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Investigating the influence of visuospatial stimuli on driver's speed perception: a laboratory study

Anna-Lena Köhler^{1*} , Maren Klatt¹, Iring Koch² and Stefan Ladwig¹

Abstract

Driving at an inappropriate speed is a major accident cause in the EU. Understanding the underlying sensory mechanisms can help to reduce speed and increase traffic safety. The present study investigated the effect of visuospatial stimuli on speed perception using an adaptive countermeasure to speeding based on a manipulation of optic flow. We added red lights on both sides of a simulated road. We expected speed to be perceived as faster when lights moved toward drivers due to increased optic flow, whereas we expected static light stimuli to not alter the optic flow and thus not influence speed perception. Two experiments applied the method of constant stimuli. To this end, participants encountered several trials of two video sequences on a straight road. A reference sequence showed the same traveling speed while test sequences varied around different traveling speeds. Participants indicated which sequence they perceived as faster, leading to the calculation of the point of subjective equality (PSE). A lower PSE indicates that the speed in this experimental condition is perceived as faster than in another experimental condition. Experiment 1A did not show a difference between PSEs of static and oncoming lights. Because participants had counted reflector posts for speed estimation, we removed these reflector posts in Experiment 1B and found a lower PSE for oncoming lights. Thus, such light stimuli may have an effect only in situations without other competing visual stimuli supporting speed perception. Future research should investigate whether speed perception is indeed a primarily visuospatial control task or whether other sensory information such as auditory factors can have an influence as well.

Keywords Speed perception, Safe speed, Traffic safety, Adaptive traffic intervention, Optic flow

Significance statement

Inappropriate speed remains a major cause of accidents. There is a variety of interventions aiming at lowering driving speed inappropriate for a given context. Countermeasures to speeding in the driving infrastructure can target every driver in potential areas. Understanding the mechanisms in speed perception can help to develop

better interventions. The present two experiments investigated the role of visual stimuli in speed perception based on a dynamic light-based intervention that led to lower driving speeds in a previous simulator study and field test (Köhler et al., 2022). Our findings show that oncoming lights lead to lower perceived traveling speed, but only when there are no other salient visual stimuli that support speed perception. In sum, the findings provide valuable insights for future development of countermeasures targeting speeding.

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Speed Of Perception

Qin Gao, Jia Zhou



Speed Of Perception:

Neurowaves Georg Northoff,2023-05-15 The connection of the brain to the mind remains one of the most persistent mysteries in philosophy and neuroscience Georg Northoff proposes a new approach to the so called mind body problem drawing on an insight from physics time structures all objects and events in the world and all objects and events are in dynamic relationship This also shapes the brain as it is part of the dynamic of the world as whole In *Neurowaves* Northoff posits that the entire world is structured by waves of time and argues that the passing of these waves through our brains neurowaves produces mental experience The brain s neural waves transform into mental waves time and its dynamics are shared by brain and mind as their common currency As in physics and biology that radically changes our view Copernicus showed how the earth moves and that its movements are just a tiny part of the universe s passage of time Darwin showed that the human species is one among many species passing through evolution s timescales Northoff calls for another Copernican revolution replacing the mind body problem with questions about the temporal dynamic relationship between brain and world Illustrated with vivid examples from different facets of the physical and biological world *Neurowaves* provides captivating insights and an innovative entertaining unravelling of the temporal connection of brain and mind

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explores human factors principles and findings for consideration by highway designers and traffic engineers The report is designed to help the nonexpert in human factors to consider more effectively the roadway user s capabilities and limitations in the design and operation of highway facilities *Frontiers in Neural Circuits and Frontiers in Neurology* Desdemona Fricker,Mathieu Beraneck,Michele Tagliabue,K. J. Jeffery,2021-02-26 In this 2nd edition the following article has been added
Fricker D Beraneck M Tagliabue M and Jeffery KJ 2020 Editorial Coding for Spatial Orientation in Humans and Animals
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