

# Impact of VR Training on Safety Confirmation Behavior Based on Individual Characteristics of Older Drivers

Yuki Yoshihara<sup>1)</sup> Linjing Jiang<sup>1)</sup> Nihan Karatas<sup>1)</sup> Hitoshi Kanamori<sup>1)</sup> Asuka Harada<sup>1)</sup>

Motoshi Kojima<sup>2)</sup> Takahiro Tanaka<sup>1)</sup>

*1) Nagoya University, Institute of Innovation for Future Society,  
708 National Innovation Complex (NIC), Furo-cho, Chikusa-ku, Nagoya, 464-8601, Japan  
(E-mail: yoshihara.yuki.b8@f.mail.nagoya-u.ac.jp)*

*2) TOYOTA MOTOR CORPORATION, 1, Toyota-cho, Toyota, Aichi, 471-8571, Japan*

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Fig. 1 VR training system.

Table 1 ANCOVA predictors. Count: safety confirmations per intersection;  $\Delta$  = post – pre;  $\beta$ : standardized coefficient.

| Model                                                                                          | R2  | n  | Predictor                 | beta  | p               |
|------------------------------------------------------------------------------------------------|-----|----|---------------------------|-------|-----------------|
| $\Delta\text{Count} \sim \text{Count (pre)} + \text{Overconfidence}$                           | .17 | 30 | Count (pre)               | -0.22 | .23             |
|                                                                                                |     |    | Overconfidence            | -0.36 | .051            |
| $\Delta\text{Count} \sim \text{Count (pre)} + \Delta\text{Count (VR)} + \text{Overconfidence}$ | .55 | 29 | Count (pre)               | -0.37 | <b>.014</b>     |
|                                                                                                |     |    | $\Delta\text{Count (VR)}$ | +0.65 | <b>&lt;.001</b> |
|                                                                                                |     |    | Overconfidence            | -0.30 | <b>.047</b>     |
| $\Delta\text{Count} \sim \text{Count (pre)} + \text{MPI}$                                      | .06 | 30 | Count (pre)               | -0.21 | .28             |
|                                                                                                |     |    | MPI                       | +0.12 | .52             |
| $\Delta\text{Count} \sim \text{Count (pre)} + \text{Age}$                                      | .10 | 30 | Count (pre)               | -0.22 | .25             |
|                                                                                                |     |    | Age                       | -0.24 | .20             |

**Introduction** Whether safety training transfers to real-road driving, and why its effect differs between drivers, remains unclear. We examined the transfer of Virtual reality (VR) safety training in older drivers and the driver characteristics that shape it.

**Method** Thirty older drivers aged 65–78 completed ten VR drives on a head-mounted display (Fig. 1): three baseline drives, four training drives with diagnostic feedback, and three post-training drives. Participants also drove a public road before and after the VR session. From real-road stop-sign intersection approaches, we extracted head-movement metrics: the number of safety confirmations, their duration, angle, angular speed, and vehicle speed during confirmation. An overconfidence axis was derived from a driving-style questionnaire, and cognitive function was assessed with a verbal memory test (MPI).

**Results** Safety confirmations increased markedly within VR and carried over to real driving, rising from 3.7 to 4.4 per intersection ( $p < .001$ ), accompanied by wider and faster head movements. The size of this transfer was largely determined by how much each driver improved within VR, whereas overconfident drivers tended to transfer less (Table 1). Verbal memory and age were unrelated.

**Discussion** Overconfidence appeared to act not on learning itself but on applying what was learned. These findings support individualized feedback targeting overconfidence as a promising direction for older driver training.