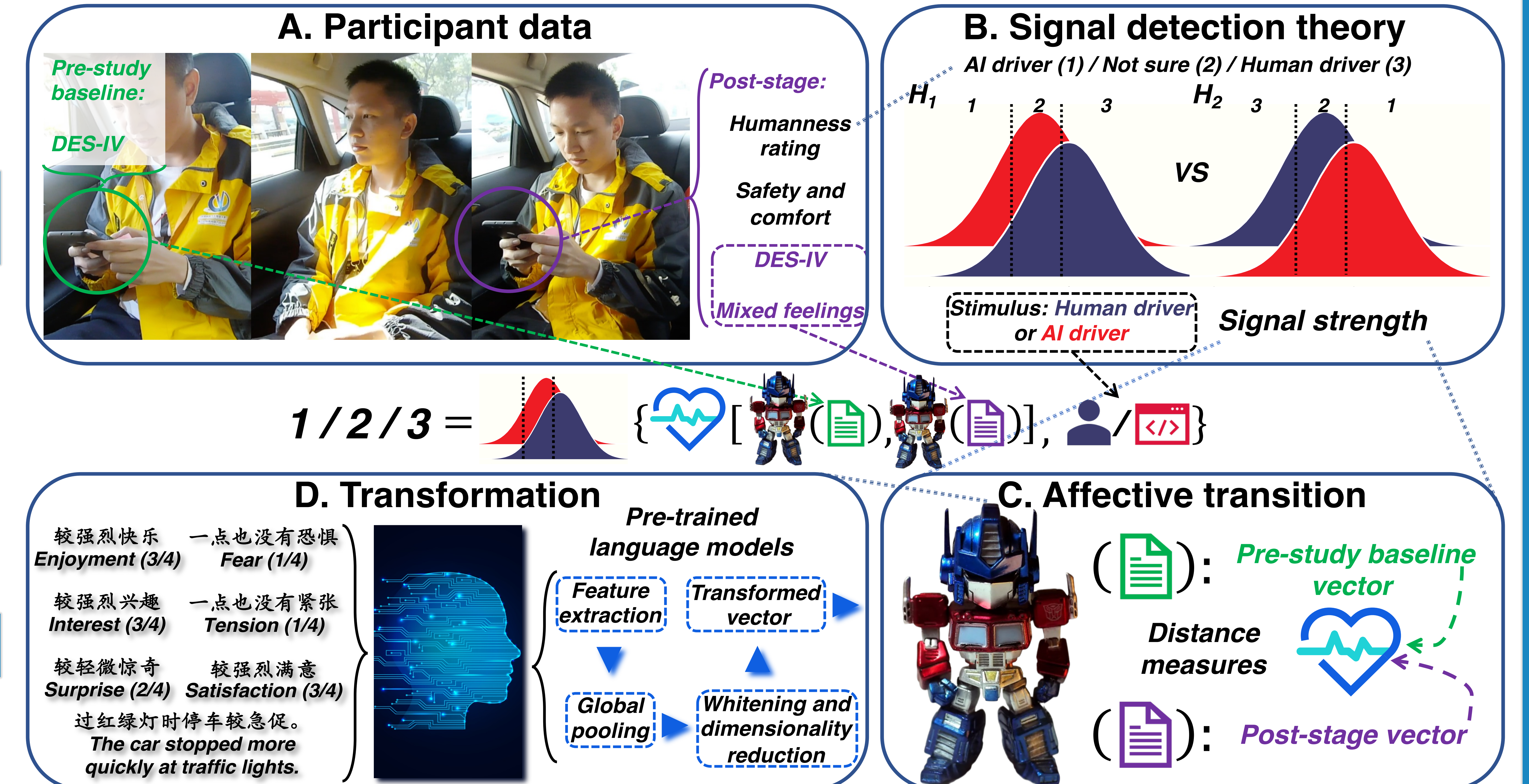## VI. Ascription of Humanness Would Increase with the Greater Affective Transition

0.6 — *Spearman's rank correlation score (rho)* — 0

rho = 0.4768 *p* = 3.94×10^{-5}	First stage
rho = 0.4739 *p* = 4.46×10^{-5}	Second stage
rho = 0.5615 *p* = 1.14×10^{-6}	Third stage
rho = 0.5093 *p* < 1.0×10^{-13}	All stages

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V. Basing the Computational Modelling on Lewin's Field Theory

A. Participant data

Pre-study baseline: **DES-IV**

Post-stage: **Humanness rating** · **Safety and comfort** · *DES-IV* · **Mixed feelings**

B. Signal detection theory

AI driver (1) / Not sure (2) / Human driver (3)

H_1 — 1 2 3 — **VS** — 3 2 1 — H_2

Stimulus: Human driver or AI driver

Signal strength

$1 / 2 / 3 = \{ \heartsuit [\blacksquare (\text{pre}), \blacksquare (\text{post})], \text{human} / \text{code} \}$

D. Transformation

较强烈快乐 一点也没有恐惧
Enjoyment (3/4) Fear (1/4)
较强烈兴趣 一点也没有紧张
Interest (3/4) Tension (1/4)
较轻微惊奇 较强烈满意
Surprise (2/4) Satisfaction (3/4)
过红灯时停车较急促。
The car stopped more quickly at traffic lights.

Pre-trained language models

Feature extraction → Transformed vector

Global pooling → Whitening and dimensionality reduction

C. Affective transition

(pre): *Pre-study baseline vector*

Distance measures

(post): *Post-stage vector*

VII. Discussion

We examined whether the current autonomous cars could create a human-like ride experience for passengers **for the first time:** the AI driver failed to pass our test because passengers detected the AI driver above chance.

We offer the first insights into what renders passengers' subjective ride experience truly human-like: **the passengers' ascription of humanness would increase with the greater affective transition.**