

Philosophy of Space, Time and Spacetime: Study Questions for Riemann and Helmholtz on Physical Geometry

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1. What is Riemann's concept of measurement ("magnitude-concepts")—what does it contain, what does it imply, what does it require for its application in practice? In particular, think about the way that measurement relates to the possibilities for the structure of physical geometry (*i.e.*, the geometry of physical space): for Riemann, does the kinds of measurement one conceives as possible determine the possibilities for physical geometry (*i.e.*, the geometry of physical space), or, contrarily, does the class structures one thinks possible for physical geometry determine the possible kinds of measurement one can make? How can measurements of the kind he conceives get fixed in principle, and how would one go about trying to perform them in practice?
2. What is Helmholtz's concept of measurement, and how does it differ from Riemann's? In particular, is the relation of the possibility of measurement to the possibility for a kind of physical geometry the same for Helmholtz as for Riemann?
3. What role does the possibility for visualization and intuition of different kinds of geometrical structure play in Helmholtz's analysis? (If you are familiar with Kant's Transcendental Aesthetic, it is particularly instructive to compare Kant's conception to Helmholtz's conception of the relationship between intuition and physical geometry.)

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