Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTRI-2004-21		

4. Title and Subtitle	5. Report Date
The Roles of Retroreflective Arm Treatments and Arm Motion in Nighttime Pedestrian Conspicuity	October 2004
	6. Performing Organization Code: 302753

7. Author(s)	8. Performing Organization Report No.
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9. Performing Organization Name and Address	10. Work Unit no. (TRAIS)
The University of Michigan Transportation Research Institute 2901 Baxter Road Ann Arbor, Michigan 48109-2150 U.S.A.	11. Contract or Grant No.

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
The University of Michigan Industry Affiliation Program for Human Factors in Transportation Safety	14. Sponsoring Agency Code

15. Supplementary Notes

The Affiliation Program currently includes AGC America, Autoliv, Automotive Lighting, Avery Dennison, Bendix, BMW, DaimlerChrysler, DBM Reflex, Denso, Federal-Mogul, Ford, GE, General Motors, Gentex, Guide Corporation, Hella, Honda, Ichikoh Industries, Koito Manufacturing, Lang-Mekra North America, Magna International, Mitsubishi Motors, Muth, Nichia America, Nissan, North American Lighting, OLSA, OSRAM Sylvania, Philips Lighting, PPG Industries, Reflexite, Renault, Samlip, Schefenacker International, Sisecam, Solutia Performance Films, Stanley Electric, TG North America, Toyota Technical Center USA, Truck-Lite, Valeo, Vidrio Plano, Visteon, 3M Personal Safety Products, and 3M Traffic Safety Systems. Information about the Affiliation Program is available at: http://www.umich.edu/~industry

16. Abstract

A naturalistic, nighttime field study was conducted to assess the effects of retroreflective arm treatments, pedestrian arm motion, scene complexity, and pedestrian orientation on detection distances for older drivers. Participants drove instrumented vehicles in real traffic, along a fixed 38-km route, in search of pedestrians wearing one of three retroreflective trimmed safety garments. Participants had no prior knowledge of where along the route pedestrians would be located, nor the number of pedestrians positioned along the route. All of the challenges normally encountered when driving at night on public roadways were present during the study (oncoming traffic, traffic entering the flow, and distracters such as traffic signals, lights, signs, pedestrians, and bicyclists), imposing an ecologically valid level of workload on participants.

The results show that both arm motion and scene complexity significantly affected the distances at which pedestrians were detected at night. Pedestrians with their arms in motion were detected on average 32% farther away than those who stood motionless. Pedestrians located in the low complexity environments were on average detected at distances that were 30% farther than the medium complexity conditions. Yet, there were no main effects of either the type of retroreflective arm treatment or the way the pedestrian was oriented relative to the flow of traffic. Interactions involving arm motion and pedestrian orientation as well as scene complexity and arm motion were found.

Overall, the results of this study continue to support the benefits to pedestrians from wearing retroreflective safety garments when in the vicinity of traffic at night. However, further study is needed to better understand the role of reflective markings in combination with garment background materials on pedestrian conspicuity in daytime conditions and in higher complexity nighttime scenes.

17. Key Words	18. Distribution Statement
biomotion, personal protective equipment, retroreflection, safety garment	Unlimited

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. of Pages	22. Price
None	None	23	