

Research Report Summary



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Using Connected Vehicle Technology to Deliver Timely Warnings to Pedestrians

Vehicle-to-pedestrian communication systems

A mounting body of evidence points to distraction caused by pedestrian use of mobile technology as a key risk factor for pedestrian/vehicle collisions. This project used an immersive pedestrian simulator to evaluate

how texting pedestrians cross streams of traffic and how alerts delivered via their cell phones

influence road-crossing safety. Participants crossed a lane of continuous virtual traffic while texting with or without alerts telling them when it was safe to cross. There was also a control group who crossed without texting. We found that



participants in the texting + alert and control groups chose larger gaps, were more discriminating in their gap choices, and better timed their crossing motions than did participants in the texting

group. However, participants who received alerts relied heavily on the alert system and paid less

attention to the roadway. The results demonstrate the potential gains and pitfalls of assistive technologies based on vehicle-to-pedestrian (V2P) communications technology for mitigating pedestrian-motor vehicle crashes.

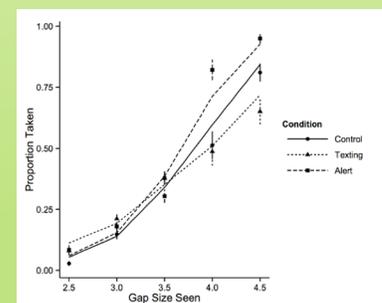
Cell-phone Alerts



Texting Interface

Left image shows the countdown clock to the next crossable gap.

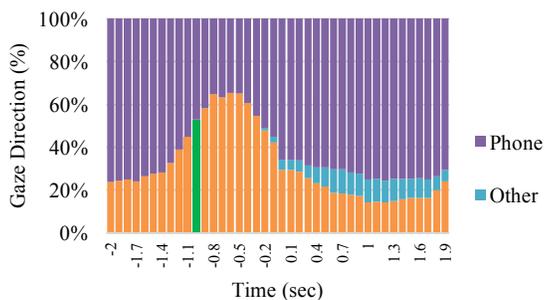
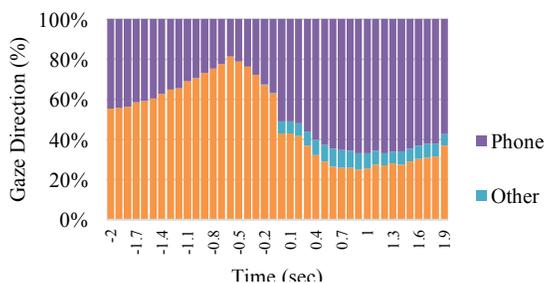
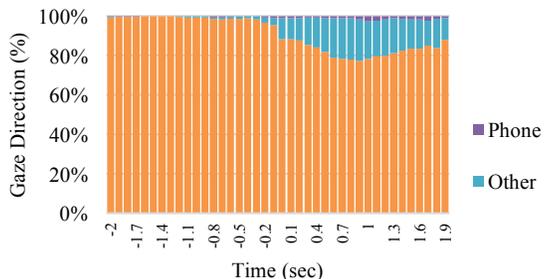
Right image shows green box signaling time to cross.



Logistic regression curves for gap acceptance in the control, texting, and alert conditions.

The role of distraction as a contributing factor to vehicle crashes has gained heightened attention in recent years. Numerous studies have shown that driver attention is impaired by the use of mobile devices. While the deleterious influence of texting and phone conversations on driving is well documented, there is relatively little research on the dangers of using a mobile device as a pedestrian. Recent studies have shown that pedestrians exhibit riskier road-crossing behaviors when texting or talking on a cell phone [1, 2]. The combination of drivers and pedestrians being distracted by mobile devices creates a particularly lethal mix.

“While the results show the promise of alerts to improve the safety of pedestrian road crossing, they also raise concerns about overreliance on technology for making crossing decisions. Extensive testing is needed before deploying V2P systems on real roads.”



Gaze direction for control (top), texting (middle) and alert (bottom) conditions.

The source of the distraction (mobile technology) also offers a potential means of remediation to improve pedestrian road-crossing safety through integrating pedestrians into the roadway communication loop. Advances in connected vehicles technology allow cars to “communicate” with each other through Dedicated Short-Range Communications (DSRC). This technology can also allow smartphones and vehicles to exchange information about their locations and movements, so-called V2P communication. A major problem in developing V2P technology is incorporating human users into the roadway communication loop. In particular, little is known about how information about traffic can be most effectively presented to pedestrians through mobile devices, and whether pedestrians will trust and attend to this information. This project developed and tested an interface for informing texting pedestrians when it was safe to cross a stream of traffic. The project highlights the adverse effects pedestrian texting can have on safe road crossing and the potential of cell phone alerts to reduce the risk of being hit by a vehicle when walking across roads while texting. However, the results also raise concerns about the impact of overreliance on technology for making road-crossing decisions. Reduced attention to traffic could leave pedestrians vulnerable to unexpected changes in traffic or technological failures in predicting gap affordances, resulting in unsafe entry into traffic-filled roadways.

References

1. Nasar, J. L., & Troyer, D. (2013). Pedestrian injuries due to mobile phone use in public places. *Accident Analysis & Prevention*, 57, 91-95.
2. Schwebel, D. C., Stavrinou, D., Byington, K. W., Davis, T., O’Neal, E. E., & de Jong, D. (2012). Distraction and pedestrian safety: How talking on the phone, texting, and listening to music impact crossing the street. *Accident Analysis & Prevention*, 45, 266-271.