Deceleration Differences Between Novice and Experienced Riders

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Research Question

Do Motorcyclists brake differently based on their experience?

Background

- Braking is the primary evasive maneuver used in crash avoidance.
- Experienced riders brake harder than Novice riders in controlled tests

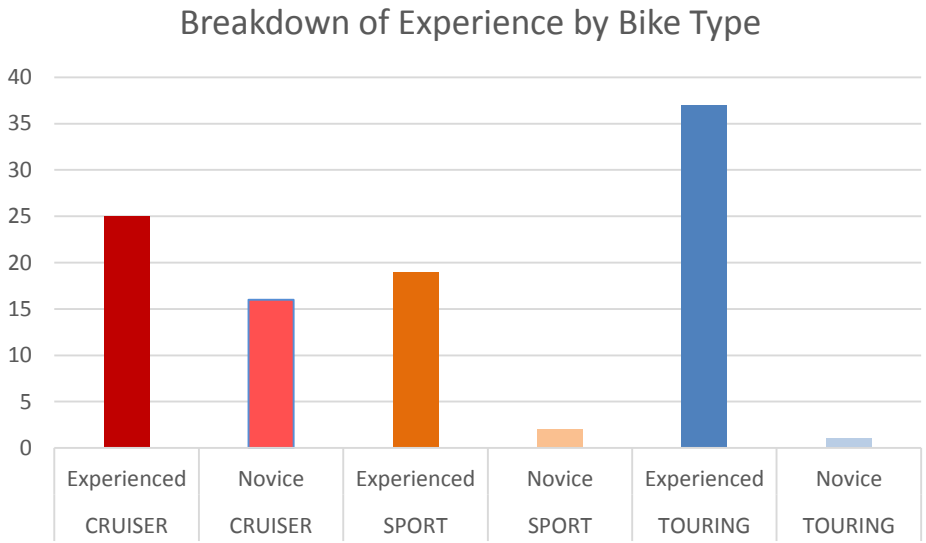
[1] MAIDS, ACEM. "In-depth investigation of accidents involving powered two-wheelers. Final report 2.0." *Brussels: Association of European Motorcycle Manufacturers (ACEM)* (2009).

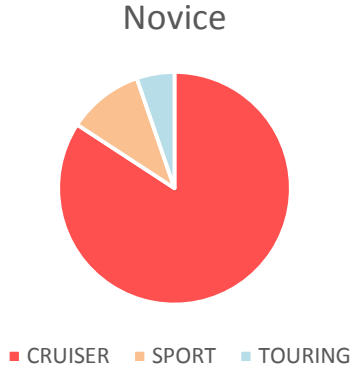
[2] Vavryn, K. Winkelbaue, M. *Braking Performance of Experienced and Novice Motorcycle Riders - Results of a Field Study,* Austrian Road Safety Board

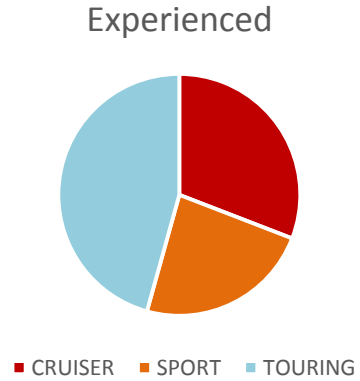
The MSF 100 Motorcyclist Study

- 100 participants
- Participation from 2 months to 2 years
- 100 calendar years of participation
- 568,700 minutes of riding
- 363,000+ miles
- 38,581 “trips” i.e., key-on to key-off

The MSF 100 Motorcyclist Study







	Experienced	Novice
CRUISER	25	16
SPORT	19	2
TOURING	37	1

Defining Experience

- Two Categories
  - Novice
  - Experienced
- Determined from Questionnaire data

Questionnaire

6. (a) For how long have you been riding MOTORCYCLES on public roads?

(DO NOT include long periods when you never rode; Please write in the number of years and months)

_____Years _____Months INTEGER *(convert years to months and add to number of additional months…ex. 21 years 7 months, enter 259)* **(q6_mo)**

8.2 How long was your most recent break of more than a year from riding motorcycles on public roads? *(Please write in the total number of years and months)*

Years_____ Months _____ INTEGER *(convert years to months and add to number of additional months…ex. 21 years 7 months, enter 259)* **(q8_2)**

(b) Approximately how many miles have you ridden a MOTORCYCLE on public roads in the past 12 months?

(Please include the amount you have ridden IN TOTAL ON ALL MOTORCYCLES)

_____Miles INTEGER *(whole integer, round to the nearest whole number)* **(q6_12_mo)**

(g) On average, how many miles *per year* do you ride a street motorcycle? INTEGER miles

(round to nearest whole number, make sure to convert to yearly number if necessary) **(q11g)**

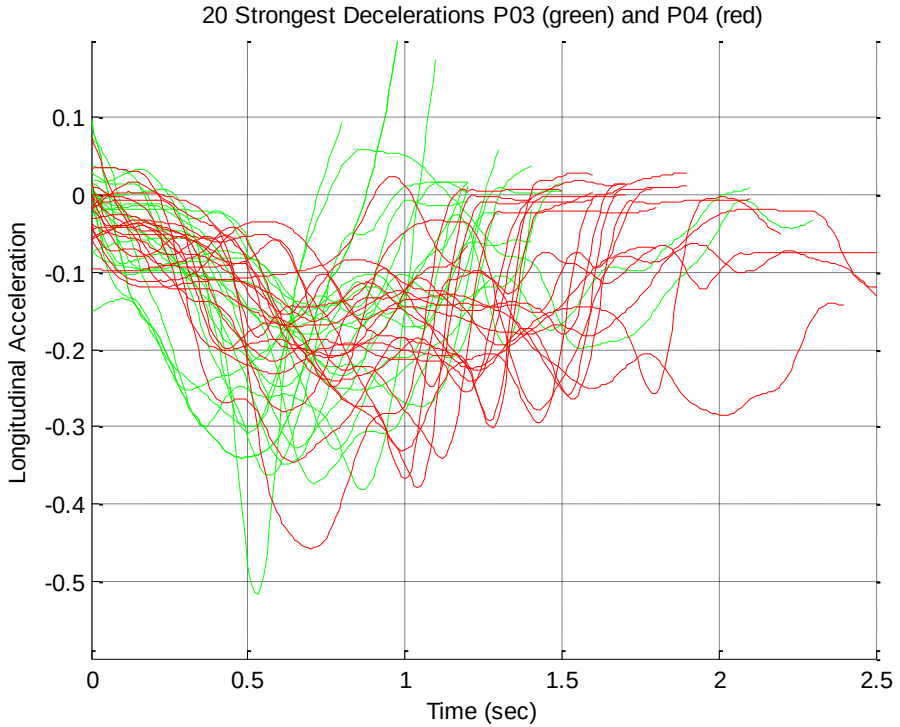
Defining Experience

- How is experience defined?
  - Novice
    - Less than 50000 lifetime miles
    - AND less than 2000 miles in the previous year.
  - Experienced
    - Less than 50000 lifetime miles
    - AND less than 2000 miles in the previous year.

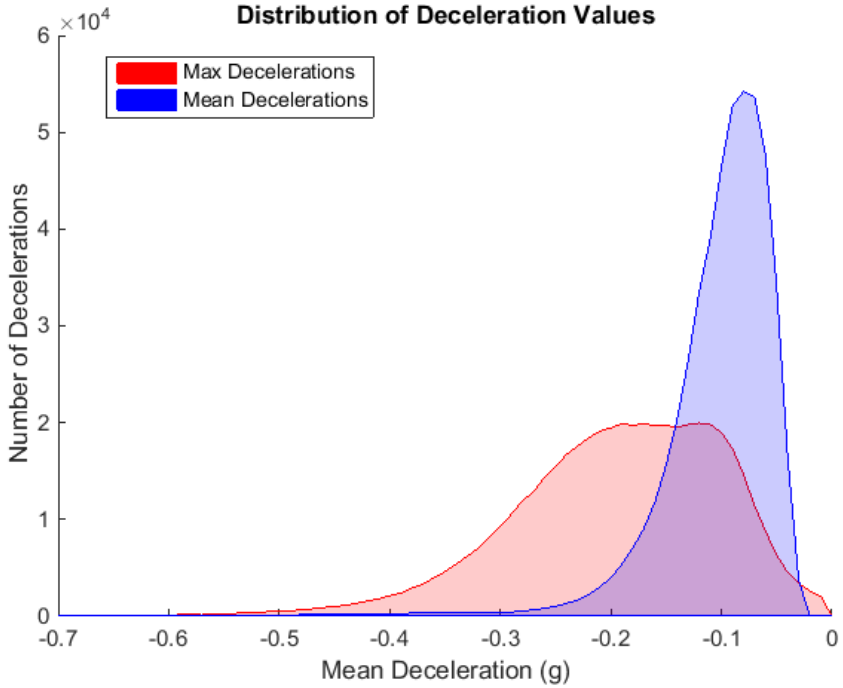
Importance of Braking Behavior

- Cars and Motorcycles are different
  - Modern cars equipped with more advanced safety features than average motorcycle
  - Brakes are controlled independently
  - Motorcycles are inherently unstable in their riding position.

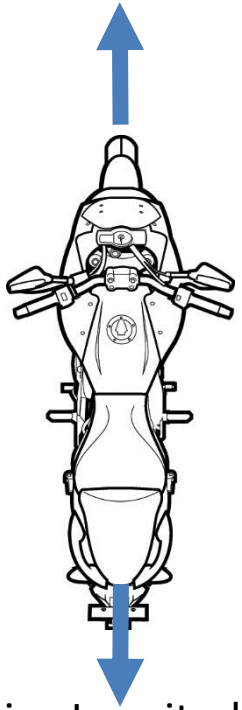
Decelerations



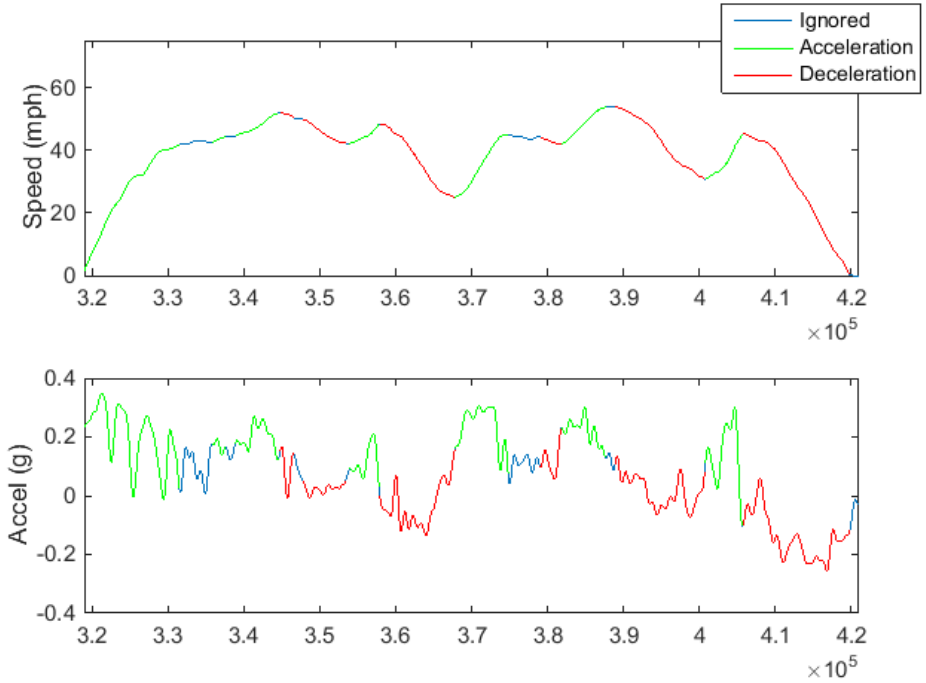
Deceleration Distribution



Positive Longitudinal Acceleration



Negative Longitudinal Acceleration ("Deceleration")

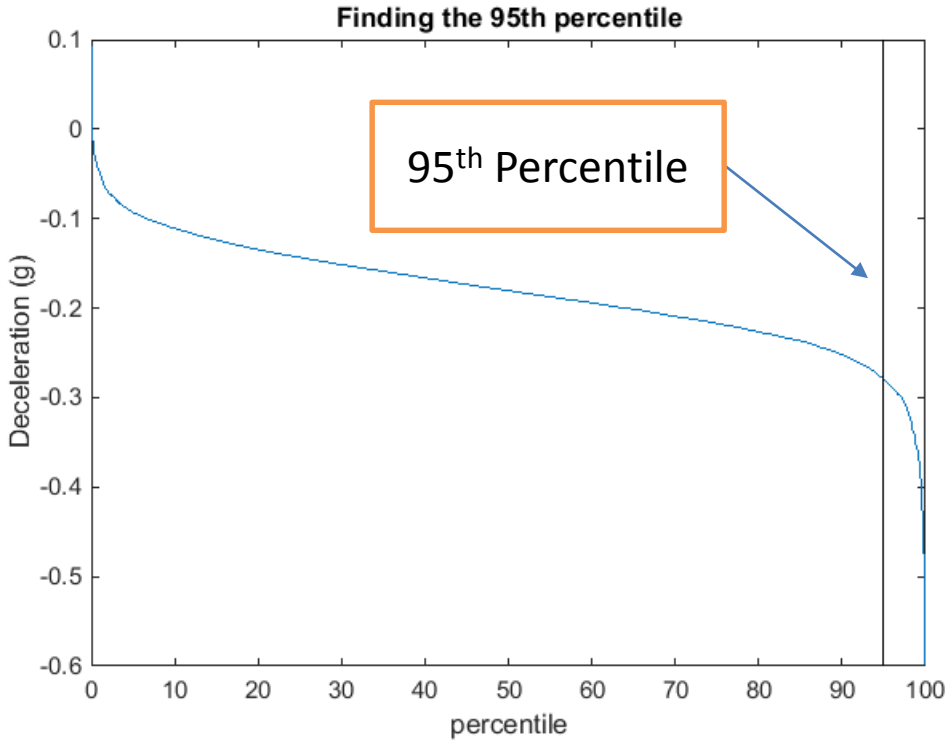


Different aspects of braking analyzed

- 95th Percentile braking levels
- Normal braking
- Crash and Near Crash Braking

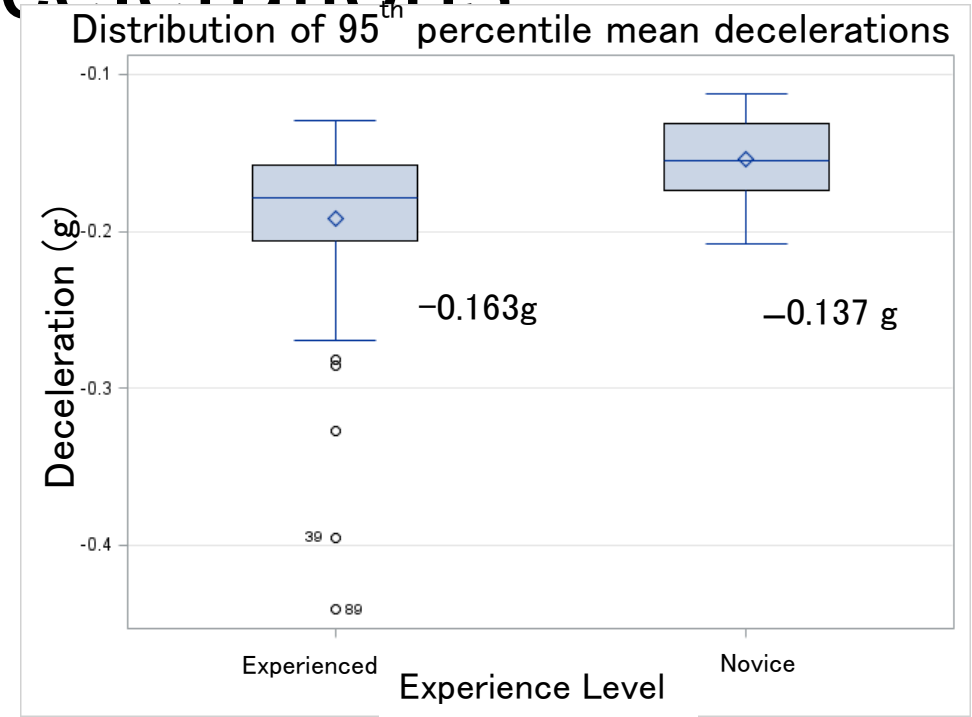
Finding 95th Percentile

Decelerations of participant are ordered and the 95th percentile is located



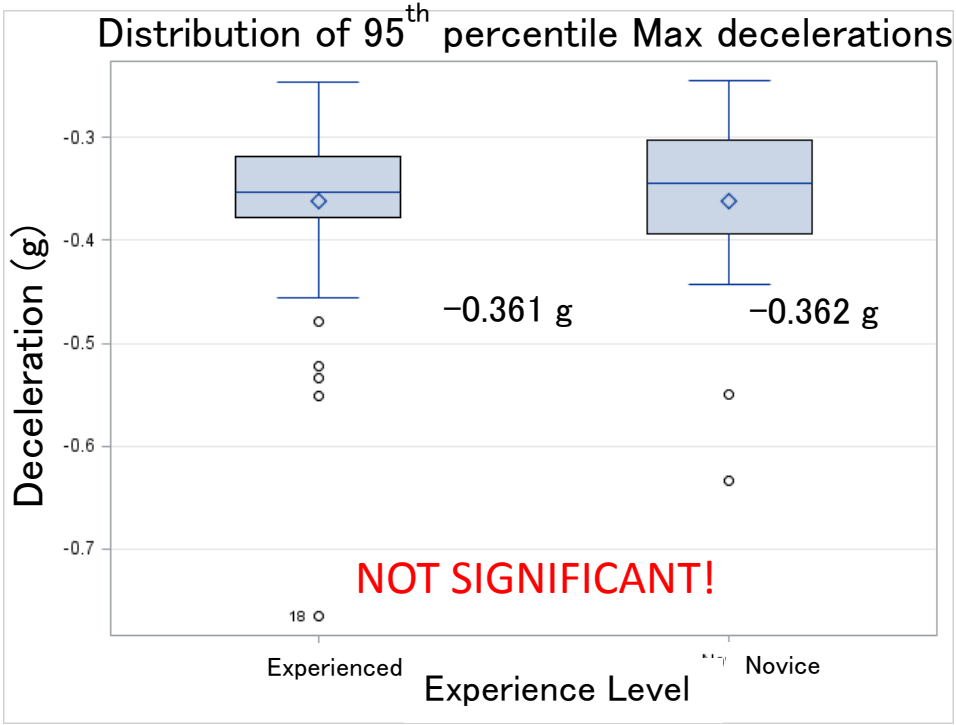
95th percentile mean decelerations

- Experience not
- Overall Average: -0.18g



95th percentile decelerations

- Experience was significant.
- Overall Average: -0.37g



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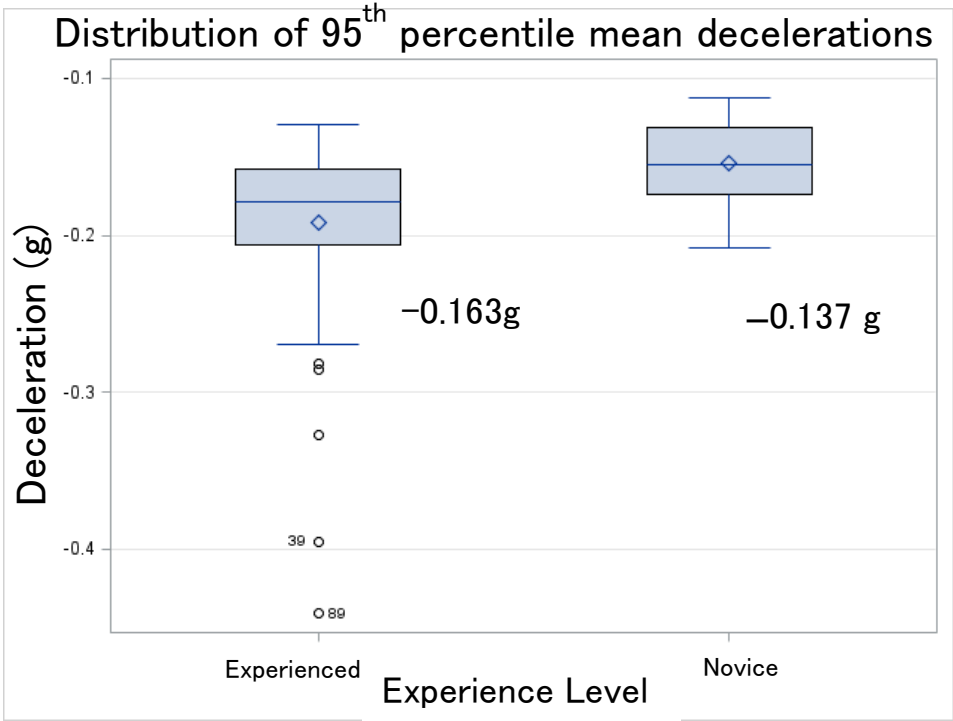
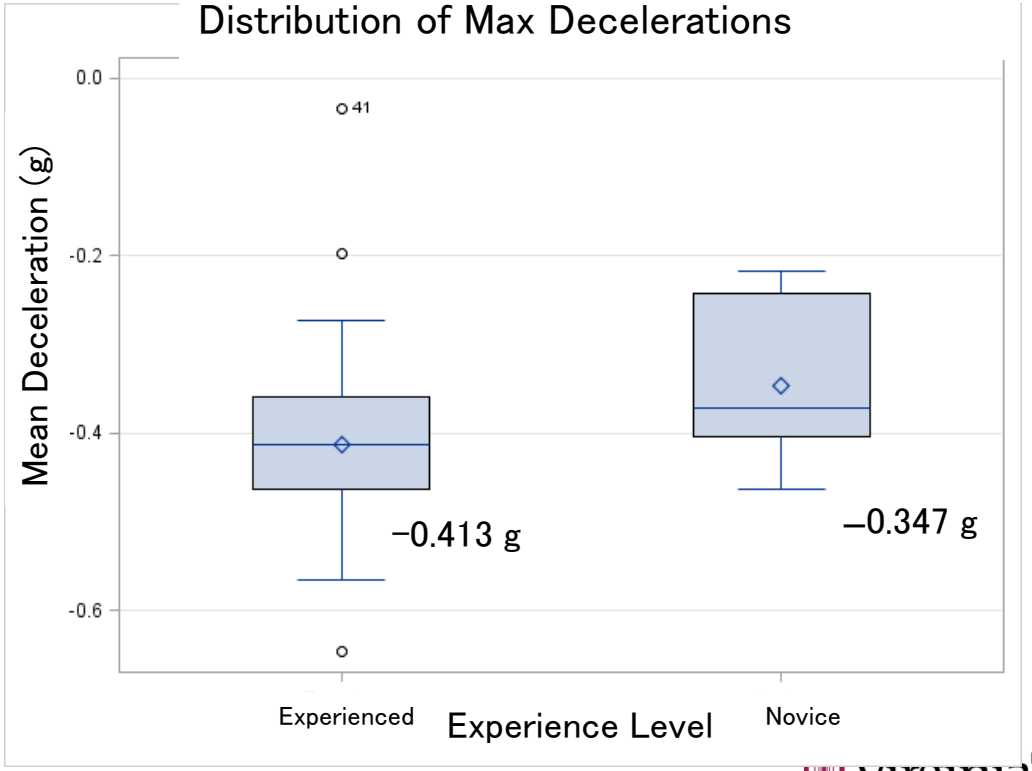


Deceleration to Stop

- Looking at top 30 decelerations going from 25-40 mph to 0 per participant.
- Analyses uses Motorcycle Type and Experience as Independent Variables

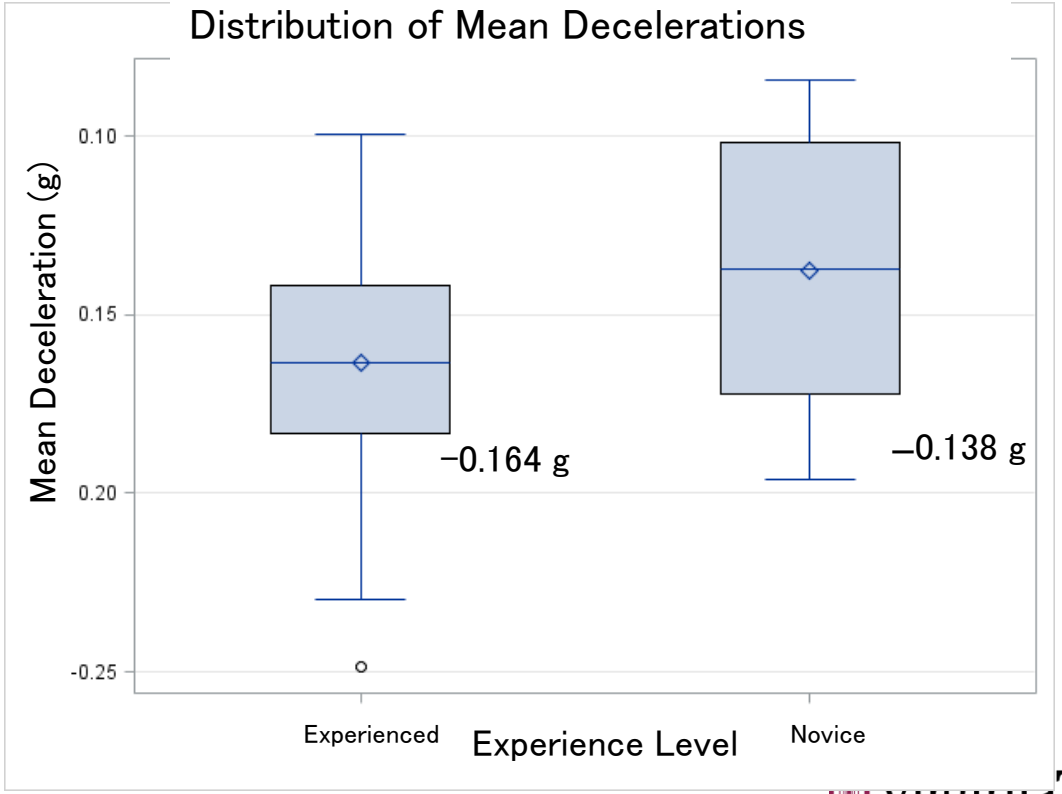
Max Decelerations

- Experience was significant.
- Experienced riders have higher Max decelerations



Mean Decelerations

- Experience was significant
- Experienced riders have higher mean decelerations



Braking during Crash and Near Crash

- 152 Crash and near crash events
- 133 Were moving
- 110 braking was an evasive maneuver

Crash Near Crash Events

- Max Decelerations not significant between Experienced and Novice riders.
- Mean Decelerations are significant between Experienced and Novice riders.

	Avg .Max Deceleration	Avg. Mean Deceleration
Novice	-0.44 g	0.14 g
Experienced	-0.46 g	-0.07 g

Summary

- Mean 95th Percentile Decelerations Significant.
- Experienced motorcyclists can brake harder than novice motorcyclists going from surface street driving speed to 0.
- There is no difference between experience levels when braking in Crash and Near Crash situations.

Questions?