

# AUTOMOTIVE ERGONOMICS

## DRIVER-VEHICLE INTERACTION



EDITED BY  
**NIKOLAOS GIKIKAS**



**CRC Press**  
Taylor & Francis Group

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# Preface

## A NEW PHASE IN THE RELATIONSHIP BETWEEN THE DRIVER, THE VEHICLE AND THE INFRASTRUCTURE

Car manufacturing cannot turn into a major business, since there are few people who can train as chauffeurs.

**Karl Benz**

The name of Karl Benz, one of the father figures in the automotive industry, is quoted more than once in this book. This is not only because of his undoubted contribution during the initial phase of automotive development, but also because of the contrast of expectations between key figures such as himself with the established beliefs and practices of today. Common perception of what the automobile is and to whom it is addressed was significantly different back then. From the time when very few could afford it and a handful of those were skilled enough to control such machines, we were led, within a few decades, to the generalisation of the automobile, first in the U.S., then in Europe and post-WWII Japan. Backed by the technological and industrial impetus from two world wars, the automotive industry quickly grew from a niche for the very few, to the ubiquitous supplier of one of the essentials of modern living. The automobile was the ideal vehicle to transfer the technical skills and knowledge developed during the Wars to the relatively peaceful era that followed.

And it did not stop there. The end of the Cold War, the opening of China to the West, the growth of the developing world and the economic boom in the Middle East; all of these events are significant milestones in modern human history, and they all marked new opportunities for further growth in the automotive industry. Openness initially meant opportunities to expand production facilities; quickly, however, production was followed by growth and the emergence of new markets. The automobile has been in the centre of it all along; be it as a commercial product, as a means of transportation, a means of recreation, or an object of art.

Considering all the above and the abundance in technical and non-technical automotive literature, one could argue that the parallel development of vehicle ergonomics has been largely ignored. Significant changes to driver-vehicle interface, such as the establishment of the steering wheel for its biomechanical properties as the de facto control for lateral vehicle control, have largely passed unnoticed. By contrast, there has been a wealth of publications on specific topics such as gearboxes, turbochargers, variable valve-timing or chassis tuning. Against that wealth, there are relatively few, although significant, publications on ergonomics and even fewer books. There was of course the original *Automotive Ergonomics* book from 20 years ago and a few other books on specific areas of research and applications of ergonomics in

the automotive domain; still, considering (a) the gravity of the human user as driver, passenger and customer, and (b) the volume of technical information on vehicle attributes with less obvious impact to drivers/passengers/customers, ergonomics is rather scarce.

In addition, recent geopolitical and economic developments such as the emergence of new markets and players, as already mentioned, effectively increased the portfolio of physical, anatomical and cognitive human characteristics that have to be considered during the development of a road vehicle—or any other surface transportation system. Furthermore, the recent technological developments, with the addition of new electronic systems in every vehicle model introduced, set new standards in driver–vehicle interaction, from the moment a customer enters a dealership to examine a prospective vehicle, to the driving experience during the vehicle lifecycle, and the interaction with other road users and facilities in place. It is such developments, socioeconomic on the one hand, technological on the other, that made the present book necessary in the mind of the authors. It is therefore hoped that the pages that follow provide a decent—although imperfect—insight of such phenomena through the eyes of automotive ergonomists to a wider audience.

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# The Editor

**Nikolaos (Nick) Gkikas** is a human factors engineer/ergonomist. He holds a PhD in ergonomics (2010) and an MSc in transportation human factors, both from Loughborough University. He is a certified European Ergonomist (Eur. Erg.), a member of the Human Factors and Ergonomics Society (HFES), a member of the Institute of Ergonomics and Human Factors (IEHF), and a founding member and coordinator of the Driving Ergonomics Special Interest Group (SIG), within which the idea of the present book evolved. Dr Gkikas is also a member of the British Standards Institute committees AUE/11, AUE/12 and AUE/14. He has previously worked for the Vehicle Safety Research Group (VSRC) at Loughborough University, which received the Queen's Anniversary Award for Higher Education in 2008 for their contribution to road safety in the United Kingdom. Dr Gkikas has published original research in vehicle HMI, ergonomics and safety. He has also worked as an independent consultant, and as development engineer for Nissan in their European Technical Centre.