How does a virtual peer influence children's distance from the roadway when initiating crossing?

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A bike rider's distance from the roadway is one of the factors that determine the safety of the crossing. First, it dictates the vantage point from which the rider sees the oncoming traffic. Second, it governs the distance that must be crossed to clear the beam of oncoming traffic. This study investigated how the behavior of a virtual peer in an immersive bicycling simulator influences how far away from the roadway children are when they initiate crossing.

Friends and siblings provide role models that can affect judgments of physical ability and decision-making in performing physical tasks by school-aged children [Plumert and Schwebel 1997]. Previously [Babu et al. 2009] we examined how a virtual peer influences children's choice of gaps and timing of their motion to cross roads with streams of traffic. Here we compare starting position for roadway crossing chosen by 10- and 12-year-old children when riding with a virtual peer (in one of the two experimental conditions) and when riding alone in a control condition. In the far distance condition, the peer was programmed to initiate the crossing from the stop line in front of the pedestrian crosswalk at each intersection (7.73 m from the edge of the roadway). In the close distance condition, the peer was programmed to initiate road crossing at a shorter distance from the edge of the crossing road (4.68 m from the edge of the roadway). In the two experimental conditions, children crossed 6 intersections with a virtual peer and then crossed 6 intersections alone. The control group rode through all 12 intersections without the peer. At each intersection, continuous cross-traffic approached on the near lane from the left. Children riding with the peer were instructed to wait for the peer to cross the intersection before crossing themselves. There were 27 participants in the far distance condition, 47 participants in the close distance condition, and 20 participants in the control group.

1 Results

We found that the peer had a significant influence on where children positioned themselves in preparation for crossing (Figure 1). We measured starting position by computing the distance between the edge of the intersection and the start location. The "start" location was defined as the position where the rider's speed exceeded 1.0 m/s. In cases when the rider did not come to a complete stop, the starting position was defined as the position where the rider consistently stayed above her slowest speed when accelerating to cross the intersection. We considered the rider to have come to a stop if his or her speed stayed below 0.1 m/s for at least 2 seconds.

A two-way repeated measures ANOVA with experimental condition and intersection group (first six vs. last six) as independent variables revealed a significant main effect of experimental condition ($F(2, 91) = 37.30, p < .0001$). The interaction ($F(2, 1031) = 1.43, p = 0.24$) and main effect of intersection group ($F(1, 1031) = 0.29, p = 0.6$) were not significant, suggesting that the differences between conditions persisted through the last six intersections when the children in all three conditions rode by themselves. The mean starting positions were at 6.45 m (SD 0.22) for far condition, 4.16 m (SD 0.17) for close condition and 5.8 m (SD 0.26) for control group. A follow-up analysis using Tukey's HSD showed a significant difference between average starting position in far and close distance conditions ($t = 2.29, p < .0001$) as well as between close distance condition and control ($t = -1.67, p < .0001$). The difference between far distance condition and control was not significant ($t = 0.66, p = 0.14$).

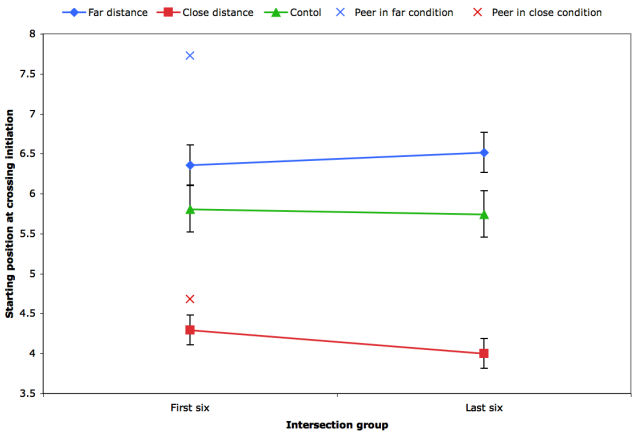

Figure 1: *Average starting position by experimental condition*

As would be expected, the starting position of the peer influenced position where children initiated crossing when they were riding with the peer. Moreover, when the children in the close distance condition rode alone, they did not revert to the preferred default distance exhibited by children in the control condition. This demonstrates the powerful influence that peers have on one another. These results are important for understanding social influences on complex motor behaviors involved in crossing roads. In addition, they may provide the potential basis for the development of training systems to instruct children in safe riding behavior.

References

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APGV 2009, Chania, Crete, Greece, September 30 – October 02, 2009.
ISBN 978-1-60558-743-1/09/0009