Braking Bad: The Dynamic Influence of Anxiety on Visually Guided Action Performance

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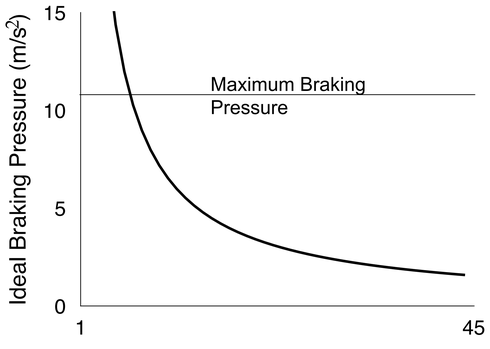
Introduction

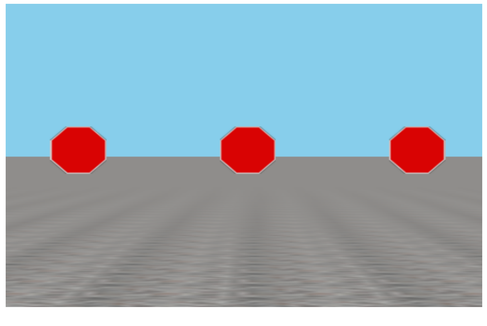
- Ecological and Dynamic System theories of visual perception argue that visual information constrains performance of actions in order to stabilize behavior (Warren, 2006).
- However, flexibility in the performance of actions is necessary to deal with uncertainty, changes in environmental demands, or changes in internal goals (Fajen, Riley, & Turvey, 2009).
- Emotions may be a source of flexibility.
- Anxiety has been shown to alter static perceptual judgments and sports-related actions.
  - Function of anxiety to reduce the possibility of negative consequences by reducing uncertainty in outcome (Hirsh, Mar, & Peterson, 2012).
  - Participants judge their ability to reach to, grasp, and reach through more conservatively when anxious (Graydon, Linkenauger, Teachman, Proffitt, 2012)
  - Sports-related actions altered by pressure to perform (Beilock & Carr, 2001).

Does anxiety influence the visual guidance of braking over time?

Visually-Guided Braking



- Braking behavior determined by the relationship between instantaneous Ideal Braking Pressure (Velocity^2/2*Distance) and maximum braking pressure.
- Brake so that you stop as close to the stop signs as possible without crashing through.



General methodology

Dependent Variables

- Likelihood of crashing
- Adjustments in braking behavior
- Ratings of Anxiety (SUDs)

Independent Variables

- Anxiety (Between-Ss)
- Starting Velocity: 8, 11, 14, 17, 20 m/s
- Size of Stop Signs: .165, .390, .615 m
- Starting Distance: 45 m

Procedure

- 75 Practice Trials followed by 3 sets of 25 Experimental Trials
- Breathing task before each experimental block

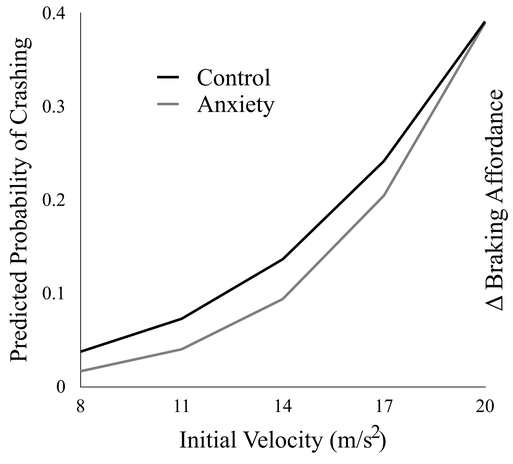
Manipulation of Anxiety

- Control: Breathe though large straw (8 mm)
- Anxiety Condition: Breathe through tiny straw (3 mm)
- 2 minutes

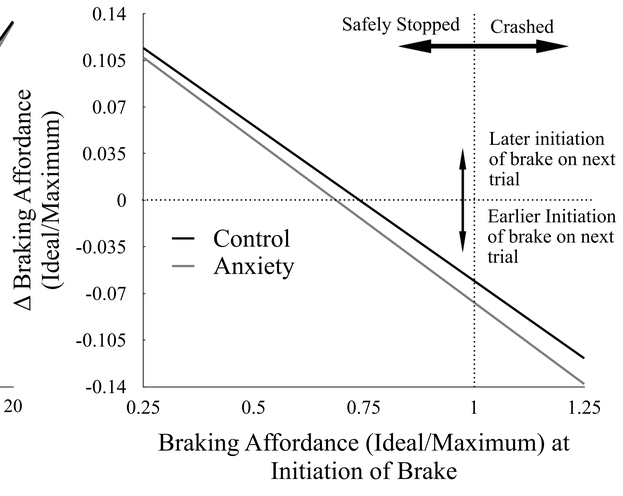
Experiment 1: Emergency Braking

N = 38

Does anxiety change likelihood of crashing?



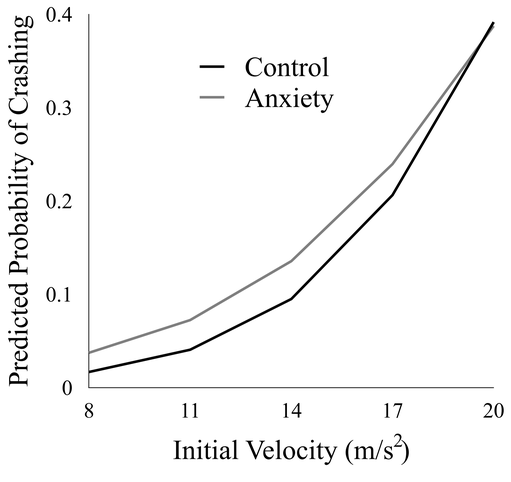
Does anxiety alter stability of braking behavior?



Experiment 2: Regulated Braking

N = 38

Does anxiety change likelihood of crashing?



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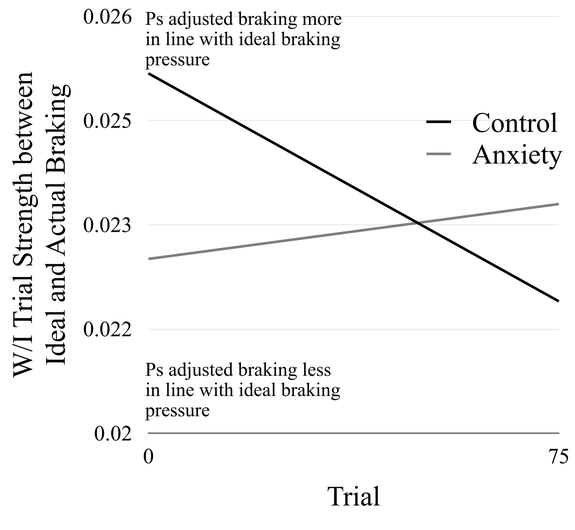
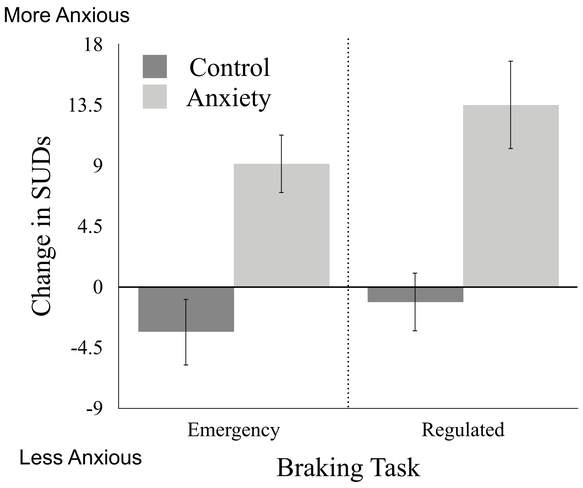


Manipulation Check



Result Summary

- Emergency Braking:
  - Anxious participants crashed *less* often
  - Anxious participants made more drastic trial-to-trial adjustments
- Regulated Braking:
  - Anxious participants crashed *more* often
  - Anxious participants used Ideal Braking Pressure less consistently within trials.
  - Control group participants used Ideal Braking Pressure less as trials progressed
- When anxious, participants initiated braking sooner for BOTH types of braking.

Conclusions

- **The influence of anxiety on success of braking depends on type of braking.**
  - **Anxiety improved a decision based action (emergency braking)**
  - **Anxiety disrupted an online control action (regulated braking)**
- **Anxious participants used visual information differently than non-anxious participants.**
- **The results suggest that anxiety alters calibration between perception and action both within and across braking events**

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