

Submission ID #: 69813

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Project Page Link: <https://review.jove.com/account/file-uploader?src=21293013>

Title: Humor or Rationality? The Neural Mechanisms of How Agent Type and Language Style Influence Satisfaction with Ride-Hailing Service Failure Recovery

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Author Questionnaire

1. We have marked your project as author-provided footage, meaning you film the video yourself and provide JoVE with the footage to edit. JoVE will not send the videographer. Please confirm that this is correct.

✓ Correct

2. Microscopy: Does your protocol require the use of a dissecting or stereomicroscope for performing a complex dissection, microinjection technique, or something similar? **No.**

I

3. Software: Does the part of your protocol being filmed include step-by-step descriptions of software usage? **Yes.**

If **Yes**, we will need you to record using screen recording software.

We recommend using the screen capture program [OBS](#). JoVE's tutorial for using OBS Studio is provided at this link: <https://review.jove.com/v/5848/screen-capture-instructions-for-authors?status=a7854k>

As these files are necessary for finalizing your script, please upload all screen captured video files to your project page as soon as possible:

<https://review.jove.com/account/file-uploader?src=21293013>

4. Proposed filming date: To help JoVE process and publish your video in a timely manner, please indicate the proposed date that your group will film here: **03/15/2026**

When you are ready to submit your video files, please contact our China Location Producer, [Yuan Yue](#).

Current Protocol Length

Number of Steps: 27

Number of Shots: 57

Introduction

Authors: Please note that **the questions will not appear on screen**. Please answer in **stand-alone full sentence with sufficient context**.

INTRODUCTION:

~~REQUIRED: Summarize your research focus and the main questions it aims to answer.~~

- 1.1. **Xiaojia Yu:** We explore neural mechanisms of agent types and language styles on ride-hailing recovery satisfaction.
 - 1.1.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera

~~Describe the research gap or limitation in existing methods and how this protocol addresses them.~~

- 1.2. **Xiaojia Yu:** Traditional approaches lack direct neural evidence; this ERP protocol captures real-time brain activity to reveal underlying cognitive processing mechanisms.
 - 1.2.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera

CONCLUSION:

~~What does this protocol allow researchers to study or measure?~~

- 1.3. **Xiaojia Yu:** The protocol measures users' neural and behavioral responses to agent types and language styles in ride-hailing service recovery strategies.
 - 1.3.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera

~~Describe the most important consideration or challenge when performing this protocol.~~

- 1.4. **Xiaojia Yu:** Accurate stimulus timing, precise electrode placement, low impedance, and rigorous artifact rejection are critical for obtaining reliable ERP data.
 - 1.4.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera

~~How can future studies build on this work? Describe the questions or research directions that can be investigated next.~~

- 1.5. **Xiaoja Yu:** Future research could explore cross-cultural effects, personality influences, and vocal tones in AI-human recovery communication.

- 1.5.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera

Ethics Title Card

This research has been approved by the Ethics Committee of the School of Economics and Management, Harbin Engineering University

Protocol

2. Electroencephalogram (EEG) Recording Setup, E-Prime Task Execution, and Data Acquisition Procedure

Demonstrator: Xiaojia Yu

- 2.1. To begin, conduct a preliminary briefing after the participant arrives at the laboratory [1]. Introduce the core equipment, materials, and the complete experimental procedure step by step [2-TXT].
 - 2.1.1. WIDE: Talent welcoming the participant into the laboratory and beginning the briefing.
 - 2.1.2. Talent pointing to and introducing the core equipment and materials on the laboratory bench. **TXT: Clearly explain tasks and related information**
- 2.2. Provide a written informed consent form to the participant [1]. Instruct the participant to carefully read the form and sign it before the experiment commences [2].
 - 2.2.1. Talent handing the informed consent form to the participant.
 - 2.2.2. Shot of the participant reading and signing the consent form.
- 2.3. Instruct the participant to wash their hair with neutral shampoo in the designated area to remove scalp oil, dust, and impurities that may affect electrode conductivity [1]. Using the laboratory-provided hair dryer, thoroughly dry the hair to ensure no damp areas remain [2-TXT].
 - 2.3.1. Talent guiding the participant to wash their hair in the designated washing area.
 - 2.3.2. Talent using the laboratory-provided hair dryer to dry the participant's hair. **TXT: Set hair dryer to medium airspeed and constant temperature of about 50°C**
- 2.4. Then guide the participant into the dedicated EEG (E-E-G) recording laboratory equipped with electromagnetic shielding and sound insulation [1-TXT]. Instruct the participant to sit in the comfortable chair about 1 meter from the center of the screen [2].
 - 2.4.1. Talent escorting the participant into the electroencephalogram laboratory. **TXT: Temperature : 22°C, dim lighting**
 - 2.4.2. Talent positioning the participant in the chair at a 1 meter distance from the screen.
- 2.5. Using 75 percent medical alcohol cotton balls and non-irritating facial cleanser, gently wipe the specified facial areas of the participant [1].

- 2.5.1. Talent wiping the participant's face with alcohol cotton balls and facial cleanser.
- 2.6. Position the electrode cap equipped with 64 silver-silver chloride electrodes on the participant's scalp [1-TXT]. Align the midline of the cap with the nasion toinion line, then place the CZ (C-Zed) electrode at the vertex [2].
 - 2.6.1. Talent placing the electrode cap on the participant's scalp. **TXT: Position electrodes according to the International 10 - 20 system**
 - 2.6.2. Shot of the midline of the cap being aligned with the nasion toinion line and the CZ electrode being placed at the vertex.
- 2.7. Verify that Fp1 (F-P-One) and Fp2 are approximately 2 centimeters above the nasion [1] and that T3 and T4 are approximately 2 centimeters above the ear tragus [2].
 - 2.7.1. Shot of the Fp1 and Fp2 in place 2 cm above the nasion.
 - 2.7.2. Shot of the T3 and T4 electrodes in place 2 cm above the ear tragus.
- 2.8. Fill all electrode wells with conductive gel [1]. Then secure external electrodes with medical tape [2]. Place the reference electrode on the tip of the nose [3].
 - 2.8.1. Shot of conductive gel being applied into the electrode wells.
 - 2.8.2. Talent securing external electrodes with medical tape.
 - 2.8.3. Talent placing the reference electrode on the nose.
- 2.9. Position the vertical electrooculogram electrodes 1 centimeter above and below the left orbital socket [1]. Then place the horizontal electrooculogram electrodes 1 centimeter lateral to the outer canthus of each eye [2], and the M1 and M2 electrodes on the left and right mastoids, respectively [3].
 - 2.9.1. Talent positioning the vertical electrooculogram above and below the left orbital socket.
 - 2.9.2. Talent positioning the horizontal electrooculogram lateral to the outer canthus of each eye.
 - 2.9.3. Shot of the mastoid electrodes being placed on the left and right mastoids.
- 2.10. Now, adjust the chin strap of the electrode cap to a snug yet comfortable fit [1]. Verify that the cap is not twisted or rotated and confirm its final position [2].
 - 2.10.1. Talent tightening and adjusting the chin strap.
 - 2.10.2. Talent checking the alignment of the electrode cap.
- 2.11. Switch the recording software to impedance check mode [1]. Using a blunt-tip syringe, fill the electrode wells with conductive gel [2]. Gently part the hair at each site to ensure full scalp contact [3].
 - 2.11.1. SCREEN: 69813_screenshot_1.mov.mov: 00:05-00:11

- 2.11.2. Talent using a blunt-tip syringe to fill the electrode wells with conductive gel.
- 2.11.3. Talent parting the hair at electrode sites.
- 2.12. Adjust the electrodes until each channel impedance drops below 10 kilohms [1]. Verify that acceptable values are indicated by blue or dark color on the monitor [2].
 - 2.12.1. SCREEN: 69813_screenshot_2.mov.mov: 00:05-00:07, 00:43-00:47
 - 2.12.2. SCREEN: 69813_screenshot_3.mov.mov: 00:00-end
- 2.13. Now, inform the participant that the experiment will take place in a closed and quiet environment [1]. Instruct them to remain relaxed, maintain a stable sitting posture, minimize body movements, and stay focused throughout the session [2].
 - 2.13.1. Talent explaining the environmental conditions to the participant.
 - 2.13.2. Participant sitting calmly with minimal movement in the chair.
- 2.14. Then present the stimuli on a 22-inch liquid crystal display monitor [1]. Set the screen refresh rate to 60 hertz [2].
 - 2.14.1. Shot of the 22 inch liquid crystal display monitor.
 - 2.14.2. SCREEN: 69813_screenshot_4.mov.mov: 00:00-00:04
- 2.15. Next, insert the E-Prime hardware key into a universal serial bus port on the computer [1]. Double-click the E-Studio (*E-Studio*) icon to launch the software, then select **File** and choose **Open** to load the project file [2].
 - 2.15.1. Talent inserting the hardware key into the universal serial bus port.
 - 2.15.2. SCREEN: 69813_screenshot_5.mov.mov: 00:00-end
- 2.16. On the E-Run (*E-run*) startup interface, enter the **Subject number**, the **Session number**, and other required information [1].
 - 2.16.1. SCREEN: 69813_screenshot_6.mov.mov: 00:00-end
- 2.17. Now click on **Tools** and **E-Run**, then choose **Run** to execute the practice session [1]. Ensure the participant understands the instructions and runs the 10 practice trials identical to the main experiment [2]. After completion, ask whether the participant clearly read and understood the stimuli [3].
 - 2.17.1. SCREEN: 69813_screenshot_7.mov.mov: 00:00-end
 - 2.17.2. Shot of Participant viewing instructions and performing practice trials on the monitor.
 - 2.17.3. Talent asking the participant about their understanding.
- 2.18. Proceed to the instruction screen after the practice trials once the participant confirms they are ready [1]. Instruct the participant to press the spacebar to begin the main experiment [2] consisting of 120 trials divided into 2 blocks of 60 trials each, with a

mandatory 2-minute rest between blocks [3].

2.18.1. SCREEN: 69813_screenshot_8.mov.mov: 00:00-00:11

2.18.2. Shot of participant pressing the spacebar.

2.18.3. SCREEN: 69813_screenshot_9.mov.mov: 00:00-00:15

2.19. Monitor the session progress from an adjacent room using a monitor screen [1]. Upon completion, ensure the software automatically saves the data file [2].

2.19.1. Talent observing the session from an adjacent room via monitor.

2.19.2. SCREEN: 69813_screenshot_10.mov.mov: 00:00-00:18

2.20. Now, remove the electrode cap from the participant [1]. Instruct the participant to clean residual conductive gel from their hair and skin and ensure no residue remains [2]. Confirm that the participant experiences no discomfort after cleaning [3]. Conclude the experiment and provide the remuneration [4].

2.20.1. Talent removing the electrode cap carefully from the participant's head.

2.20.2. Shot of participant cleaning gel from hair and skin in the washing area.

2.20.3. Talent checking with the participant regarding comfort.

2.20.4. Talent handing remuneration to the participant and thanking them.

3. Electroencephalogram (EEG) Data Preprocessing and Event-Related Potential Analysis Procedure

3.1. Visually inspect the EEG data and exclude epochs with significant baseline drift or severe noise artifacts [1].

3.1.1. SCREEN: 69813_screenshot_11.mov.mov: 00:04-00:09, 00:22-00:36

3.2. Set the vertical electrooculogram channel as the reference [1]. Apply the ocular artifact reduction algorithm in the Scan software to correct blink and eye movement artifacts [2].

3.2.1. SCREEN: 69813_screenshot_12.mov.mov: 00:03-00:06, 00:10-00:15

3.2.2. SCREEN: 69813_screenshot_12.mov.mov: 00:20-00:38, 01:10-01:14

3.3. Next, using event markers inserted by the E-Prime program, segment the continuous data into epochs time-locked to stimulus onset. Define the time window from minus 200 milliseconds to plus 800 milliseconds [1].

3.3.1. SCREEN: 69813_screenshot_13.mov.mov: 00:00-00:32

3.4. Define the 200-millisecond pre-stimulus interval as baseline and apply baseline correction in the Scan software [1]. Reject epochs where the signal amplitude exceeds plus or minus 100 microvolts within the analysis window to eliminate artifacts [2].

- 3.4.1. SCREEN: 69813_screenshot_14.mov.mov: 00:00-00:21
- 3.4.2. SCREEN: 69813_screenshot_15.mov.mov: 00:00-00:27
- 3.5. Compute the average signal from the left and right mastoid electrodes. Re-reference all channels offline to this mastoid average [1].
 - 3.5.1. SCREEN: 69813_screenshot_16.mov.mov: 00:00-end
- 3.6. For each participant, average all artifact-free epochs within the same stimulus condition to obtain condition-specific event-related potential waveforms [1].
 - 3.6.1. SCREEN: 69813_screenshot_17.mov.mov: 00:00-00:20
- 3.7. Then, apply a 30-hertz low-pass filter with 24 decibels per octave roll off to the averaged waveforms [1]. Combine individual averages across all participants to create grand average event-related potential for each condition [2].
 - 3.7.1. SCREEN: 69813_screenshot_18.mov.mov: 00:00-00:20
 - 3.7.2. SCREEN: : 69813_screenshot_19.mov.mov: 00:00-00:23, 00:44-00:46

Results

4. Results

- 4.1. Satisfaction ratings showed a significant main effect of service agent, with satisfaction for the human agent higher than for the AI agent [1]. Satisfaction ratings showed a significant main effect of language style, with the humorous condition higher than the rational condition [2].
 - 4.1.1. LAB MEDIA: Figure 2. *Video editor: Highlight the orange bar for “human”*
 - 4.1.2. LAB MEDIA: Figure 2a. *Video editor: Highlight the green bar for “humorous”*
- 4.2. A significant interaction between service agent and language style was observed [1]. In the humorous language condition satisfaction was higher for the human agent than for the AI agent [2].
 - 4.2.1. LAB MEDIA: Figure 3.
 - 4.2.2. LAB MEDIA: Figure 3. *Video editor: Highlight the orange bar for Humorous under Human*
- 4.3. The N2 component showed a significant main effect of language style, with the rational language style eliciting a more negative N2 than the humorous language style [1].
 - 4.3.1. LAB MEDIA: Figures 4, 5, and 6. *Video editor: Sequentially show Figure 4-6. Highlight the Ai-rational and Human-rational lines in 4, the same columns in 5 and the green graph for rational in 6*
- 4.4. A significant interaction between service agent and language style was observed for the P300 component [1]. In the humorous language condition, the human agent elicited a more positive P300 (*P-Three-Hundred*) than the AI agent [2]. In the AI agent condition, the rational language style elicited a more positive P300 than the humorous language style [3].
 - 4.4.1. LAB MEDIA: Figure 7.
 - 4.4.2. LAB MEDIA: Figure 7. *Video editor: Highlight the orange humorous condition, under Human*
 - 4.4.3. LAB MEDIA: Figure 7. *Video editor: Highlight the green rational condition, under AI*

1. Preliminary
Pronunciation link: <https://www.merriam-webster.com/dictionary/preliminary>
IPA: /prɪˈlɪməˌneri/
Phonetic Spelling: prih·lih·muh·neh·ree
2. Laboratory
Pronunciation link: <https://www.merriam-webster.com/dictionary/laboratory>
IPA: /ˈlæbrəˌtɔri/, /ləˈbɔrəˌtɔri/
Phonetic Spelling: lab·ruh·tor·ee, luh·bor·uh·tor·ee
3. Experimental
Pronunciation link: <https://www.merriam-webster.com/dictionary/experimental>
IPA: /ɪkˌsperəˈmentl/
Phonetic Spelling: ik·sper·uh·men·tuhl
4. Consent
Pronunciation link: <https://www.merriam-webster.com/dictionary/consent>
IPA: /kənˈsent/
Phonetic Spelling: kuhn·sent
5. Designated
Pronunciation link: <https://www.merriam-webster.com/dictionary/designated>
IPA: /ˈdeziɡˌneɪtɪd/
Phonetic Spelling: dez·ig·nay·tuhd
6. Impurities
Pronunciation link: <https://www.merriam-webster.com/dictionary/impurity>
IPA: /ɪmˈpjʊrəti/
Phonetic Spelling: im·pyur·uh·tee
7. Electrode
Pronunciation link: <https://www.merriam-webster.com/dictionary/electrode>
IPA: /ɪˈlekˌtroʊd/
Phonetic Spelling: ih·lek·trohd
8. Conductivity
Pronunciation link: <https://www.merriam-webster.com/dictionary/conductivity>
IPA: /ˌkɒndʌkˈtɪvəti/
Phonetic Spelling: kon·duhk·tiv·uh·tee
9. Electromagnetic
Pronunciation link: <https://www.merriam-webster.com/dictionary/electromagnetic>
IPA: /ɪˌlektroʊmæɡˈnetɪk/
Phonetic Spelling: ih·lek·troh·mag·net·ik
10. Electroencephalogram
Pronunciation link: <https://www.merriam-webster.com/dictionary/electroencephalogram>
IPA: /ɪˌlektroʊɪnˌsefəˈləˌgræm/
Phonetic Spelling: ih·lek·troh·en·sef·uh·luh·gram

11. Nasion
Pronunciation link: <https://www.merriam-webster.com/dictionary/nasion>
IPA: /'neɪʒi,ɑ:n/
Phonetic Spelling: nay·zhee·on
12. Inion
Pronunciation link: <https://www.merriam-webster.com/dictionary/inion>
IPA: /'ɪni,ɑ:n/
Phonetic Spelling: ih·nee·on
13. Vertex
Pronunciation link: <https://www.merriam-webster.com/dictionary/vertex>
IPA: /'vɜ:tɛks/
Phonetic Spelling: vur·teks
14. Tragus
Pronunciation link: <https://www.merriam-webster.com/dictionary/tragus>
IPA: /'treɪɡəs/
Phonetic Spelling: tray·guhs
15. Electrooculogram
Pronunciation link: <https://www.merriam-webster.com/dictionary/electrooculogram>
IPA: /ɪ,lektroʊ'ɑ:kjələ,græm/
Phonetic Spelling: ih·lek·troh·ok·yuh·luh·gram
16. Orbital
Pronunciation link: <https://www.merriam-webster.com/dictionary/orbital>
IPA: /'ɔ:rbɪtəl/
Phonetic Spelling: or·bih·tuhl
17. Canthus
Pronunciation link: <https://www.merriam-webster.com/dictionary/canthus>
IPA: /'kænθəs/
Phonetic Spelling: kan·thuhs
18. Mastoid
Pronunciation link: <https://www.merriam-webster.com/dictionary/mastoid>
IPA: /'mæ,stoɪd/
Phonetic Spelling: mas·toyd
19. Impedance
Pronunciation link: <https://www.merriam-webster.com/dictionary/impedance>
IPA: /ɪm'pi:dəns/
Phonetic Spelling: im·pee·duhns
20. Syringe
Pronunciation link: <https://www.merriam-webster.com/dictionary/syringe>
IPA: /sə'rɪndʒ/
Phonetic Spelling: suh·rinj
21. Stimuli
Pronunciation link: <https://www.merriam-webster.com/dictionary/stimulus>

IPA: /'stɪmjəˌlaɪ/

Phonetic Spelling: stim-yuh-lye

22. Hertz

Pronunciation link: <https://www.merriam-webster.com/dictionary/hertz>

IPA: /'hɜːts/

Phonetic Spelling: hurts

23. Interface

Pronunciation link: <https://www.merriam-webster.com/dictionary/interface>

IPA: /'ɪntərˌfeɪs/

Phonetic Spelling: in-ter-fays

24. Epochs

Pronunciation link: <https://www.merriam-webster.com/dictionary/epoch>

IPA: /'ɛpək/, /'iːˌpɑːk/

Phonetic Spelling: ep-uhk, ee-pahk

25. Baseline

Pronunciation link: <https://www.merriam-webster.com/dictionary/baseline>

IPA: /'beɪsˌlaɪn/

Phonetic Spelling: bays-line

26. Artifacts

Pronunciation link: <https://www.merriam-webster.com/dictionary/artifact>

IPA: /'ɑːrtəˌfækt/

Phonetic Spelling: ar-tuh-fakt

27. Algorithm

Pronunciation link: <https://www.merriam-webster.com/dictionary/algorithm>

IPA: /'ælgəˌrɪðəm/

Phonetic Spelling: al-guh-ri-thuhm

28. Amplitude

Pronunciation link: <https://www.merriam-webster.com/dictionary/amplitude>

IPA: /'æmpləˌtuːd/

Phonetic Spelling: am-pluh-tood

29. Microvolts

Pronunciation link: <https://www.merriam-webster.com/dictionary/microvolt>

IPA: /'maɪkrəʊˌvɔʊlt/

Phonetic Spelling: my-kroh-vohlt

30. Decibels

Pronunciation link: <https://www.merriam-webster.com/dictionary/decibel>

IPA: /'dɛsəˌbɛl/

Phonetic Spelling: des-uh-bel