

Completeness has to be restricted: Gödel's interpretation of the parameter t *

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... even such successful theories as relativity and quantum mechanics have proven to be vulnerable, for, implicit in each is a latent completeness postulate. Once one realizes that a physical theory should remain open and therefore incomplete, the role of the associated mathematics becomes a crucial issue.

W. Yourgrau¹

In 1949 Gödel presented Einstein with a new solution of the field equations of the general theory of relativity: an exact solution which allows for the bizarre possibility of time-travel.² This discovery of a universe with a strange time-structure which is consistent with the general theory of relativity did not however surprise Einstein, or so at least he leads the reader to believe. In his reply to Gödel's contribution, Einstein intimated that the strange feature of a possible closed time-like lines in which the distinction "earlier-later" should be abandoned, "disturbed... [him] already at the time of the building up of the general theory of relativity, without... [him] having succeeded in clarifying it." The weird result of Gödel constituted in Einstein's view "an important contribution to the general theory of relativity, especially to the analysis of the concept of time."³

Unlike the general theory, the special theory of relativity has been accepted by the mid-century as an undisputed part of theoretical physics. It has been commonly presented as the invariance theory of the Maxwell equations under the Lorentz group of transformations. However, Einstein seems to have conceived of the special theory as the theory of a special type of gravitational field: the uniform one. This recognition motivated him to go further and require generalization by the inclusion of gravitational phenomena.⁴ In

* This paper is in its final form and no similar paper has been or is being submitted elsewhere.

¹ Yourgrau, 1969, p.80.

² Gödel, 1949b.

³ Schilpp, 1970, p.687.

⁴ Kerszberg, 1989, pp.71-72.