

*l'inégalité*, in *Oeuvres complètes*, vol. 3, Paris: Gallimard, 1975; trans. J. Conaway Bondanella, *Discourse on Inequality*, in *Rousseau's Political Writings*, ed. A. Ritter and J. Conaway Bondanella, New York and London: W.W. Norton, 1988. (Rousseau's critique of inegalitarian attitudes, practices and institutions rests on demystifying historical narrative in a fashion which anticipates Nietzsche, despite the latter's opposing normative commitments.)

\* — (1762) *Contrat social*, in *Oeuvres complètes*, vol. 3, Paris: Gallimard, 1975; trans. J. Conaway Bondanella, *On the Social Contract*, in *Rousseau's Political Writings*, ed. A. Ritter and J. Conaway Bondanella, New York and London: W.W. Norton, 1988. (Rousseau's contribution to liberal political theory also emphasized the artificiality of the social.)

Schacht, R. (1983) *Nietzsche*, London and New York: Routledge, 2nd edn, 1992. (Systematic, thorough, moderately difficult. Issues associated with genealogy can be found throughout, but see especially chapters 2, 5, 6 and 7.)

— (ed.) (1994) *Nietzsche, Genealogy, Morality: Essays on Nietzsche's Genealogy of Morals*, Berkeley, CA: University of California Press. (This collection is an ideal starting point for further reading about Nietzsche's *Genealogy*.)

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## GENERAL RELATIVITY, PHILOSOPHICAL RESPONSES TO

*Much of the early philosophical attention given Einstein's theory of gravitation was not uncontaminated by a grim post-war atmosphere conducive to public diversions, hysteria and national chauvinism. Most was ill-informed regarding the mathematical and physical content of the theory. Even amongst the scientifically literate, there was disagreement as to the theory's philosophical implications. In part, this lack of clarity is due to Einstein. In an endeavour to eliminate references to 'absolute space' as the earlier special (or, as it was then known, restricted) theory of relativity (STR) had eliminated reference to 'absolute time', Einstein had motivated his theory of gravitation as arising from an epistemologically mandated generalization of the relativity principle of STR, which governed only inertial motions, and he misleadingly baptized it a theory of 'general relativity', wherein all motions are regarded as*

*relative to other bodies. This the theory does not show. Also, some incautiously expressed remarks on the formal requirement of general covariance were seized upon as evidence for antithetical epistemological and ontological attitudes. Amidst such confusions, it is not at all surprising that inherently antagonistic philosophical outlooks claimed vindication or confirmation by the general theory of relativity (GTR). In turn, the perceived failure of both Machian positivism and Neo-Kantianism to accommodate the revolutionary theory spurred the development of a new 'scientific philosophy', logical positivism. The subsequent course of philosophy of science in the twentieth century was indelibly marked by this development. Yet it would turn out that Einstein himself refused to be a cooperative exemplar for any of the major philosophical schools, positivism, Kantianism, or, to its embarrassment, logical positivism.*

- 1 Positivism
- 2 Neo-Kantianism
- 3 Logical positivism
- 4 Einstein's response

### 1 Positivism

Positivists generally welcomed the special theory of relativity (STR), viewing Einstein's operational analysis of the 'simultaneity' of separated events as a vindication of Mach's account of concepts as mere tools, economical shorthand for operations exhibiting the dependence of phenomena on one another (see LOGICAL POSITIVISM §§2, 4; MACH, E.; OPERATIONALISM). Some of Einstein's epistemological remarks in the context of STR appear to underscore this alignment: for example, 'The concept does not exist for the physicist until he has the possibility of discovering whether or not it is fulfilled in an actual case' (Einstein 1917: 22). Such pronouncements served to cast Einstein's philosophical orientation in a positivist light and, naturally enough, promoted tendencies both to fashion similar interpretations of the general theory of relativity (GTR) and, in view of ensuing difficulties, to criticize GTR as a violation of Einstein's own methodological precepts (Bridgman 1949).

A single passage from section three of Einstein's 1916 exposition of GTR provided further grist for the mill of Machian positivism. There, in the course of a heuristic 'reflection' on the reason for the necessity of general covariance of the field equations of gravitation (that they remain unchanged under arbitrary transformation of the coordinates), Einstein proclaimed that this requirement, 'takes away from space and time the last remnant of physical objectivity' since

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1 FERHAT YÖNEY, Din felsefesi açısından izafiyet teorisi, Marmara Üniversitesi, Yüksek Lisans, 2009