

# The (mis)Measurement of Group Differences: The Case of Pain-of-Payment



Rumela Sengupta  
(Doctoral Student, University of Illinois at Chicago)

Samuel Bond  
(Associate Professor, Georgia Tech)  
Iman Paul  
(Doctoral Student, Georgia Tech)



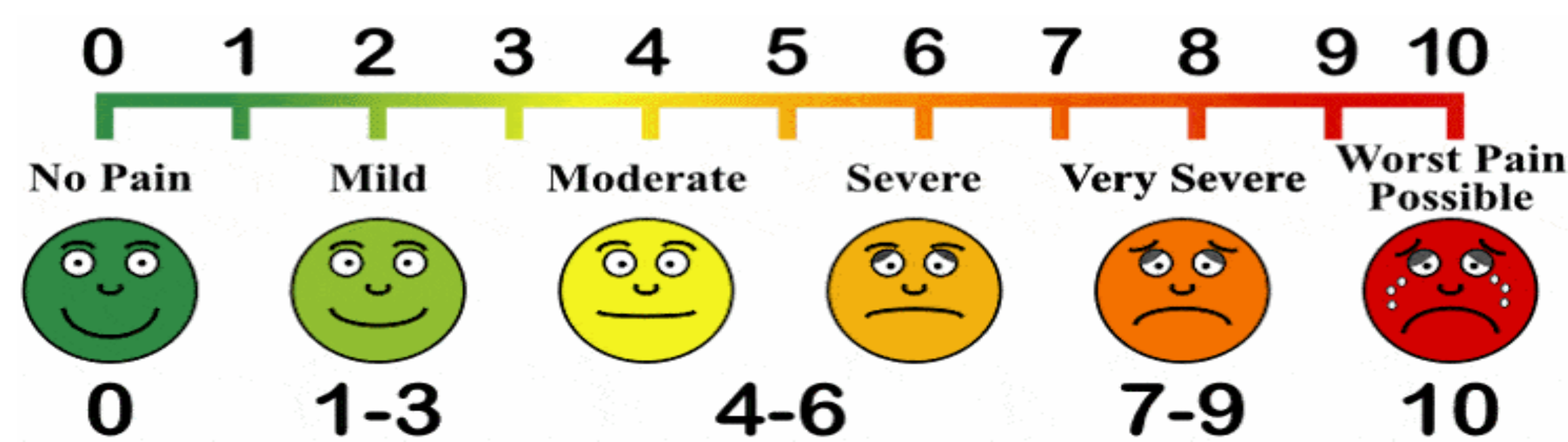
## Abstract

For constructs that are unobservable and perceptual, group differences on conventional measurement scales may not represent “true” differences, but rather differences in scale interpretation. To illustrate the problem and potential solutions, we explored gender differences in “pain-of-payment.” Participants simulated paying for a speeding ticket, then reported pain-of-payment using either a conventional or sensory-specific (brightness) scale format. Results revealed no gender difference on the conventional scale, but a sizeable difference on the sensory scale. The mismeasurement issue we identify has broad implications for JDM research.

## Introduction

- Current Practice:** Group differences in perceptual variables are measured by use of conventional rating scales (categorical, verbal).

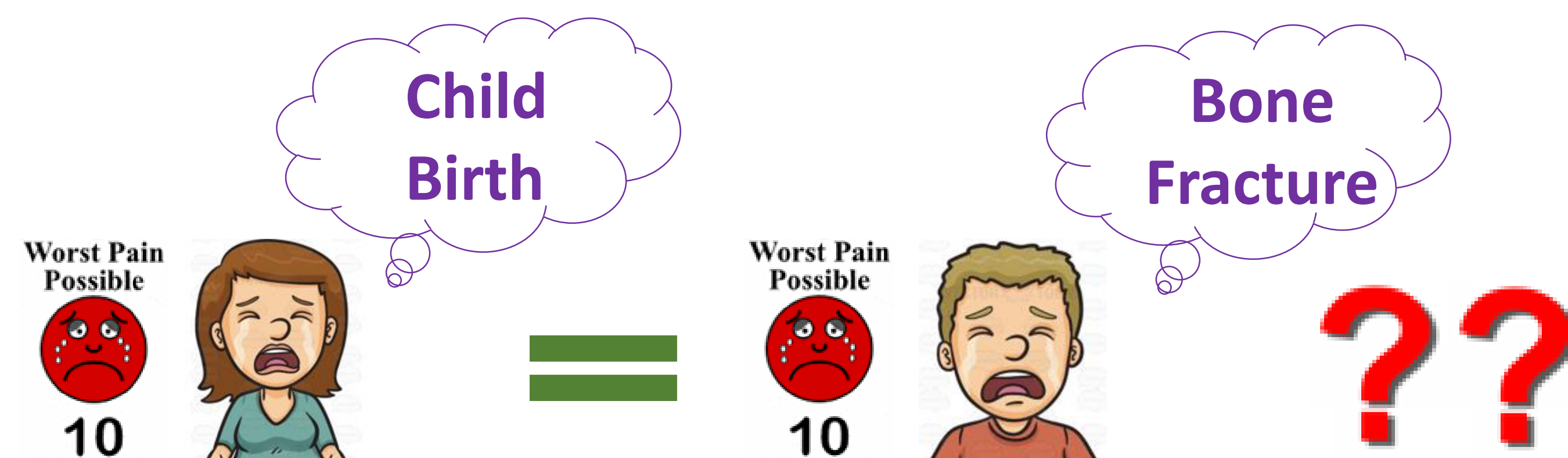
➤ e.g., Do women experience more intense pain than men?



- Assumption:** Intensity descriptors (like “severe” and “worst”) are interpreted by both groups to mean the same absolute perceived intensities.

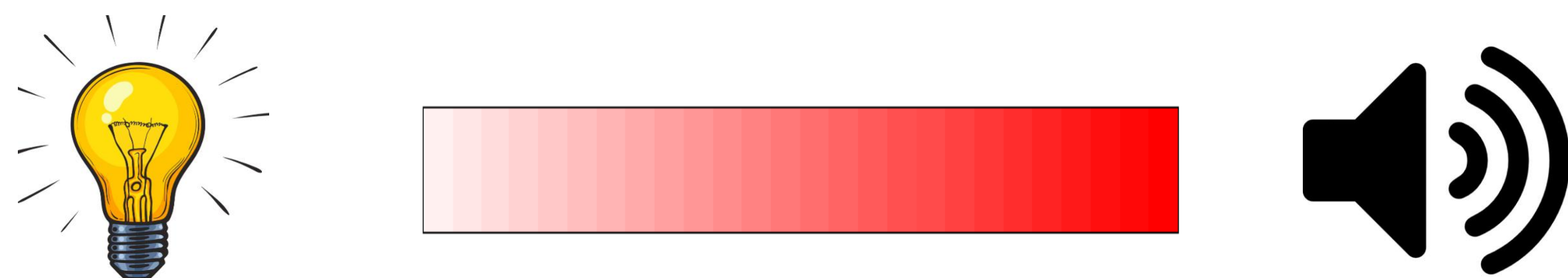


- Problem:** The assumption may be wrong! If so, group comparisons may not be measuring “true” differences, but rather systematic differences in scale interpretation across groups.



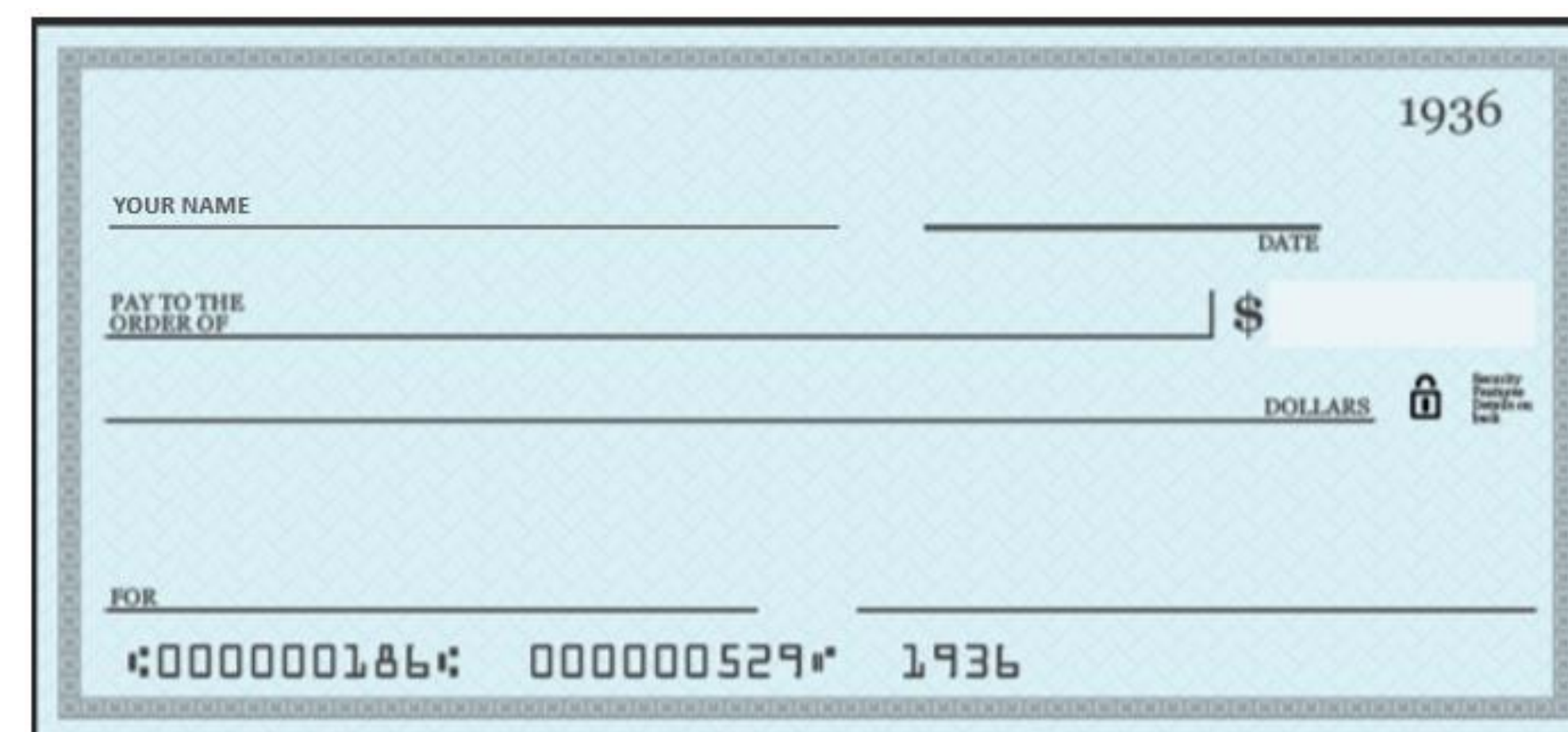
- Solution:** Utilize a *cross-modal, sensory-specific* scale whose perceived interpretation will not be subject to systematic group differences.

➤ e.g., “worst pain” → “brightest light,” “loudest noise,” etc.

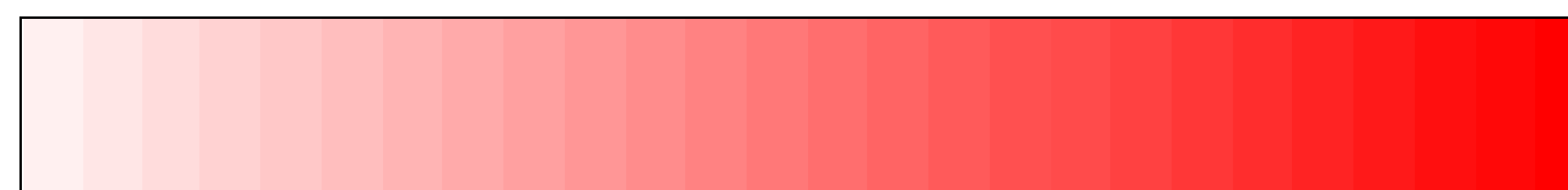


## Methodology

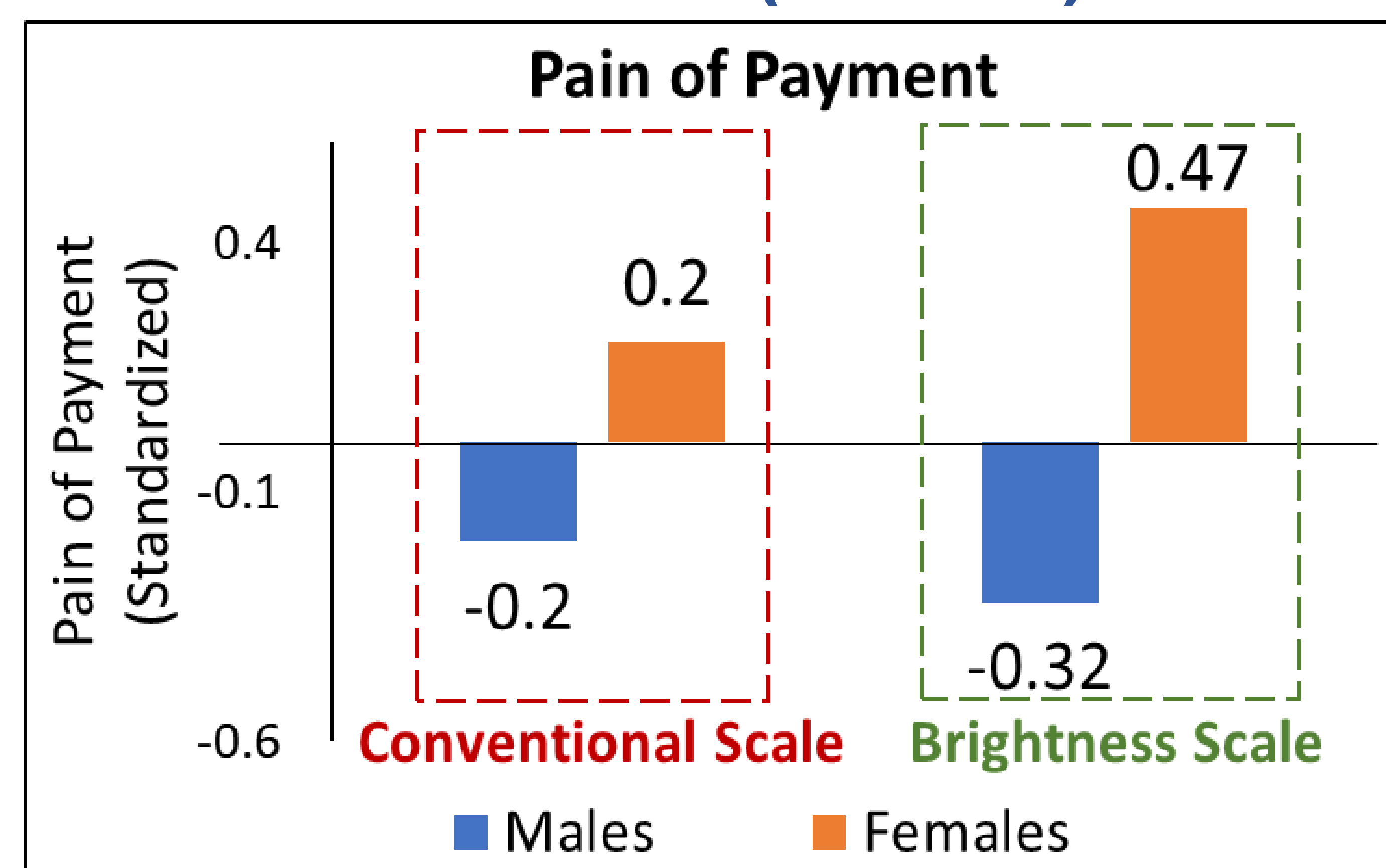
- Design (n = 165)**
  - 2 x 2, between-subjects
    - Gender: *male* vs. *female*
    - Scale format: *conventional* vs. *sensory*
- Scenario (speeding ticket):**
  - “...You were driving home from a friend’s house when you were pulled over by the police and ticketed for speeding, with a fine of \$180....”
  - “...Upon returning home, you decided to pay off the ticket immediately, using a check...”



- DV and Scale Manipulation:**
  - “Please indicate how painful it was to pay \$180 for the speeding ticket.”
  - Conventional scale:** verbal, 9-point scale (1=“somewhat painful,” 9=“extremely painful”)
  - Sensory (brightness) scale:** “Paler colors represent less pain, and brighter colors represent greater pain.”



## Results (ANOVA)



- No main effect of scale format
- Main effect of gender ( $p < .05$ ), qualified by a gender\*scale interaction ( $p < .05$ )
  - Conventional scale:** Pain-of-payment did not reliably differ for men vs. women ( $M = .02$  vs.  $-.02$ ,  $p > 0.05$ ).
  - Sensory scale:** Pain-of-payment was reliably greater for women vs. men ( $M = .47$  vs.  $-.32$ ,  $p < .01$ )

## Discussion

- Faced with an identical transaction, women and men reported similar pain-of-payment on a conventional measure, but women reported more pain-of-payment on a sensory-specific measure.
  - Consistent with past evidence that women “under-report” physical pain
  - Pain-of-payment researchers should be sensitive to this under-reporting.
- Cross-modality measurement represents a practical, portable solution to problems in group comparison
  - Takes advantage of our innate ability to match intensities across different sensory modalities
- Moving forward, we plan to explore other domains where group differences are a primary focus:
  - Risk perception?
  - Emotions?
  - Utility?
  - Satisfaction?
  - ETC.



## References

- Bartoshuk, L. M., Fast, K., & Snyder, D. (2005). Differences in our sensory worlds: Invalid comparisons with labeled scales. *Current Directions in Psychological Science*, 14, 122–125.
- Bartoshuk, L. (2014). The measurement of pleasure and pain. *Perspectives on Psychological Science*, 9(1), 91-93.
- Mazar, N., Plassmann, H., Robitaille, N., & Lindner, A. (2016). Pain of paying?—A metaphor gone literal: Evidence from neural and behavioral science.
- Stevens, J. C. (1959). Cross-modality validation of subjective scales for loudness, vibration, and electric shock. *Journal of Experimental Psychology*, 57, 201–209.
- Zellermayer, O. (1996). The pain of paying. unpublished dissertation, Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh, PA.

## Contact Information

- We welcome your questions, comments, and (hopefully) ideas for improvement!

Rumela Sengupta, [rsengu4@uic.edu](mailto:rsengu4@uic.edu)  
Iman Paul, [iman.paul@scheller.gatech.edu](mailto:iman.paul@scheller.gatech.edu)