

ATTENTION & THE BRAIN: DETECTION OF AUDIO SIGNALS IN DRIVING AND AUTONOMOUS DRIVING

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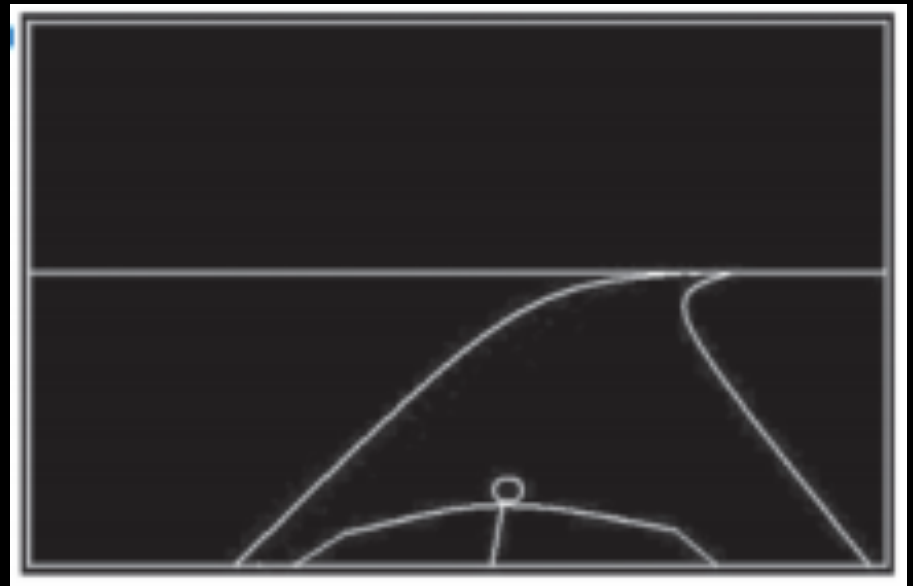


While cars still need the human (backup)

- The driver needs to be warned in the event of a handover situation.
- How susceptible are drivers to warning sounds?

Measuring human capabilities

- ERP study following previous study - Wester et al. 2008
- Driving simulator study (simple setup)
- Lane keeping task



Oddball task

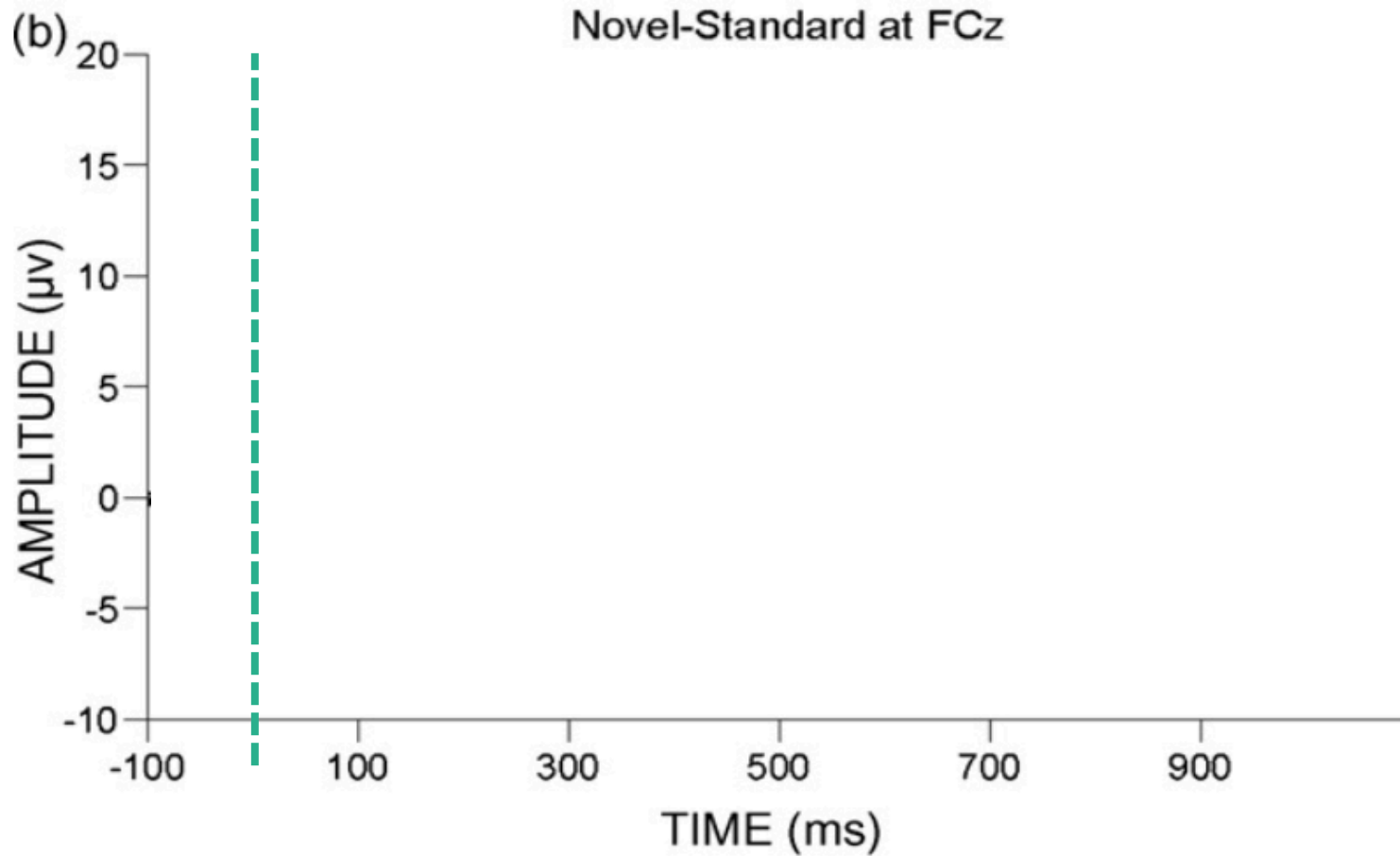
- Standard (80%) – 1000Hz
 - Deviant (10%) – 1200Hz
 - Novel (10%) – Environmental sounds (Fabiani & Friedman, 1995)
-
- Active & Passive condition

P3a (epoch 325 – 375ms after stimulus onset)

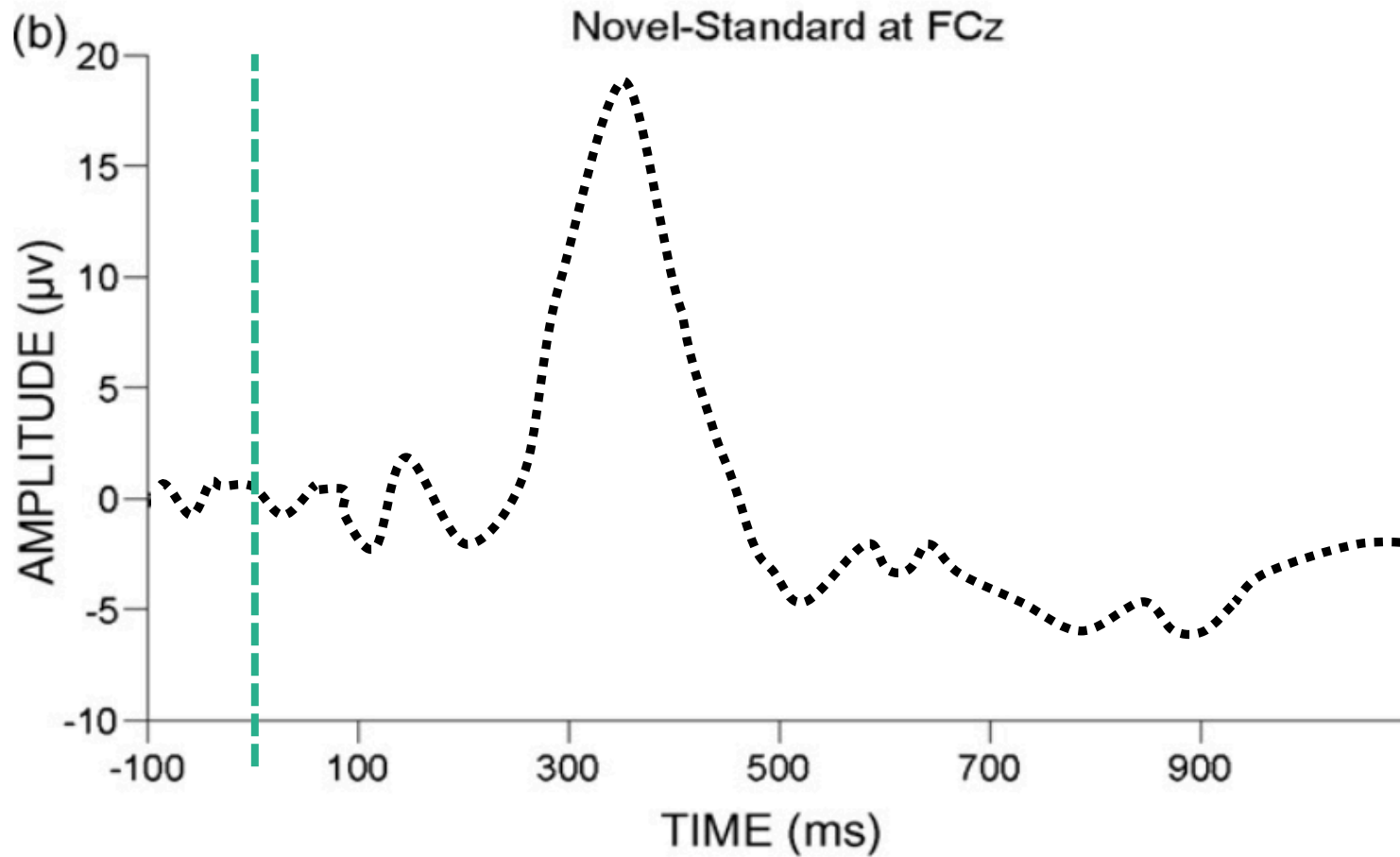
- Signal detection
- Measuring P3a in response to novels compared to response to standards



Wester et al. 2008

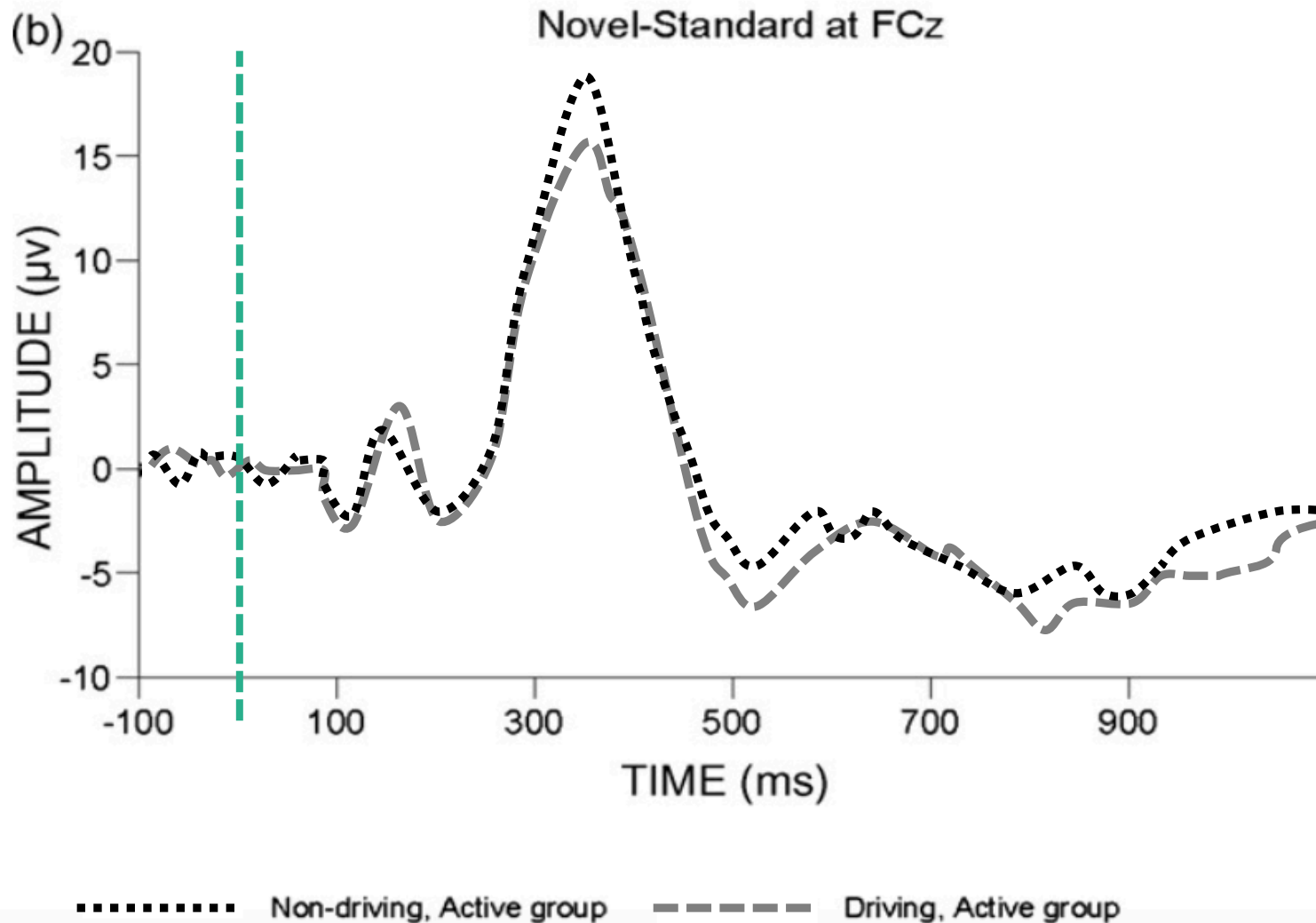


Wester et al. 2008



Non-driving, Active group

Wester et al. 2008





What about autonomous driving?

Driving task

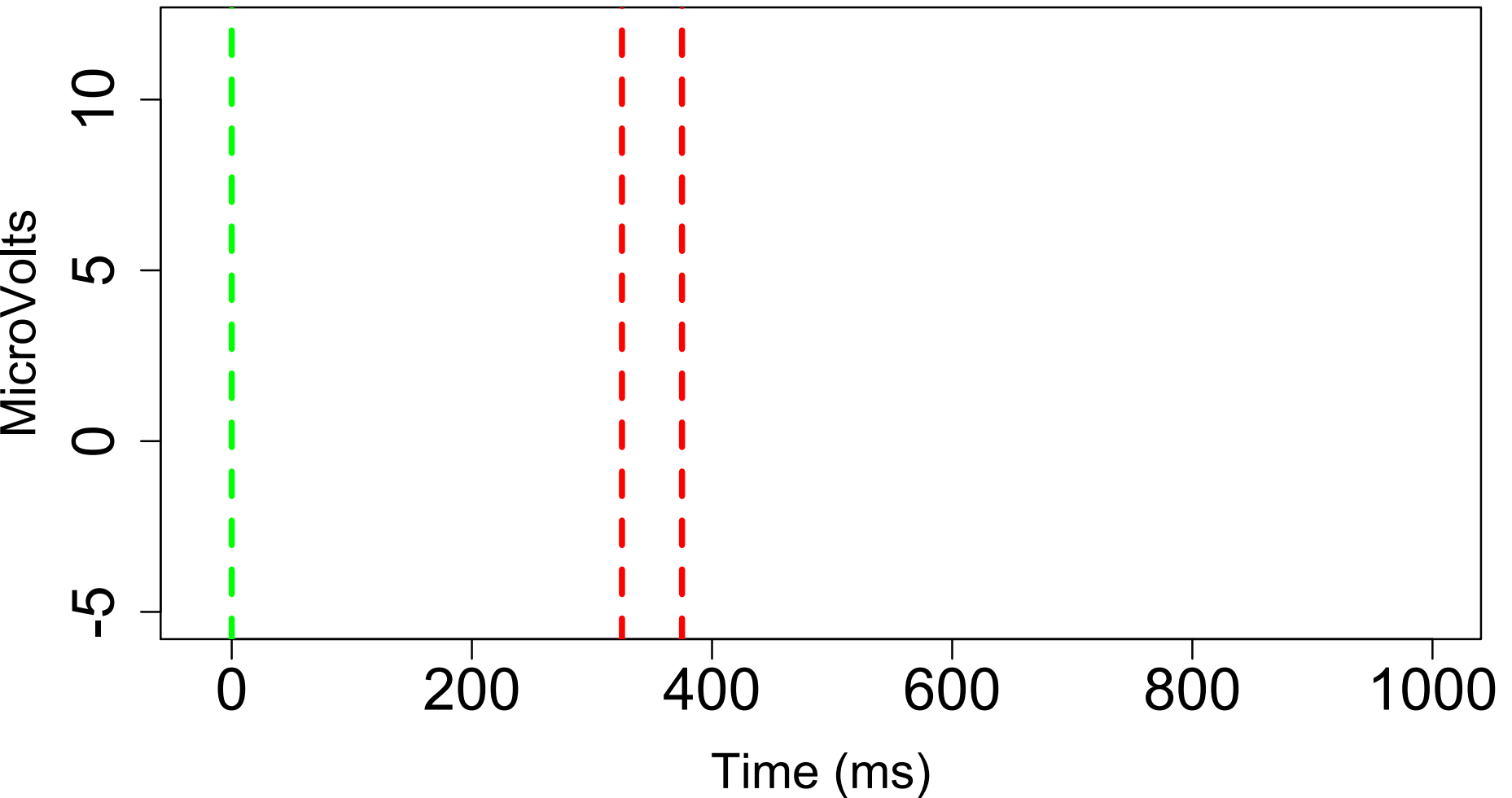
1. Participant driving
2. Car stationary
3. Autonomous driving





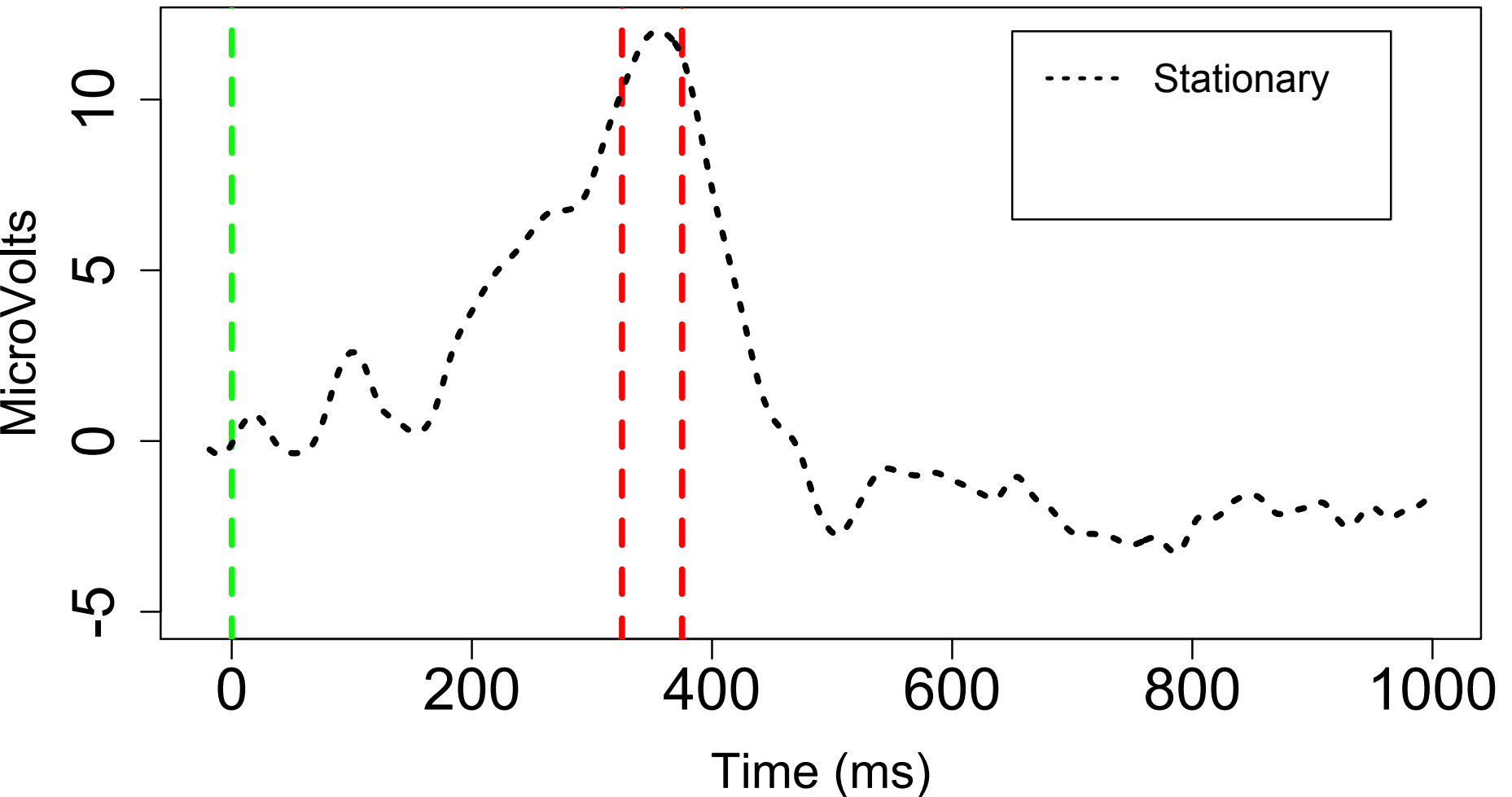
Results - Active

P3a at FCz



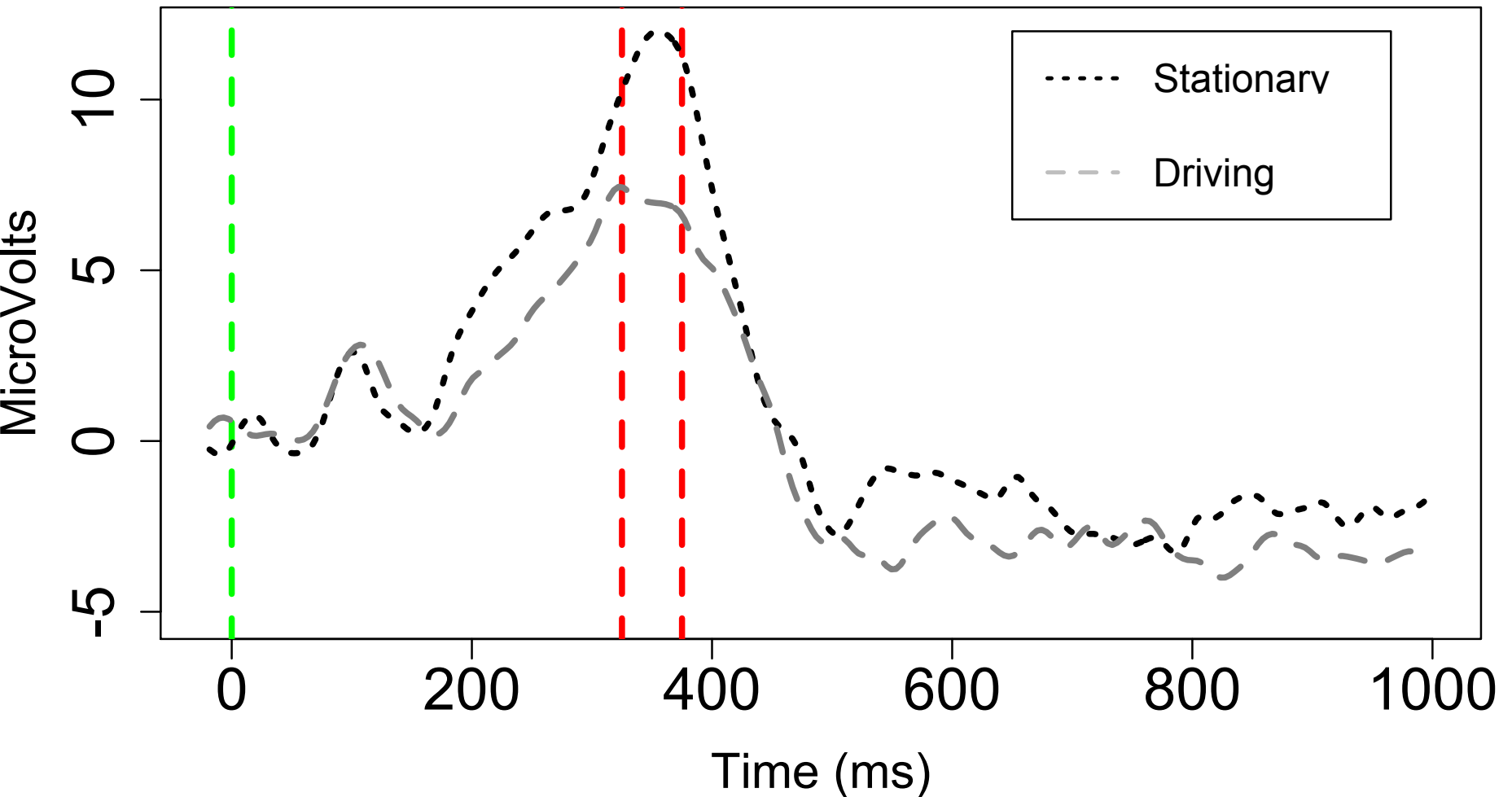
Active - susceptibility

P3a at FCz



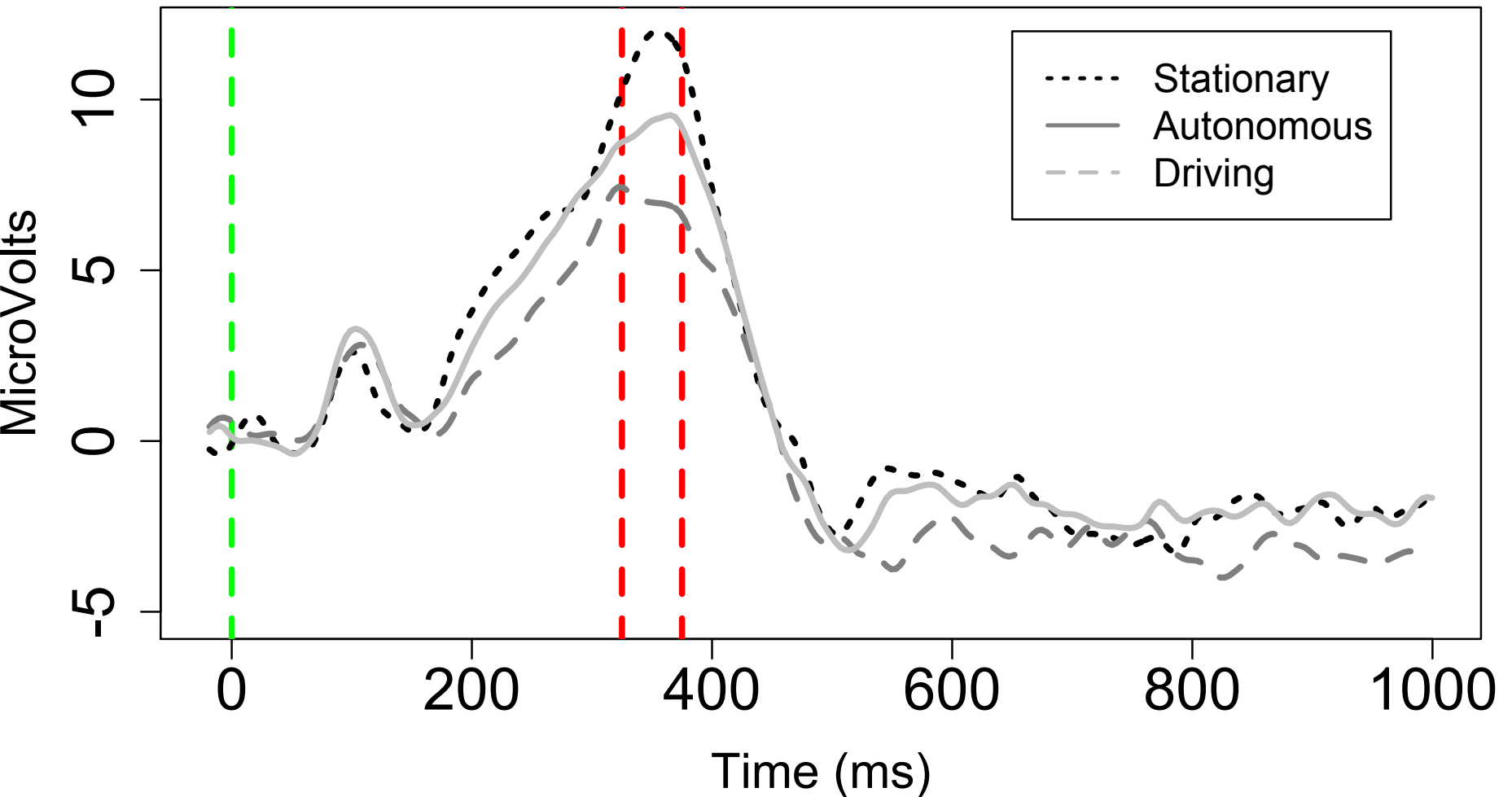
Active - susceptibility

P3a at FCz

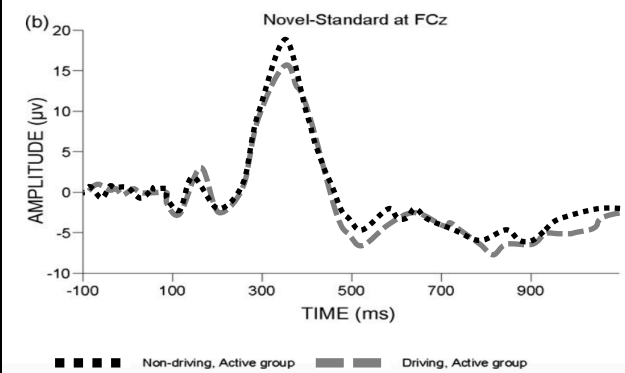


Active - susceptibility

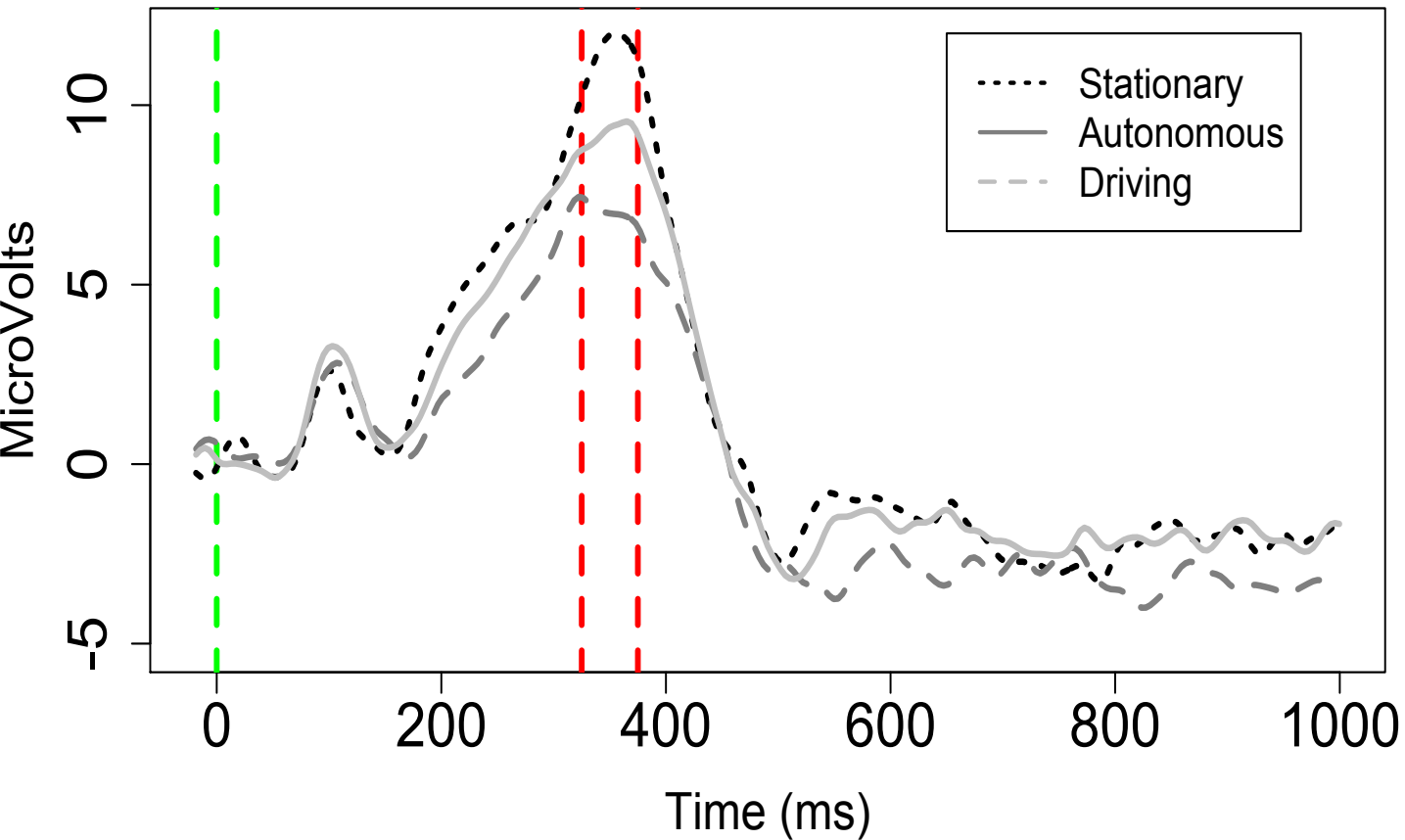
P3a at FCz



Active - susceptibility

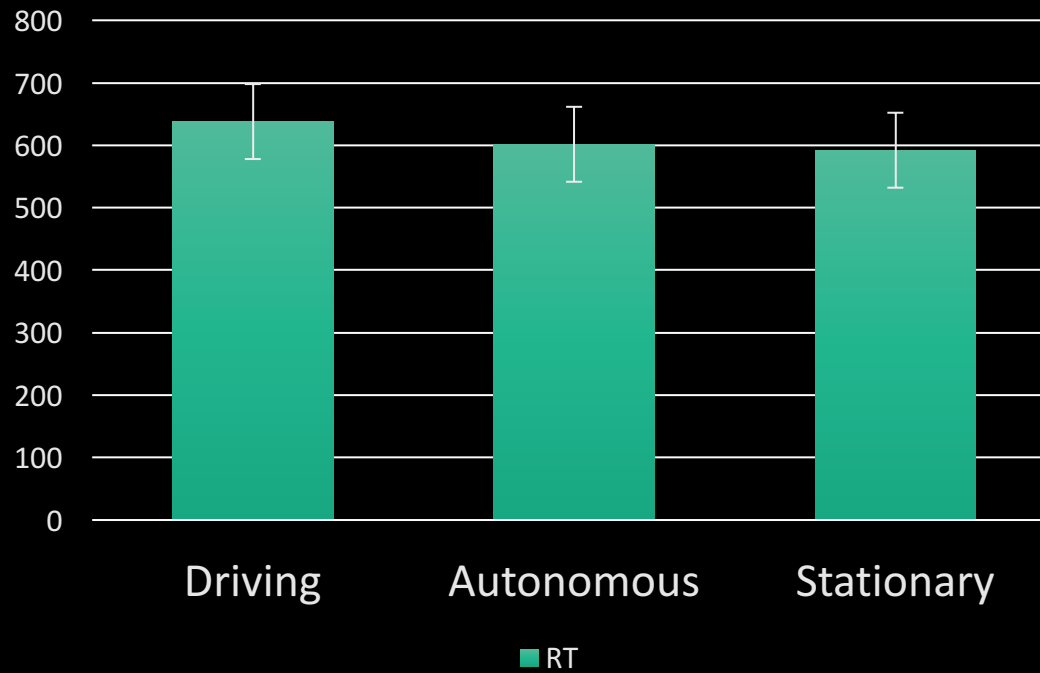


P3a at FCz



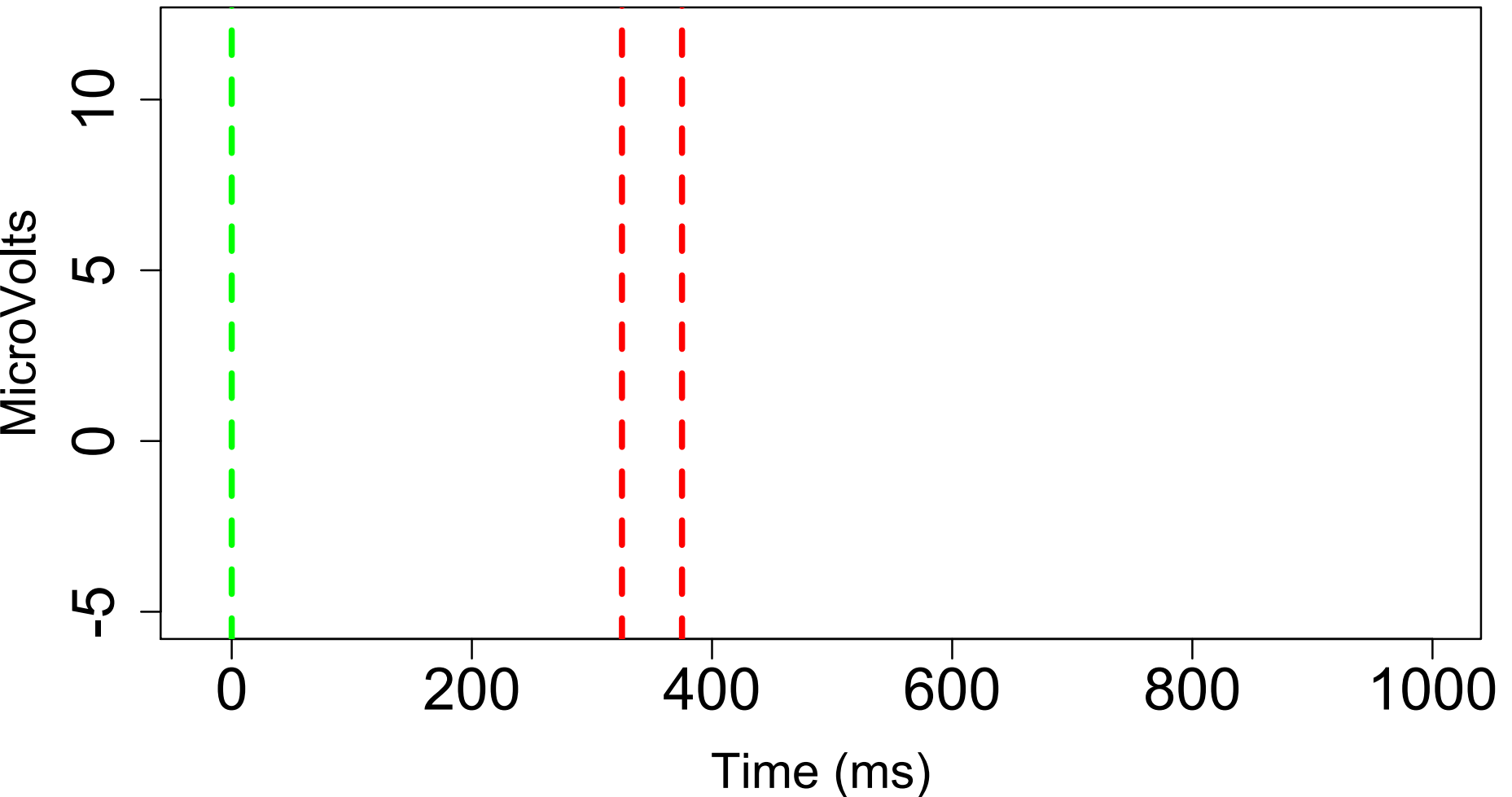
Active - reaction time

	Driving	Autonomous	Stationary
Mean reaction time (ms)	637.88 (SD = 103.49)	601.51 (SD = 118.08)	592.02 (SD = 99.95)



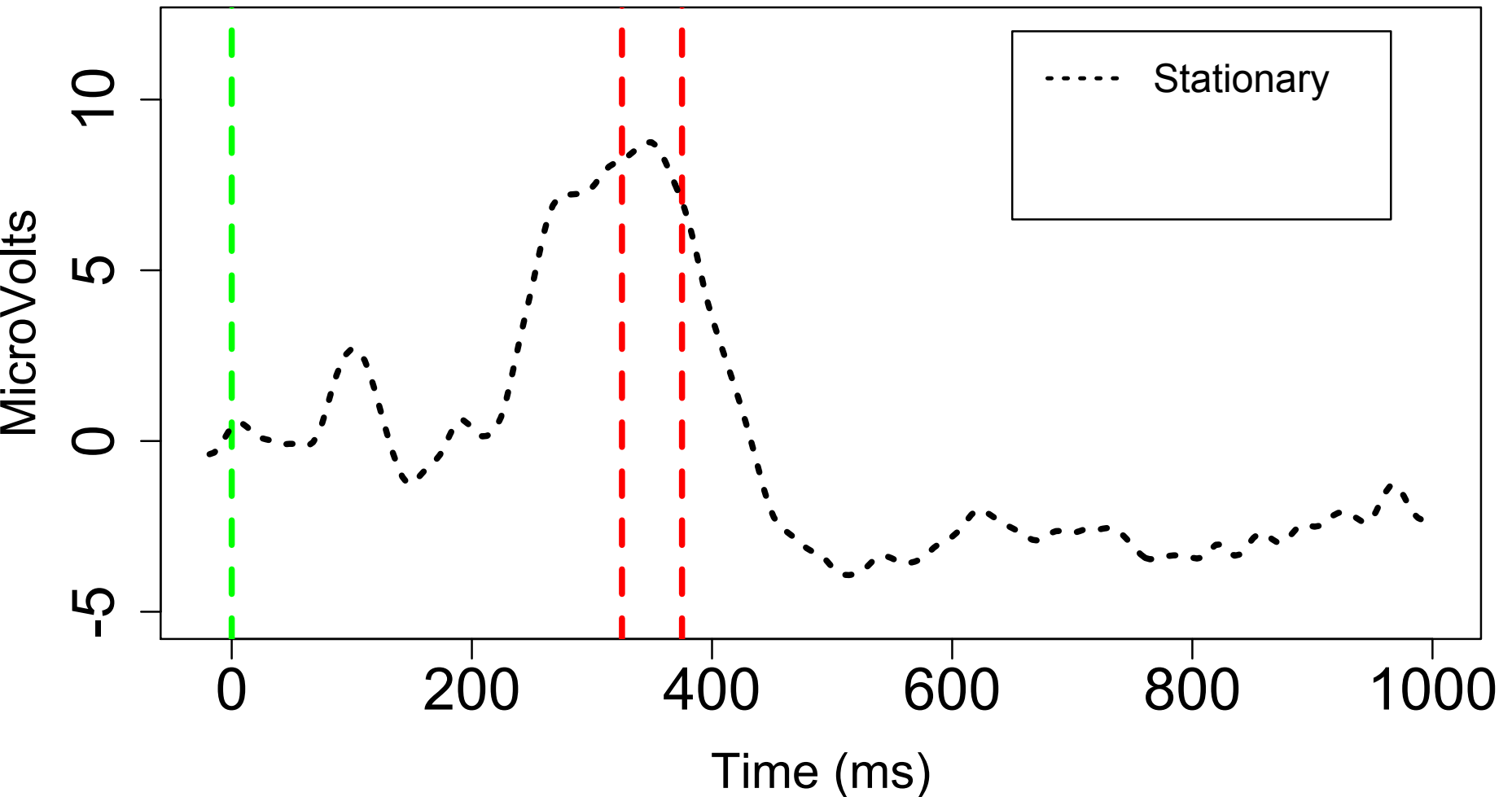
Passive - susceptibility

P3a at FCz



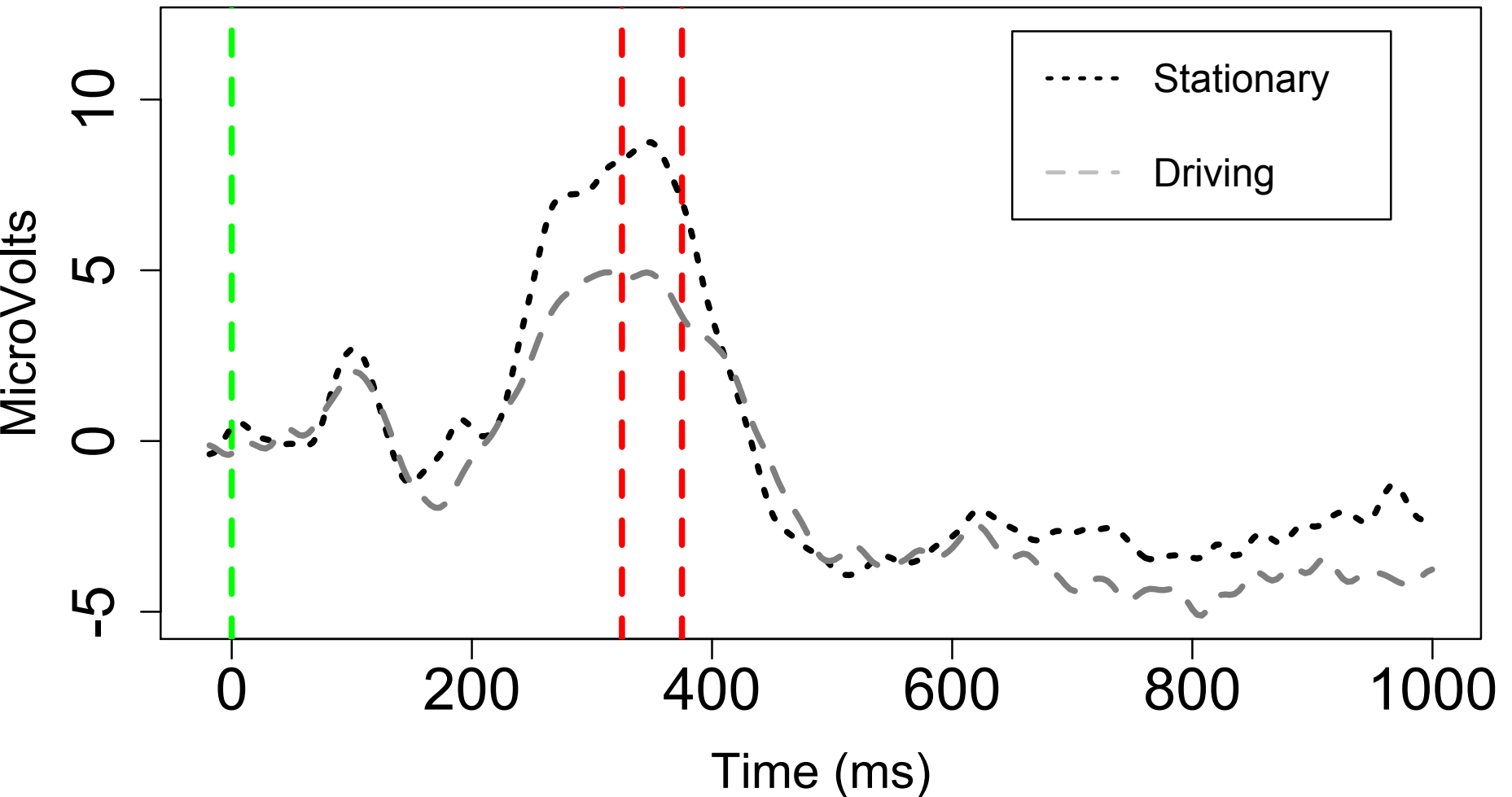
Passive - susceptibility

P3a at FCz



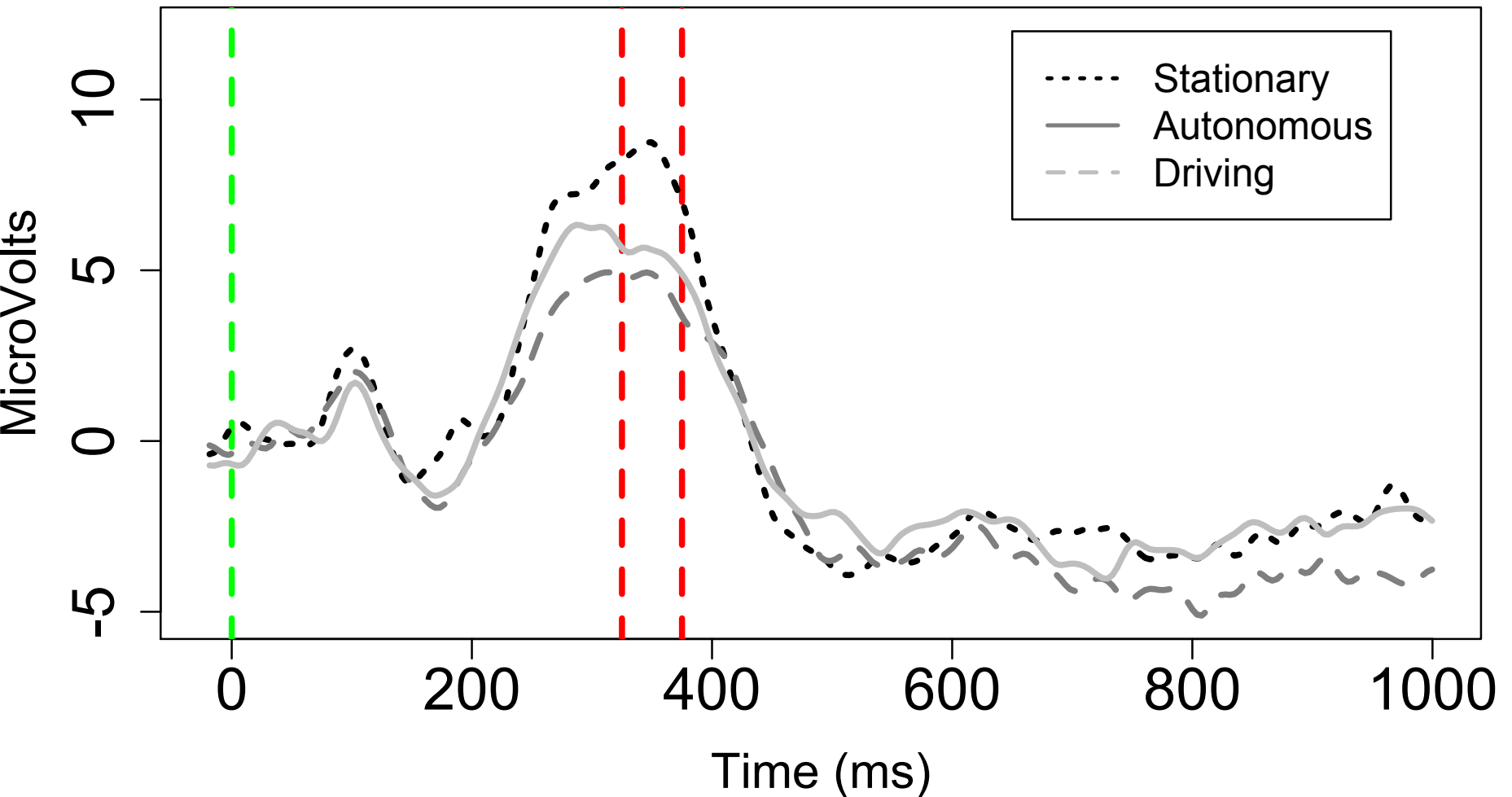
Passive - susceptibility

P3a at FCz

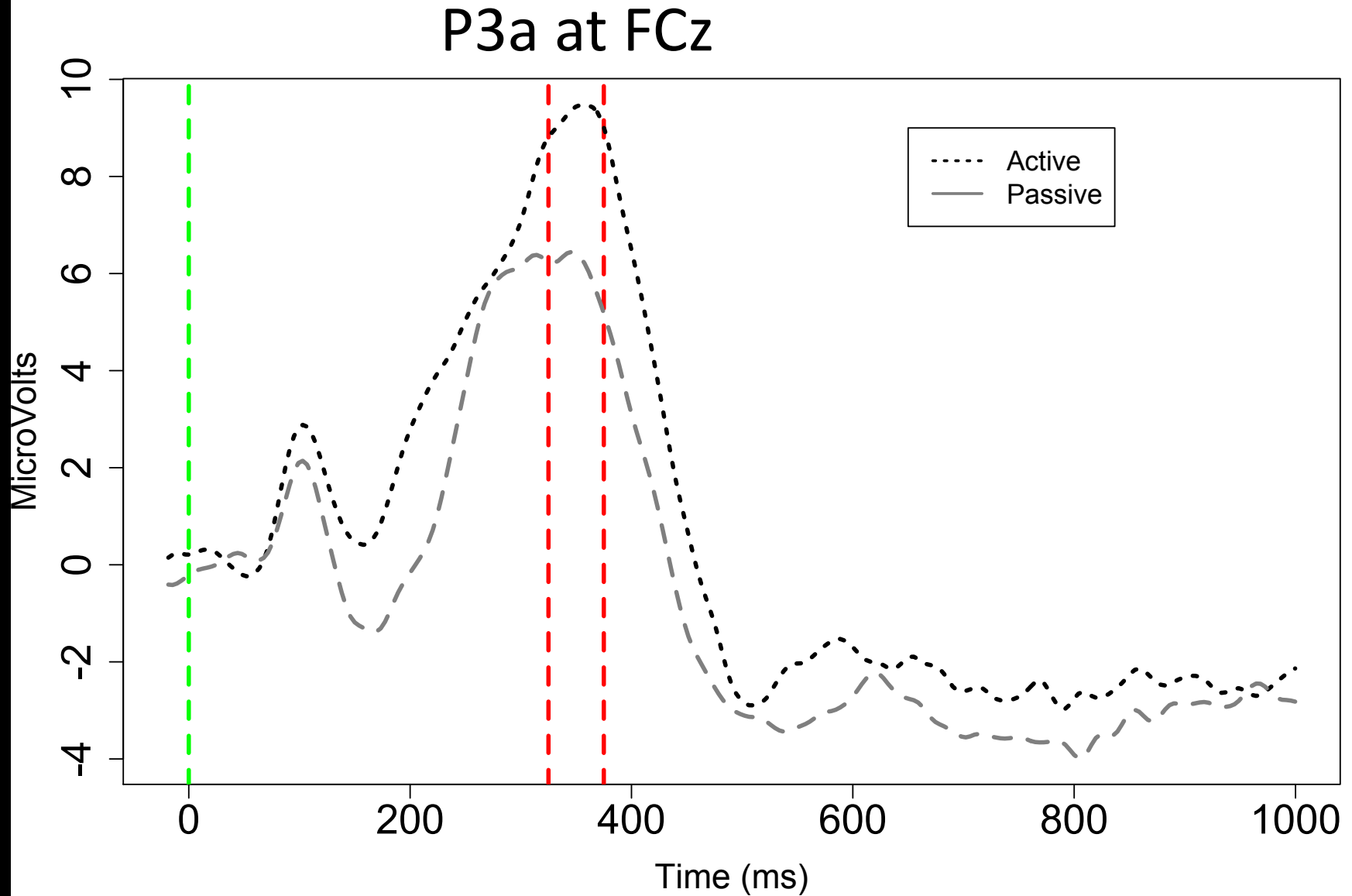


Passive - susceptibility

P3a at FCz



Passive vs Active - susceptibility



General discussion

- Susceptibility during autonomous driving
- Autonomous driving not equal to Stationary and Driving
- How does this apply to distracted drivers?

General discussion #2

- We did a study on early warnings
- Showed that drivers can benefit from being warned early

Cars and Automation

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Priming Drivers before Handover in Semi-Autonomous Cars

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ABSTRACT

Semi-autonomous vehicles occasionally require control to be

further in 'self-driving' or 'autonomous' vehicles, where cars assume more of the driving responsibilities [16].

Questions?

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