

Neuropragmatics

and Emotion Lab

The Sound of Regret: How Your Brain Perceives Regret in the Voice

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Written Stimuli Creation

Database of statements expressing regret: 260 scenarios x 4 forms = 1040 stimuli



Written Validation

Online survey assessing intensity of regret of the semantic content of each stimulus



Auditory Stimuli Recording

Four native English speakers record stimuli in three different prosodic conditions



Auditory Validation

Online survey assessing regret perception from prosodic & semantic content of stimuli



fMRI Experiment

Perform fMRI while participant listens to auditory recordings of regret stimuli

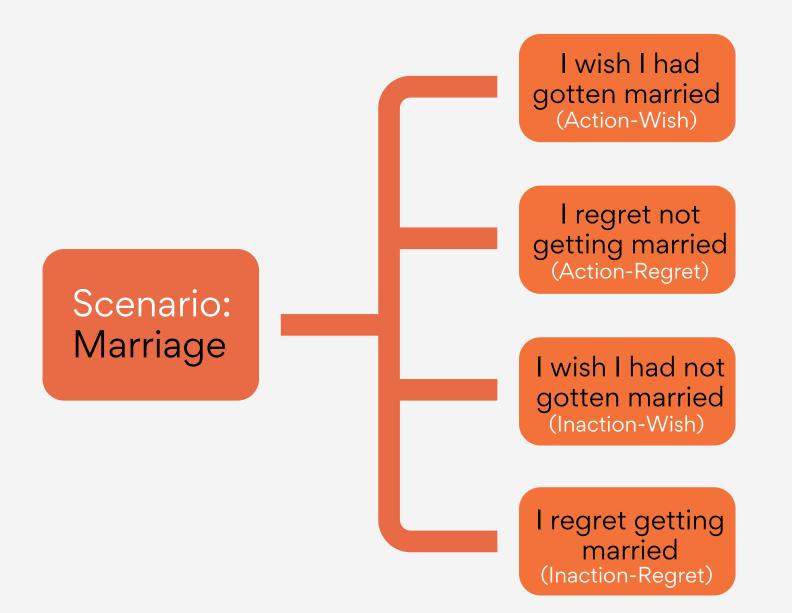
Hypotheses

- Perception of the speaker's regret is expected to be visible as activity resembling personal experiences of regret (eg. vmPFC & ACC), due to empathetic mirror-resonance mechanisms [9].
- We expect this activity to be modulated by both the prosodic quality and semantic content of the stimulus, but not necessarily with equal strength.

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Written Validation **Procedure (Direct)**

For each statement, please imagine how you would feel in the situation.

Example: "I regret lying"

If you were in this situation, how much regret would you feel?

(Not at all) 1 - 2 - 3 - 4 - 5 (Very much)

Written Validation Procedure (Indirect)

Example: "I regret lying"

Could you repair this situation in the future? If so, what is the chance that

None - Low - Medium - High

you <u>would</u> repair the situation?

Applications

We hope to expand this study to be cross-cultural in the future, so topics like in-group vs out-group regret perception can be investigated. This work is crucial for promoting cooperation and effective communication between different linguistic communities, particularly with regards to empathy and forgiveness in the types of situations that elicit regret.

Summary

The emotion of regret has received much attention in psychology and neuroscience research due to its unique cognitive nature; however, few studies have looked at how we understand regret in other people, and none have considered expressions of regret in speech. This study will use fMRI to investigate how expressions of regret are processed in the listener's brain, particularly examining the role of prosody.

Auditory Validation Procedure

How much regret do you think the speaker is experiencing?

(Not at all) 1 - 2 - 3 - 4 - 5 (Very much)

If you were in this situation, how much regret would you feel?

(Not at all) 1 - 2 - 3 - 4 - 5 (Very much)

Examples of Recorded Stimuli "I wish I hadn't gotten angry"

KEY TERM

what is

REGRET?

Regret is a complex

cognitively-generated

negative emotion,

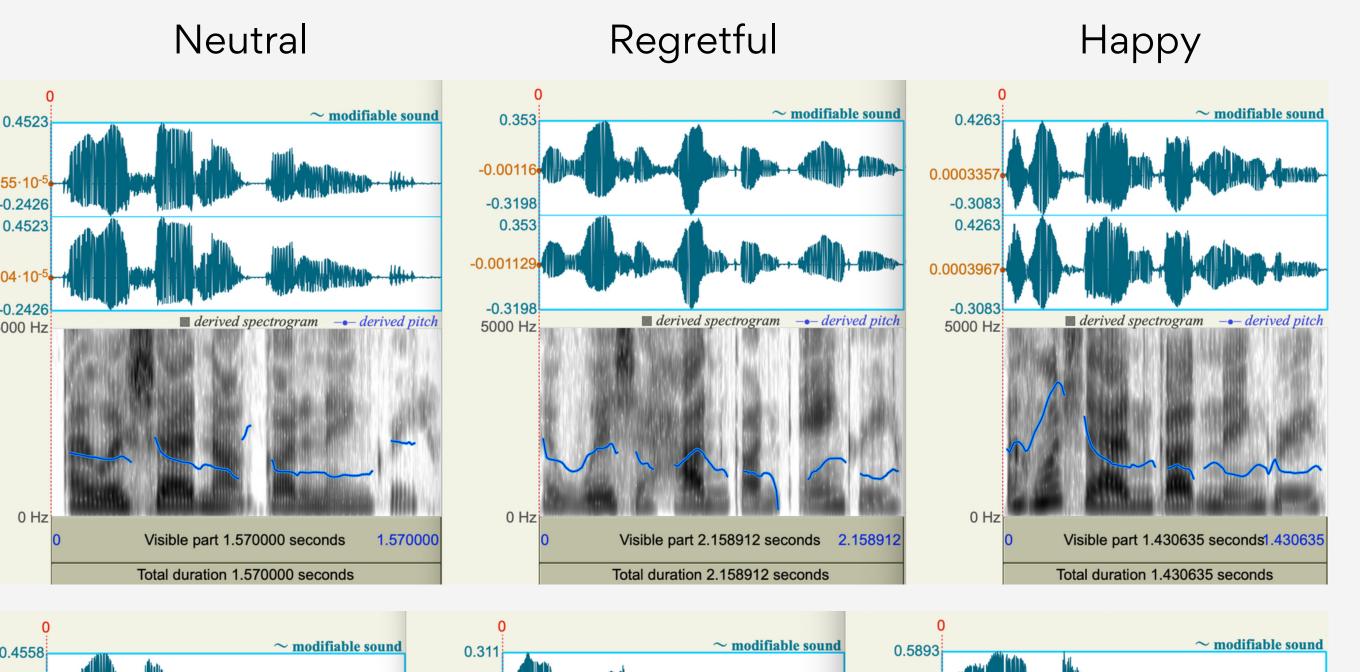
arising from an evaluation

of counterfactual realities

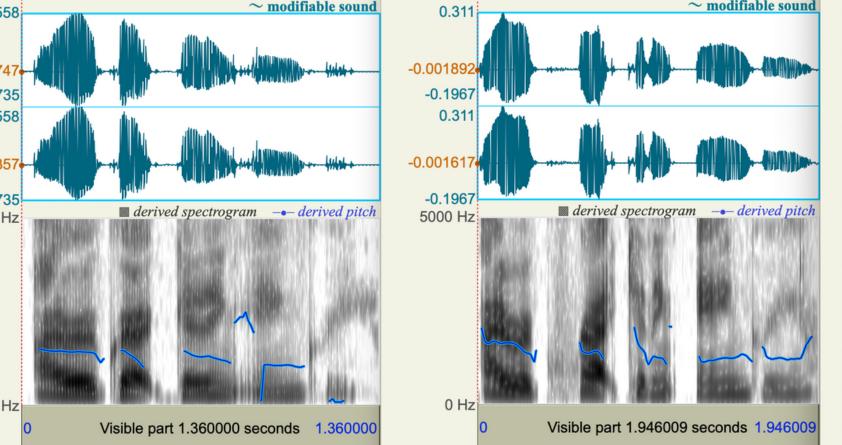
and the causal role of

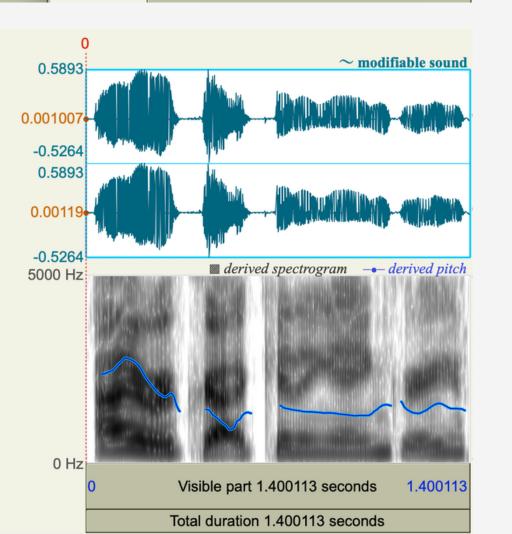
one's past actions [1].

"I regret getting angry" (bottom)



Total duration 1.946009 seconds





Action-Inaction Effects

- Action Effect: Actions will elicit greater regret due to omission bias and norm theory [2]
- Inaction Effect: Does not fit as clearly with omission bias or norm theory, but experimentally supported [3]

• Opportunity Theory: Events that could be

remedied in the future will elicit greater regret (based on functional theory of regret) [5] • Lost Opportunity Theory: Events that have no opportunity for repair will elicit greater regret [6] Theories

• Norm theory has so many dimensions, potentially

explaining contradictory results supporting both

Other Factors

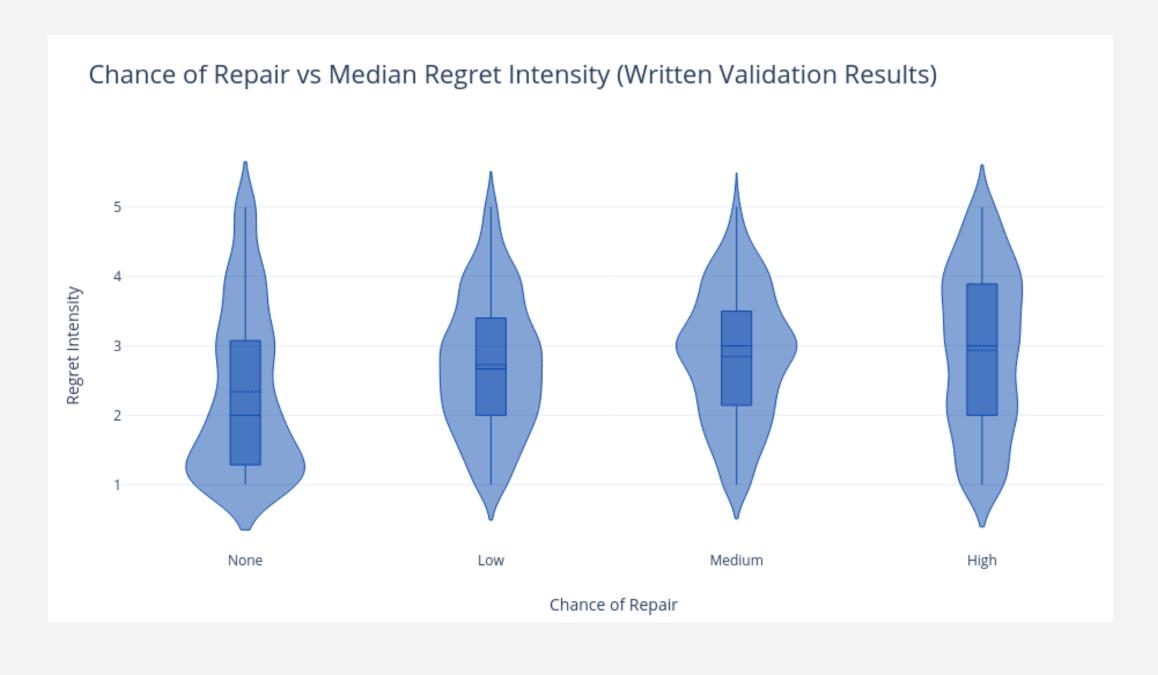
(Lost) Opportunity Theory

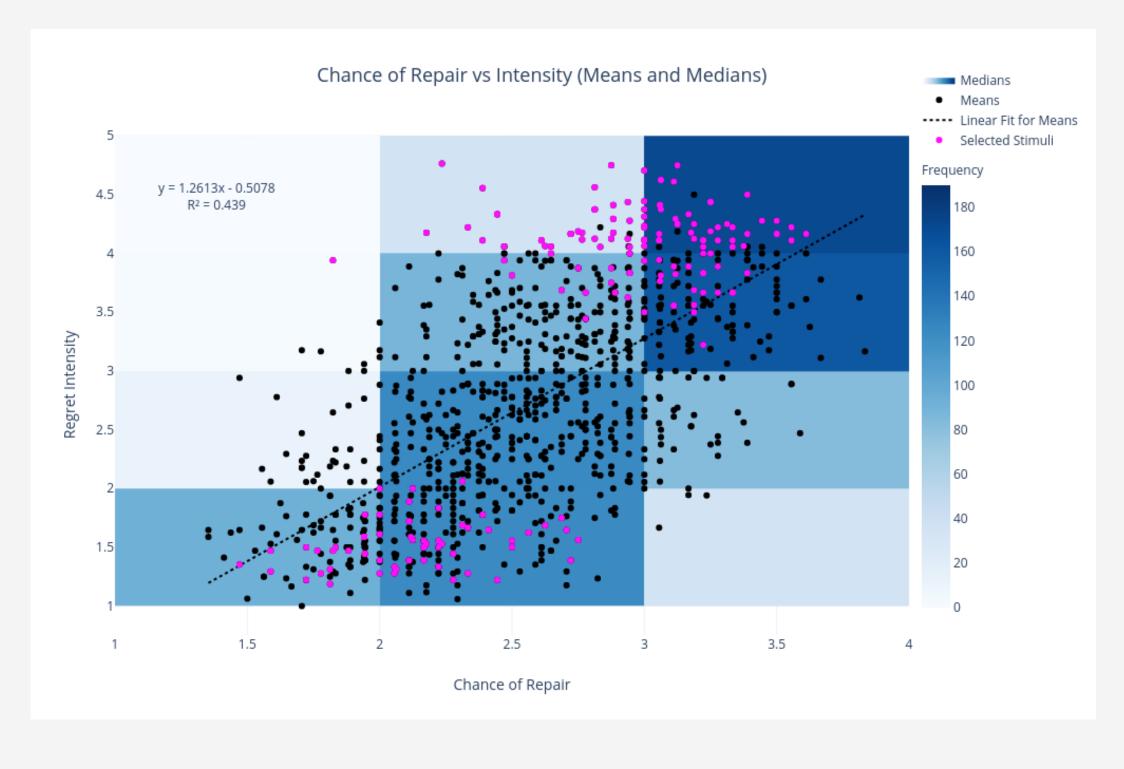
of Regret Intensity

Norm Theory

- Abnormal events are more cognitively mutable -> easier to generate counterfactual scenarios that elicit feelings of regret [4] • Generally action is more abnormal compared to inaction (consistent with action effect) [4]
- action and inaction effects [7] • Temporal Mediation: Inaction regrets elicit greater regret later in life (lost opportunity theory?) [8]

Perceptual Data from Written Validation





References

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1. Coricelli, G., Dolan, R. J., & Sirigu, A. (2007). Brain, emotion and decision making: The paradigmatic example of regret. Trends in Cognitive Sciences, 11(6), 258–265. https://doi.org/10.1016/j.tics.2007.04.003 2. Gilovich, T., Wang, R. F., Regan, D., & Nishina, S. (2003). Regrets Of Action And Inaction Across Cultures. Journal of Cross-Cultural Psychology, 34(1), 61-71. https://doi.org/10.1177/0022022102239155 3. Gilovich, T., & Medvec, V. H. (1994). The temporal pattern to the experience of regret. Journal of Personality and Social Psychology, 67(3), 357. https://doi.org/10.1037/0022-3514.67.3.357 4. Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, 93(2), 136. https://doi.org/10.1037/0033-295X.93.2.136 5. Roese, N. J., & Summerville, A. (2005). What We Regret Most... And Why. Personality and Social Psychology Bulletin, 31(9), 1273-1285. https://doi.org/10.1177/0146167205274693 6. Beike, D. R., Markman, K. D., & Karadogan, F. (2009). What We Regret Most Are Lost Opportunities: A Theory of Regret Intensity. Personality and Social Psychology Bulletin, 35(3), 385–397. https://doi.org/10.1177/0146167208328329

7. Feldman, G., Kutscher, L., & Yay, T. (2020). Omission and commission in judgment and decision making: Understanding action-inaction effects using the concept of normality. Social and Personality Psychology Compass, 14(8), e12557. https://doi.org/10.1111/spc3.12557 8. Yeung, S. K., & Feldman, G. (2022). Revisiting the Temporal Pattern of Regret in Action Versus Inaction: Replication of Gilovich and Medvec (1994) With Extensions Examining Responsibility. Collabra: Psychology, 8(1), 37122.

https://doi.org/10.1525/collabra.37122 9. Canessa, N., Motterlini, M., Di Dio, C., Perani, D., Scifo, P., Cappa, S. F., & Rizzolatti, G. (2009). Understanding others' regret: A FMRI study. PloS One, 4(10), e7402. https://doi.org/10.1371/journal.pone.0007402

Total duration 1.360000 seconds

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