the dimension and weight of a binocular of given specification.

Chapter 7 offers a well deserved break, and a visit to the real world, in which our guest author, Gerhard Eller, presents the making of his home-brewed high performance binocular in great detail and with numerous pictures.

The second part of the book focuses on visual perception, beginning with the eye as an optical instrument and the properties of the retina, being a photoreceptor, but also performing the first stage of image processing. Chapter 9 then enters the world of visual perception, whose basic principles have been compiled, in painstaking experiments, over decades by perceptual psychologists. The visual perception model of Max Berek, dealing with the limits of target recognition, is discussed in detail, as well as modern insights into saccadic image formation, optical flow and the distortion of visual space. Chapter 10 covers the combination of binocular and observer: The man-machine. It derives quantitative results for binocular performance under various operating conditions, as well as formulas for depth of field and stereoscopic depth-perception. For the first time, a description of the globe-effect is presented, offering quantitative conclusions regarding the selection of the ideal distortion pattern in handheld binoculars, considering the intended mode of application. *The second paradigm of this book is taking shape:* The performance of a binocular contains a considerable observer-specific element – a fact that consistently leads to misunderstandings on the part of equipment testers and their subsequent evaluations.

The third part of this book is devoted to binoculars in practice. Application profiles are derived, the testing of binoculars inside the store and in the field are discussed, and strategies to choose a binocular for virtually any application are developed, based on the technical background elaborated in previous chapters. *The third paradigm of this book is finalized*

in this part: Every optical instrument is the result of numerous compromises, and there exists no way to find »simply the best« binocular for a given task or mode of observation. Equipped with the body of facts, insights into the meaning and the dependencies between performance defining parameters, the reader is safely guided through the jungle of marketing hype and around the pitfalls of subjective perception.

This book is for the curious binocular user, who seeks to gain a better understanding of his instrument – whether to fully exploit its potentials, or to prepare for a pending purchase. But also specialists who would dare a look into the bigger picture behind their professions are addressed: The optical designer who wants to learn more about what is going on with the light beam beyond the exit pupil, or the perception psychologist who seeks for serious applications of his models in practical situations. The sales clerk is going to find all the arguments he needs to offer a profound and serious consultation to his customers, and the lecturer of applied optics may detect interesting and sometimes unconventional material for his seminars.

Quantitative results would be impossible without the language of mathematics. For this reason, we apply our box of mathematical tools whenever necessary. Fortunately, the level remains restricted to elementary functions, mostly applied to triangulation, while higher math has been avoided altogether. This book, including all its technical details, is therefore accessible to the interested high school student and to the technically inclined layman. In this manner, it bridges between the commonly available literature about binoculars, which hardly touches the surface of the involved technical issues, and the specialized literature of technical optics or perception science, which remains restricted to university students. Even those readers who cannot make friendship with mathematical formulas are not left in the rain: All results that are derived in this book