

like Pauly's in order to make an attack like v. Aster's quite pointless *logically*, is that in all organic structures, organs, events, etc. there is a consciousness or a will immanent, yet discontinuous with other consciousness. Thus the purposefulness of all reflex acts of the lower centers is compatible with a 'spinal cord consciousness' and in the very nature of the case this cannot be disproved by appealing to the introspection of cortical consciousness.

However, v. Aster concludes from his argument that, for example, in the case of our striving after that which is pleasurable, etc., — this being the useful — there is an unusually purposeful arrangement: our striving and willing serve the objective purpose of conserving the organism without our being conscious of this. Every organism in fact, has the peculiarity that it reacts purposefully, and so conduces to its own conservation, and, with a change of environment, to new species. The scientific problem is, then, to show that for such and such a function an organ must appear in a certain manner and not otherwise.

As concerns v. Aster's 'objective teleology' I cannot see anything in it, as he has defined and developed it, which is really different from mechanism. The only ground for retaining the term is, accordingly, possibly to describe vital phenomena, inasmuch as they have certain specific characters coördinate with certain specific inorganic properties, as a special case of mechanism. Accordingly, I see really no ground for, at least only confusion in, the conclusion reached, that the origin and nature of organic bodies can not be explained by the laws of mechanistic physics and chemistry. For such an explanation or subsumption can be granted and yet the admission be made at the same time, that, for specific organic properties, specific organic laws in terms, perhaps, of teleology must be found. Any dualism, then, would be only a dualism of species under the genus mechanism.

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Space and Geometry in the Light of Physiological, Psychological and Physical Inquiry. ERNST MACH. Translated by T. J. McCORMACK. Chicago, Open Court Publishing Co., 1906. Pp. 148.

"The three essays constituting the present volume were written originally for *The Monist*, 1901-3. Last year they were partly incorporated in their original German in Professor Mach's latest published work, *Erkenntniss und Irrtum*."

The titles of the three essays are: 'On Physiological, as distinguished from Geometrical, Space'; 'On the Psychology and Natural Development of Geometry'; 'Space and Geometry from the Point of View of Physical Inquiry.'

Some of the topics treated (briefly) in the first essay are: The space of vision and that of touch; the correspondence of physiological and geometric space; the non-coincidence of the physiological spaces; correlation of visual and tactual space, and physiological influences in geometry. Under the last heading a list of instances are mentioned, including, for example, right and left; division of space into right angles; positive and negative coördinates as these are reckoned to the right or to the left, upward or downward.

In the second essay, again, many topics are briefly treated. Some of their titles will suggest the contents: The Notion of Constancy, of Rigidity, Physical Origin of Geometry ('geometry bears the distinctest marks of its origin from the interest centering in the spatial relations of *physical bodies*'), Practical Origin of Geometry, Empirical Origin of Geometry.

"Our geometrical knowledge is derived from various sources. We are *physiologically* acquainted, from direct visual and tactual contact, with many and various spatial forms. With these are associated physical (*metrical*) experiences (involving comparison of the space-sensations evoked by different bodies under the same circumstances), which experiences are in their turn also but the expressions of other relations obtaining between sensations. These diverse orders of experience are so intimately interwoven with one another that they can be separated only by the most thoroughgoing scrutiny and analysis. Hence originate the widely divergent views concerning geometry. Here it is based on pure visualization (*Anschauung*), there on physical experience, according as the one or other factor is overrated or disregarded. But both factors entered into the development of geometry and are still active in it to-day."¹

In the third essay the author endeavors 'to define his attitude as a physicist toward the subject of metageometry so called.'²

"Our notions of space are rooted in our *physiological* organism. Geometric concepts are the product of the idealization of *physical* experiences of space. Systems of geometry, finally, originate in the *logical* classification of the conceptual materials so obtained. All three factors have left their indubitable traces in modern geometry. Epistemological inquiries regarding space and geometry accordingly

¹ P. 83.

² P. 94.

concern the physiologist, the psychologist, the physicist, the mathematician, the philosopher, and the logician alike, and they can be gradually carried to their definitive solution only by the consideration of the widely disparate points of view which are here offered."¹

In this essay too we have a great variety of topics each briefly treated but all bearing on metageometry, *e. g.*, Riemann's Physical Conception of Geometry, the Measure of Curvature and the Curvature of Space, Sacchieri's Theory of Parallel, Researches of Gauss and of Stolz, the contributions of Lobachevski and Bolyai, and so on. In short, "by the comparison of space with other manifolds, more general concepts have been reached, of which the geometric represents a special case. Geometric thought has thus been freed from conventional limitations, heretofore imagined insuperable.

"By the demonstration of the existence of manifolds allied to, but different from space, entirely new questions have been suggested."²

Thus the purpose of the author is to show and to trace the empirical origin of the highest abstractions in geometrical reasoning, and thereby to add this further argument in support of the extreme empiricism and anti-conceptualism of his general philosophical views.

We certainly have to thank the Open Court Publishing Company for adding this little book to the other works of Professor Mach that they have published in English.

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NATURE AND VALIDITY OF KNOWLEDGE.

Ueber die Erfahrungsgrundlagen unseres Wissens. A. MEINONG.
(Abhandlungen zur Didaktik und Philosophie der Naturwissenschaft, 6.) Berlin, 1906. Pp. iii + 113.

A review that would do full justice to this monograph would make as many pages of print as the original. It is a most concise and keen analysis of perception as an act of knowing and of its evidential value. Unfortunately the book has the fault of most of Meinong's writings, namely, a needlessly difficult style, especially unfortunate in the present instance where the writing is intended for readers outside the innermost philosophical circle. This fault is to some extent redeemed by a careful three-page summary at the end of the book.

The book is divided into four sections:

I. These coexists with our empirical knowledge a knowledge independent of experience and, in this sense, *a priori*. This independence, however, does not belong to the presentation (*Vorstellung*) but

¹ *Ibid.*

² P. 143.