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THE BERLIN SCHOOL OF LOGICAL EMPIRICISM AND ITS LEGACY

1. BACKGROUND

What has become generally known as the Berlin School of Logical Empiricism constitutes a philosophical movement that was based in Berlin's *Gesellschaft fuer empirische Philosophie* and erected on foundations laid by Albert Einstein. His revolutionary work in physics had a profound impact on philosophers interested in scientific issues, prominent among them Paul Oppenheim and Hans Reichenbach, the founding fathers of the school, who joined in viewing him as their hero among philosopher-scientists.

Overall the membership of this school falls into three groups, as per Display 1.¹ The founding generation was linked by the circumstance that both Grelling and Reichenbach were collaborators of Oppenheim; the middle generation by the fact that both Hempel and Helmer were students of Reichenbach's in Berlin; and the younger generation by the fact that all of its members were students and (at least in their early years) disciples either of Reichenbach or of Hempel in the USA. Three stages are thus at issue: an initial phase in Berlin, a transatlantic migration, and a continuation in the U.S.A.—principally in Pittsburgh.

¹ Various other people were involved in the Berlin School in a more peripheral way. A detailed account of its early days in Berlin (roughly 1927 to 1933) is given in Dieter Hoffman's contribution to Dannenberg et. al. 1994, entitled "Zur Geschichte der Berliner Gesellschaft für empirisch/wissenschaftliche Philosophie."

Display 1

THE BERLIN SCHOOL

I. THE FOUNDING GENERATION

- Paul Oppenheim (1885-1977)
- Kurt Grelling (1886-1942)
- Hans Reichenbach (1891-1953)
- Walter Dubislav (1895-1937)

II. THE MIDDLE GENERATION

- C. G. Hempel (1905-1997)
- Olaf Helmer (1910-)

III. THE YOUNGER GENERATION

- Norman Dalkey (1915-2003)
- Adolf Grünbaum (1923-)
- Wesley Salmon (1925-2001)
- Hilary Putnam (1926-)
- Richard Jeffrey (1926-2002)
- Nicholas Rescher (1928-)
- Gerald Massey (1934-)
- Larry Laudan (1941 -)
- John Earman (1942 -)

Note 1: As a member of the “younger generation” I count those students of prior generation members who to some extent continued their work and were at least two of the following: their dissertation students, collaborators in publication, or colleagues. This means that there are bound to be some near misses. Abraham Kaplan, who was a doctoral student of Reichenbach’s and a RAND consultant—associated as such with Helmer and Dalkey—is one of those near misses; his own program of work moved outside the thematic range of the school.

Another near miss is John G. Kemeny, a student of Alonzo Church's and sometime assistant to Albert Einstein and collaborator of Paul Oppenheim's who worked on problems squarely in the Berlin School's range of interests and served for a time as a consultant at RAND, collaborating with Helmer and Rescher there.

Note 2: The "younger generation" divides into those taught by Reichenbach at UCLA (Dalkey, Salmon, Putnam) and those taught by Hempel at Queens, Yale, or Princeton (Grünbaum, Rescher, Jeffrey, Massey, Laudan, Earman.)

What sort of ties must there be to bind different individuals into the commonality of a philosophical "school of thought?" Personal interaction apart, what is it that makes such a school? The answer is: intellectual commonalities. And the following functions, in particular, come into prominence here:

- *doctrinal* commonality: shared beliefs
- *thematic* commonality: shared interests and concerns
- *ideological* commonality: shared values and goals
- *methodological* commonality: shared methods of inquiry

The early logical empiricists (and indeed even more broadly the logical positivists who were their intellectual kinsmen) formed a school on all four counts. Doctrinally they all rejected traditional metaphysics and value theory in anything like their historically established form. Thematically they focused on issues prominent in contemporary science, mathematics, and logic. Methodologically they insisted that philosophy should adopt the modes of reasoning and exposition that characterize the formal sciences of logic and language. And ideologically they all inclined to the view that science, and in particular *natural* science, is the model that all rigorous knowledge ought to emulate. As one of his students (Abraham Kaplan) wrote of Reichenbach: "he wanted man to look to the logic of science for a guide to belief and action."²

² Reichenbach 1978, p. 68. For further details on the doctrinal stance of the school see the editor's introduction to Fetzer 2001.

2. PERSONS

In considering the Berlin School more closely, it is instructive to begin with the issue of personal interaction. Let us accordingly consider the various individuals involved, with a view to their relationship as the members of a well-defined group. But first a caveat. It cannot be overemphasized that no attempt will here be made to provide a rounded view (however brief) of the life and work of the individuals at issue. Rather, what is of present concern is only their relationships to each other in regard to their conjointly constituting the membership of a particular school.³ Part of a broader movement of logical empiricism—ultimately transatlantic in its development—the scholars at issue had a unity—a commonality forged both by private interrelationships and shared research interest.

One more preliminary observation has to be made. The register of Berlin School members does not include Rudolf Carnap. And this is in strictness correct, seeing that Carnap was a member of the Vienna Circle (until 1931) and thereafter linked to it for a time from Prague. All the same, he exerted a great influence on the membership of the Berlin group and in due course was instrumental in the late 1930's in helping Hempel and Helmer secure their first foothold in the academic world of the USA. Throughout there were close linkages between Berlin and Vienna, as well as some differences of emphasis.⁴ While Carnap was not a member of the group, he nevertheless exerted substantial influence upon it. Indeed over the course of time it evolved that many members of the group were personally and scientifically closer to Carnap than to its founding father, Reichenbach.

³ The bibliographical appendix will guide the interested reader to further and fuller information regarding the philosophers at issue.

⁴ See inter alia Hans Reichenbach, "Logical Empiricism in Germany and the Present State of its Problems," *The Journal of Philosophy*, vol. 33 (1936).

A. PAUL OPPENHEIM

Born in Frankfurt in 1885, Paul Oppenheim was not a professional philosopher but a business man who was initially trained as a chemist and worked as such in Germany's war industry during World War I. Himself the heir to considerable wealth as son of a successful diamond merchant, he eventually became a director of the chemical conglomerate I. G. Farben. With the rise of Nazism in Germany, he transferred himself and his considerable fortune out of the country—first to Brussels in Belgium and then to Princeton, New Jersey—a locale he selected with a view to the proximity of his close personal friend, Albert Einstein. After leaving Germany Oppenheim never again took up employment. Instead, he lived on his fortune and became a supporter and patron of like-minded philosophers. The idea of a scientific study of the methods and concepts of the sciences was at the core of Oppenheim's interests.

As early as 1921 Oppenheim had been in touch with Hans Reichenbach.⁵ Over the years, Oppenheim exerted his influence to further Reichenbach's academic career—both in Frankfurt and in Berlin.⁶ And Reichenbach in turn was, in effect, the first of a long series of Oppenheim's collaborators. He recruited Carl G. Hempel to act as a critic and sounding board in helping Oppenheim to formulate the ideas that formed the focus of his first publications: two monographs respectively on the "fundamental principles" (*Grundgesetze*) of a comparative science of the sciences (1926) and of scientific concept-

⁵ Reichenbach, who was then assistant to the physicist Regner in Stuttgart, was at this time one of the most active and effective exponents of Einstein's theory of relativity. His contact with Oppenheim was probably mediated by Einstein.

⁶ See Oppenheim's Vorbemerkung to his 1926 book as well as his statement in Rescher (ed.), 1969, p. 1. The details of Reichenbach's collaborative and advisory relationship to Oppenheim can be traced in detail in letters and other materials preserved in the Reichenbach collection of the "Archives of Scientific Philosophy in the 20th Century" at the University of Pittsburgh.

formation (1928).⁷ And Reichenbach was also helpful to Oppenheim with the publication arrangements for these studies.

Seeing the handwriting on the wall immediately upon the Nazi rise to power, Oppenheim emigrated in late 1933 from Germany to Brussels, his wife's native city. During the subsequent six years in Belgium, Oppenheim lived as a private scholar, producing one book and several papers in joint collaboration with two investigators whom he aided personally and financially. The first was Hempel who joined Oppenheim in Brussels in 1934 and with whom Oppenheim wrote a book on the logic of classifications which was to be the first of four joint Hempel-Oppenheim publications.⁸ The second was Kurt Grelling who came to Brussels in 1935 and collaborated with Oppenheim in an investigation of the *Gestalt* concept.⁹

After moving to the U.S.A. in 1939, the Oppenheims maintained in their house at 57 Princeton Avenue what can best be described as a latter-day salon for scientists and philosophers, utilizing to the full Princeton's assets as a major center of learning. Oppenheim was delighted when Hempel eventually transferred from Yale to Princeton. He always regretted the failure of his efforts to bring Grelling there prior to the war, and appreciated Hempel's aid in recruiting Nicholas Rescher to carry forward during 1951-52 the collaborative work with Grelling that had to be abandoned in the 1930s. After Rescher left Princeton in 1951, Oppenheim also attracted other collaborators, including John G. Kemeny and Hilary Putnam. After a long and productive life devoted to personal and intellectual contact and interaction with scientists and academics, Oppenheim died in 1977 at the age of 92. He maintained an active concern for philosophy-of-science issues to the end of his days, and his last paper, collaborative as ever, was

⁷ *Die natürliche Ordnung der Wissenschaften* (Jena: Gustav Fischer, 1926) and *Die Denkfläche* (Berlin: Kontstudien, Ergänzungshefte, No. 62; 1928).

⁸ Carl G. Hempel and Paul Oppenheim, *Der Typusbegriff im lechle der nener Logik* (London: A. W. Sytholf, 1936).

⁹ Grelling remained in Belgium until the German invasion, which led to his ultimate demise in the annihilation camp at Auschwitz. For Grelling see Volker Peckhaus "Kurt Grelling in Göttingen und Berlin" in Lutz Danneberg et al. (eds.) 1994, pp. 55-73, as well as Luchins 2000.

published posthumously. In Princeton, Einstein's home at 112 Mercer Street was not far distant from the Oppenheims, and the two aging expatriates regularly went on long Sunday afternoon walks, chatting in German about current events and times gone by.¹⁰

B. KURT GRELLING

Born in Berlin in 1886, Kurt Grelling studied mathematics with Hilbert and Zermelo in Göttingen and earned a Ph.D. under their direction in 1910. He served as a medic in the German army during WW I. Active in socialist politics he encountered difficulties with an academic career and became a secondary school teacher. He settled in Berlin in 1920 where he became associated with Reichenbach's "Gesellschaft für empirische (later: wissenschaftliche) Philosophie." Through Reichenbach's mediation he became associated with Oppenheim, and in the wake of Nazism in Germany Grelling, who was of Jewish antecedence, emigrated to Brussels to work with Oppenheim during 1937-38, replacing Hempel who had moved to the U.S.A. in 1937. When Oppenheim emigrated to the U.S.A., Grelling did not join him despite Oppenheim's repeated urging. Remaining in Belgium, Grelling was expelled to France after the German occupation in 1940. Subsequently, after trying to escape to Spain, Grelling was sent back to Germany in 1942, where he perished in Auschwitz later that year.

A significant contributor to modern mathematical logic, and creator of his well-known eponymous paradox, Grelling collaborated with Oppenheim on a monograph entitled "Der

¹⁰ In view of the notorious reluctance of the biographers of the famous to allow the non-famous to play their actual role in the lives of their protagonists, it is unsurprising to find Oppenheim missing from many Einstein biographies. An exception is Jamie Sayen's *Einstein in America* (New York: Crown Publishers, 1985), written by the son of Einstein's neighbor in Princeton, which remarks perfunctorily that Einstein's circle included "intellectuals like Paul Oppenheim, a philosopher of science" (p. 126). The significance of Oppenheim in Einstein's life is symbolized in the fact that it was he who, together with Otto Nathan, his literary executor, was responsible for spreading Einstein's ashes. See Abraham Pais, *Einstein Lived Here* (New York: Oxford University Press, 1994).

Gestaltbegriff im Lichte der neuen Logik.”¹¹ For a time Grelling continued to correspond with Oppenheim about Gestalt matters, but this collaboration was unavoidably unfinished when Oppenheim’s energetic efforts to extract Grelling from internment by the Germans proved fruitless. Oppenheim continued to be mindful of Grelling’s work, and in 1951 enlisted Rescher (at Hempel’s suggestion) for its continuation. This collaboration resulted in their joint publication on “The Logical Analysis of Gestalt Concepts.”¹²

C. HANS REICHENBACH

While Oppenheim was Einstein’s personal friend, Hans Reichenbach was his protégé and disciple. Reichenbach began his career as a physicist-mathematician who had worked on radio-connected matters in the German war industry during 1917-18 and thereafter turned to an academic career via habilitation in Stuttgart in 1920. After an early interest in political matters Reichenbach turned to philosophy of science in the wake attending Einstein’s lectures in Berlin. In 1926 he was appointed, at Einstein’s urging, as Professor of Philosophy of Physics in Berlin, and in 1930 he founded (jointly with Rudolf Carnap) the journal *Erkenntnis* as official organ of the school of logical empiricism in which the two of them functioned as principal figures. With the rise of Nazism, Reichenbach emigrated from Germany, first to Istanbul in 1933 and subsequently to Los Angeles in 1938, where he held a chair in philosophy until his death in 1953.

The issues to which Reichenbach primarily dedicated his work were primarily three: space and time, probability and induction, and chance-causality-predictivity; The first of these two issued from Einstein’s work on relativity: the latter two had their grounding in the emergence of quantum theory, whose development played a crucial role in Einstein’s thought. Throughout his career, then, Reichenbach continued to work on issues within the boundaries set by Einstein’s scientific

¹¹ “Der Gestaltbegriff im Lichte der neuen Logik,” *Erkenntnis*, vol. 7 (1937/38), pp. 211-25; and “Supplemental Remarks on the Concept of Gestalt,” *Ibid.*, pp. 357-59.

¹² *British Journal for Philosophy of Science*, vol. 6 [1955], pp. 89-106.

concerns. He often visited Einstein in Princeton, invariably staying with the Oppenheims.

In the course of his brief professorship in Berlin, Reichenbach had two students who came to figure importantly in the transmission of his influence: C. G. Hempel and Olaf Helmer. Overall, Reichenbach was the driving force behind the development of a Berlin School and together with his student C. G. Hempel he assured its survival through transplantation in the USA.

However, of the score or so of graduate students whom Reichenbach mentored at UCLA, only Norman Dalkey, Hilary Putnam, and Wesley Salmon stayed firmly within the personal and ideological orbit of the school, though several others (Abraham Kaplan, Paul Wienpahl, Donald Kalish, and Ruth-Anna Putnam) can be considered as peripherally relevant.

D. WALTER DUBISLAV

The philosopher and mathematician Walter Dubislav, who was born in Berlin in 1895, was also an active member of the Berlin School for a time in the early 1930s while teaching at the Technische Hochschule in Berlin prior to his emigration to Prague in 1936. He befriended Reichenbach and played an active role in the Berlin school. Along with Grelling and Hempel, he was one of its mainstays after Reichenbach emigrated to Istanbul in 1933. However, he then became paranoid and after imprisonment for acts of madness in 1935, killed his inamorata in 1937, and committed suicide later that year.

E. CARL G. HEMPEL

Carl G. Hempel was born at Oranienburg Eden near Berlin in 1905. He studied at the universities of Göttingen and Heidelberg before taking his certification as a secondary school science instructor at the University of Berlin in 1929. Initially interested in logic and the foundations of mathematics, he turned to the philosophy of science under the influence of Hans Reichenbach with whose encouragement he also studied in Vienna with members of the Vienna Circle. Reichenbach directed the work of Hempel's doctoral dissertation, but after Reichenbach emigrated to Turkey in 1933, the psychologist

Wolfgang Köhler stepped in to complete the formalities of the degree.¹³ After receiving the doctorate in 1934 Hempel accepted an invitation from Paul Oppenheim to join him in Brussels and be his collaborator there, a venture which resulted in several later publications. (Here Oppenheim acted on the recommendation of Reichenbach.)

In 1937 Hempel came to the U.S. on a Rockefeller research fellowship to work as research associate to Carnap in Chicago and in 1939 he settled more permanently in New York, serving as instructor and then assistant professor at Queens College from 1940-48. He commuted regularly to Princeton from his teaching post in New York, staying at the Oppenheims' for three days of the week. Their collaboration continued, and resulted in several publications, most prominently an enormously influential paper of "Studies in the Logic of Explanation."¹⁴ In 1948 Hempel moved to Yale University. Subsequently, in 1955, he took the post of Stuart Professor of Philosophy at Princeton, returning once more to the orbit of Paul Oppenheim. Regarded as a major contributor to the philosophy of science, Hempel served as a President of the American Philosophical Association. After reaching the mandatory retirement age at Princeton, he continued to teach as a lecturer there but in 1977 he joined the faculty of the University of Pittsburgh as colleague to his former students Grünbaum, Laudan, Massey, and Rescher. After eight further years of well-received teaching, failing eyesight led Hempel to retire from Pittsburgh in 1985 at age 80. He then returned to Princeton where he lived until his death at the age of 92 in 1997, still continuing to make contributions to his chosen field. He was universally acknowledged as one of the principal figures of scientific philosophizing in the 20th century.

¹³ Köhler's linkage to the Berlin Society—on whose executive committee he served—was mediated through his role in founding Gestalt psychology, which also greatly interested Oppenheim. Oppenheim, Grelling, and Rescher were all eventually to write about the conceptual clarification of the Gestalt concept. For details see Luchins 2000.

¹⁴ *Philosophy of Science*, vol. 15 (1948), pp. 135-75.

F. OLAF HELMER

Olaf Helmer was born in Berlin in 1910. He studied mathematics and logic at the University of Berlin in the early 1930s and became close friends there with Hempel. In 1934 he earned his doctorate in mathematics at the University of Berlin with a dissertation on the formal axiomatization of geometry begun under Reichenbach's direction.¹⁵ Later that year he emigrated from Nazi Germany to Britain where he earned a second doctorate in philosophy under the direction of Susan Stebbing at the University of London. This dissertation was on Russell's Paradox, and Bertrand Russell himself served as one of his examiners. In 1937 Helmer moved to the U.S. At first he worked as a research assistant to Carnap at the University of Chicago. Thereafter he taught mathematics in several institutions, and worked as a collaborator of Oppenheim, whom he had met through Hempel.

In 1944-45 Helmer was drawn into mathematics-based work for the National Defense Research Council under the direction of John Williams, and in 1946, when Williams became one of the founding fathers of RAND Corporation in Santa Monica, Helmer joined him there. During 1954-56 he was joined at RAND by Rescher and their collaboration with one another and with Norman Dalkey turned Helmer's interest ever more decidedly to matters of prediction and forecasting and resulted in the widely influential DELPHI process of collaborative prediction. In 1968 Helmer left RAND to join with several collaborators in founding the Institute for the Future. During 1973-76 Helmer was the first (and only) Professor of Futuristics in the School of Business Administration at the University of Southern California. After retiring from this post, Helmer became associated with the International Institute for Applied Systems Analysis near Vienna and subsequently, he did extensive lecturing and consulting on matters of forecasting and continued for many years to contribute occasional publications to this field. The expression "thinking outside the box" might have been invented to describe Helmer's mentality. But after joining RAND in the late 1940's Helmer never returned to his earlier concern with matters of evidence and confirmation.

¹⁵ As in Hempel's case, Wolfgang Köhler took the process of superism over upon Reichenbach's departure.

G. NORMAN DALKEY

Norman C. Dalkey was born in Santa Clara, California in 1915. He was a graduate student in philosophy at the University of Chicago during 1939-40, being supervised there by Carnap and his two research assistants Hempel and Helmer.¹⁶ In 1940 he moved from Chicago to UCLA (as did his friend and fellow student Abraham Kaplan). In 1942 he earned his Ph.D. in philosophy at UCLA, with a thesis on “The Plurality of Language Structure” written under the direction of Hans Reichenbach. After military service and teaching for a time at UCLA, he joined RAND’s Mathematics division in 1948. In his first years there he was a member of Olaf Helmer’s group, working principally on issues of prediction (Project DELPHI) and on issues relating to induction and information processing. Subsequently, Dalkey’s entire career was spent at RAND until he retired in 1983. (He still lives in Pacific Palisades.) Alone among RAND’s logicians he stayed with the corporation throughout his entire career. The work of his later years was devoted primarily to issues of reasoning in condition of uncertainty, even manifesting a knack for acute insight into complex issues.

H. ADOLF GRÜNBAUM

Adolf Grünbaum was born in Cologne, Germany in 1923 and emigrated to the USA with his family in 1938 in the wake of the rise of Nazism in Germany. He studied at Wesleyan University and after military service during the post-war period he earned his Ph.D. at Yale in 1950 with a doctorate on issues of continuity in mathematics and physics written under Hempel’s direction. In an autobiographical sketch drafted in 2005, Grünbaum wrote that “the most decisive influence in the direction of my work during the first 25 years after my Ph.D. came from Hans Reichenbach.”

¹⁶ For early on, the Berlin Circle maintained a close touch with Carnap, who was personally more accessible than the somewhat more self-contained Reichenbach. Certainly after emigration to the USA, Hempel and Helmer interacted more with Carnap than Reichenbach.

During 1950-60 Grünbaum taught philosophy of science at Lehigh University where he was joined by Nicholas Rescher in 1957. Since 1960 he taught at the University of Pittsburgh where he was instrumental in launching both the Department of the History and Philosophy of Science and the Center for Philosophy of Science, as whose director he served during 1960-78. He was joined in Pittsburgh by Rescher in 1961, by Laudan in 1969, by Massey in 1970, and in 1977 also by Hempel who had recently retired from Princeton. Later on Earman and Salmon came on board as well, giving Pittsburgh a lion's share of the latter-day membership of the Berlin School

During the earlier years of his career, Grünbaum's research dealt with the philosophy of space and time. Thereafter he turned to issues of scientific rationality, largely in relation to Karl Popper's work. After the 1970's his work focused increasingly on the psychoanalytic theories of Sigmund Freud and the critique of theological approaches to science. Widely recognized for his contributions, Grünbaum has served as a President of the American Philosophical Association and also of the International Union of History and Philosophy of Science. Now over 80 years of age, he continues to be active both as chairman of the Center for Philosophy of Science and as an insightful discussant on relevant issues.

I. WESLEY SALMON

Wesley Salmon was born in Detroit in 1925. Educated at Wayne University and the University of Chicago, he earned a Ph.D. in philosophy at UCLA in 1950 with a dissertation on John Venn's theory of induction under Reichenbach's direction. After teaching at Northwestern, Brown, Indiana, and Arizona (Tucson) Universities, Salmon eventually became a colleague of Grünbaum, Hempel, Massey, and Rescher through joining the department of philosophy at the University of Pittsburgh in 1981. After his retirement in 1999, Salmon was visiting professor to Kyoto University in 2000. He died in an auto accident in 2001.

In the course of his career, Salmon published six books on such topics in the philosophy of science as inductive inference, space-time theory, causality, and scientific explanation—all of them devoted to themes that had figured centrally in the work of his teacher, Reichenbach. It was by unhappy mischance that

Salmon died less than a week before he was to deliver the 2001 Reichenbach Lecture at UCLA. He was, in the eyes of many, the most faithful continuator of Reichenbach's work.

J. HILARY PUTNAM

Hilary Putnam was born in Chicago in 1926 and after undergraduate study at the University of Pennsylvania, earned a Ph.D. in philosophy in 1951 at the University of California in Los Angeles, where Reichenbach directed his dissertation on the meaning of probability. During 1953-61 he taught at Princeton as a colleague of C. G. Hempel and as a collaborator of Oppenheim on an inquiry into the unity of science, a favorite theme alike of the Berlin School and the Vienna Circle.¹⁷ A logician and philosopher of high capacity and versatility, Putnam carried forward the work of the Berlin School both in the area of mathematical logic and in general philosophy. His contribution to the solution of David Hilbert's tenth problem represents a particularly outstanding contribution. The Vietnam era deflected his interests into political issues, and when he subsequently returned to philosophy his ideas moved in the direction of pragmatism. He counts as one of the outstanding figures of 20th century American philosophy.

K. RICHARD JEFFREY

Richard Jeffrey was born in Boston in 1936. He was initially educated as an engineer at the University of Chicago where Carnap was among his teachers. Subsequently, he earned a Ph.D at Princeton in 1957 with a dissertation on probability directed by Hempel and Putnam. For a time he taught electrical engineering, but switched to philosophy in 1959. He taught at Stanford, City College of New York, and the University of Pennsylvania before joining the Princeton faculty in 1974. For a time he was thus a colleague of Hempel at Princeton, where the rest of his career was spent. In the course of a long and

¹⁷ Paul Oppenheim and Hilary Putnam, "Unity of Science as a Working Hypothesis" in Herbert Feigl (ed.), *Minnesota Studies in the Philosophy of Science* (Vol. II; Minneapolis: University of Minnesota Press, 1958), pp. 3-36.

productive career, Jeffrey was a major contributor to research in the areas of probability induction and decision theory. Among members of the School's younger generation Jeffrey (along with Dalkey and Putnam) was exceptional as having no connection with the University of Pittsburgh.

L. NICHOLAS RESCHER

Nicholas Rescher was born in Hagen, Germany in 1928 and emigrated with his family to the U.S. in 1938. He studied at Queens College in New York, where Hempel was among his teachers. He earned a Ph.D. at Princeton in 1951 with a dissertation on Leibniz's philosophy of science, and continued to teach there in the subsequent year, during which time he collaborated with Paul Oppenheim, continuing researches that he (Oppenheim) had begun with Kurt Grelling. During 1954-57 Rescher worked at the RAND Corporation in Santa Monica, CA, where he collaborated with Olaf Helmer on future-related studies. In 1957 he took up a teaching position at Lehigh University as a colleague of Adolf Grünbaum—a post to which Rescher had been recommended by Hempel. During 1960-61 Grünbaum and Rescher moved to the University of Pittsburgh to inaugurate philosophy-of-science related studies there. During 1980-88 Rescher directed the Center for Philosophy of Science at this university and he continues to serve as chairman to the present day (2005).

In the course of his undergraduate studies at Queens College in New York during 1946-49 Rescher was a student of Hempel. Subsequently, during graduate study and teaching at Princeton (1949-52), he collaborated with Oppenheim in carrying forward a study of the concept of Gestalt begun by Grelling and Oppenheim in Brussels in 1935-39. During 1954-56 Rescher was a colleague and collaborator of Olaf Helmer's at the RAND Corporation, subsequently becoming (in 1956) a colleague of Grünbaum at Lehigh University. In the 1960-61 biennium, Grünbaum and Rescher moved to the University of Pittsburgh, where they were eventually joined by Hempel himself (in a post-retirement appointment) as well as several other Reichenbach/Hempel students. Throughout his academic career Rescher was closely linked to members of the Berlin School—although his research interests ranged (from the very start) beyond the thematic foci that had preoccupied its founders. With

many philosophical publications to his credit, Rescher has served as President of the American Philosophical Association and as Secretary General of the International Union of History and Philosophy of Science.

M. GERALD J. MASSEY

Gerald J. Massey was born in Wauseon, Ohio in 1934. He did his undergraduate studies at the University of Notre Dame, and after military service earned his doctorate at Princeton in 1964 with a dissertation on the philosophy of space under the direction of Hempel with Alonzo Church as an advisor. After teaching at Michigan State University during 1963-70. in the philosophy department he came to Pittsburgh as an academic visitor in 1969, he joined Grünbaum and Rescher there in 1970 to serve as chairman of the philosophy department. The bulk of his research and teaching has been into the area of philosophic logic, although in his later years his interests shifted to philosophical issues relating to animals and their relations to humans, an area of investigation reminiscent of the interests of Wolfgang Köhler. During 1988-97 he served as Director at the Center for Philosophy of Science—as Grünbaum and Rescher had done before him. Beyond being an acute and careful scholar, Massey possessed administrative talent in an uncommon measure.

N. LARRY LAUDAN

Laurence (“Larry”) Laudan was born in Austin, Texas in 1941. Educated at the University of Kansas, he earned a Ph.D. in philosophy at Princeton in 1965 with a dissertation on theories of scientific method in the 17th century under the direction of C. C. Gillispie with Hempel and Thomas Kuhn serving on the committee. After teaching in Britain for some years he joined the faculty of the University of Pittsburgh in 1969, where he was the founding chairman of the History of Philosophy of Science department and subsequently, during 1978-81 as director of the Center for Philosophy of Science. He then moved from Pittsburgh to Virginia Polytechnic Institute and after a time went to the University of Hawaii. In 2000 he took up a post at the National Autonomous University in Mexico City. He was prominent among the investigators who

were instrumental in the post-Kuhnian shift of “philosophy of science” into “history and philosophy of science” (generally known under the acronym HPS).

O. JOHN EARMAN

John Earman was born in Washington, D.C. in 1942 and earned his Ph.D. at Princeton University in 1968 with a dissertation on temporal asymmetry directed by C. G. Hempel and Paul Benacerraf. After holding professorships at UCLA, the Rockefeller University, and the University of Minnesota, he joined the faculty of the University of Pittsburgh in 1985 (just after Hempel’s retirement). Over the years since then he has published a series of well received books on such Berlin-School issues as relatively, cosmology and space-time theory, predictability and determinism, and applications of possibility theory. During most of the 1990’s Earman served as Associate Director of the University of Pittsburgh Center for Philosophy of Science. Throughout his work, Earman displays an unusual capacity for the philosophical elucidation of complex scientific issues.

3. TIES THAT BIND

A summary survey of significant linkages between members of the Berlin School is presented in Display 2.

Apart from Berlin, three American cities played a pivotal role in the history of the school: Princeton, Los Angeles, and Pittsburgh. (1) Oppenheim settled in Princeton (to be near Einstein), Hempel and Jeffrey taught there, and Earman, Jeffrey, Laudan, Massey, and Rescher studied there. (2) Los Angeles was prominent in that Reichenbach taught there, Dalkey, Kaplan, Putnam, and Salmon studied with him there, and Helmer worked there, at the RAND Corporation in Santa Monica, where Dalkey and Rescher were colleagues and collaborators of his. Finally, (3) Pittsburgh was prominent in that Hempel and most of younger members of the school (Earman, Grünbaum, Laudan, Massey, Rescher, Salmon) became colleagues at the University of Pittsburgh.

 Display 2

LINKAGES BETWEEN MEMBERS OF THE SCHOOL

“Scientific Advisors” to Oppenheim (order of birth)

Grelling
 Reichenbach
 Hempel

Students of Reichenbach’s (order of birth)

Hempel
 Helmer
 Dalkey
 Salmon
 Putnam

Students of Hempel’s (order of birth)

Grünbum
 Jeffrey
 Rescher
 Massey
 Laudan
 Earman

Collaborations in publication (chronological order)

Oppenheim/Hempel
 Oppenheim/Grelling
 Oppenheim/Rescher
 Oppenheim/Putnam
 Helmer/Dalkey
 Helmer/Rescher

Colleagues at the RAND Corporation (order of hire)

Helmer/Dalkey/Rescher (Also, for a brief time Hempel was a consultant there.)

Colleagues at the University of Pittsburgh (order of hire)

Grünbaum/Rescher/Laudan/Massey/Hempel/Salmon/Earman

Colleagues at Princeton (order of hire)

Hempel/Putnam/Jeffrey

 Display 3

THEMATIC COMMONALITIES

	Space Time Relativ- ity cos- mology	Probabil- ity and its Applica- tions	Induction Confirma- tion Eviden- tiation	Explan- ation and deter- minism	Predic- tion	Concept Format- tion Gestalt	Scientific Systemat- ization	Philo- sophical Logic	Mathe- matical Logic
Oppenheim				√		√	√		
Reichenbach	√	√	√		√			√	√
Grelling			√			√		√	√
Dubislav							√	√	√
Hempel		√	√	√		√		√	√
Helmer			√	√	√				
Dalkey			√		√				
Grünbaum	√		√	√					
Salmon	√	√		√					
Putnam				√				√	√
Jeffrey		√	√						
Rescher		√	√	√	√	√	√	√	
Massey	√			√				√	
Laudan			√				√		
Earman	√	√	√	√	√				

NOTES:

1. Every member of the school (except Massey) shared at least two major research areas with Reichenbach
 2. The school as a whole divides into two groups: the original Berliners (Oppenheim, Reichenbach, Grelling, Hempel, Helmer) and certain students of Reichenbach's and Hempel's. (See Display 1 above.)
 3. Several members of the junior group served in the philosophy department of the University of Pittsburgh (and in the history and philosophy of science department as well) were active in this university's Center for Philosophy of Science, and in four cases served as Directors of this Center (Grünbaum, Laudan, Massey, Rescher).
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The renaissance of the Berlin School in Pittsburgh was the result of a somewhat fortuitous accretioned process. The presence there of his former Lehigh colleague Grünbaum drew Rescher to the University of Pittsburgh; the presence of these two drew Laudan and Massey; whereupon the presence of four of his favorite former students finally attracted Hempel himself—and eventually brought in Wesley Salmon and John Earman as well. Nobody said (or thought) “Let’s recreate the Berlin here on the Ohio in Pittsburgh.” What brought this about was a rolling snowball effect with each augmentation making further argumentations easier.

As Display 3 indicates, the members of the school were linked by various thematic commonalities in point of their research concerns. (Laudan and Massey apart, every member of the younger generation shared at least two main areas of research interest with Hans Reichenbach.) However, as time went on the shared concerns among its members became increasingly attenuated as people’s interests evolved in different directions.

The confluence of thematic interests that had pervaded the earlier phases of the Berlin School thinned out in the end with the members of the younger generation. Grünbaum migrated from his early concerns with space and time via studies of rationality in Popperian contexts to issues of Freudian psychology and the critique of religion. Salmon stayed closest to the content-agenda of his teacher Reichenbach, but even he migrated beyond the original themes. Rescher developed broader interests throughout the realm of traditional philosophical issues, and ultimately devoted most of his work outside the thematic range of the original school. Massey, like Rescher, pursued interests across a wide philosophical and historical spectrum, and in due course was instrumental in founding a new field known as philosophical ethology. The unity of preoccupation that is a key requirement of commonality for constituting a definite school gradually dissolved and in the end no single research topic remained as a unifying concern shared by the younger generation. It could be added too that the doctrinal core of the Berlin school suffered erosion in the course of time in the wake of Quine’s attack on the analytic synthetic distinction, the critiques of Church and Hempel of the concept

of empirical meaningfulness, the Kuhnean revival of historicism, and cognate developments.¹⁸

And so, over time, the doctrinal cohesion needed to constitute a definite school eventually dissolved. Accordingly, one should not speak of a Berlin-Pittsburgh School despite the fact that the University of Pittsburgh is the place where most of the younger generation came together in the end. For in due course the group ceased to be a school—that is, to function on the basis of substantial intellectual commonalities. Shared thematic preoccupations fell victim to a widening diffusion of interests. Ideological commonalities succumbed to an increasing openness to influences outside the natural sciences. And even methodological conformity fell apart as expanding study in the history and philosophy of science brought to view an ever-increasing diversity of methodologies within the sciences themselves. Perhaps the requisite unity of purpose was impossible to achieve under the prevailing conditions in philosophy but in any case the remaining members of the school—and certainly their students—have scattered to the philosophical winds as regards their work. It might, however, be mentioned that a considerable number of Earman’s doctoral students at the University of Pittsburgh have continued to work in the area of explanation and determinism, including two who eventually became colleagues of the University of Pittsburgh: Laura Ruetsche and Gordon Belot.¹⁹ But in any case, in the course of time the residuum of the Berlin School blended increasingly into the broader landscape science-oriented America philosophizing that had come to be formed in large measure under the influence of transatlantic importations of Germanophone neoempiricism. So while one could indeed speak of a Berlin-Pittsburgh *cluster* or *constellation* of science-oriented philosophers, one could not, strictly speaking, designate this as a *school*.

For by the time this group had firmly reconstituted itself in Pittsburgh its concern now was less with scientific philosophy

¹⁸ On factors leading to the demise of the school as such see Fetzer 2001.

¹⁹ Insofar as the school continues, these colleagues are the prime candidates for membership on the basis of the criterion stated above. Their qualifications include doctoral dissertations directed by a school member, continued research in some of the school’s definitive areas of interest, and academic colleagueship with other school members.

then with philosophy of science, a subject matter rather than a school doctrine. All that eventually remained was the Cheshire-cat smile of a common dedication to clarity of exposition and cogency of thought—but this became a general feature of Anglo-American analytic philosophy and could not provide for the characteristic unity of a particular school.

4. THE LEGACY

The legacy of the Berlin School encompasses both an intellectual and an institutional heritage.

The intellectual heritage of the school as assessed by its impact that its work exerted on the wider philosophical community consists primarily in

- The Hempel-Oppenheim model of explanation and its subsequent development and critique by younger members of the school.
- Reichenbach's studies of space-time and relativity together with its development and critique by younger members of the school.
- The Reichenbach-Carnap studies of probability and probabilistic reasoning in the sciences and its development and critique by younger members of the school.
- Reichenbach's study of issues of philosophical logic, including matters of time and tense and their development by younger members of the school.
- The Hempel-Helmer-Carnap studies of confirmation and their development and critique by younger members of the school.
- Grelling's, Reichenbach's, and Hempel's studies in symbolic logic and their continuation by younger members of the school.

- The Hempel-Oppenheim studies of explanation and their development and critique by younger members of the school.
- The futurological studies of prediction and forecasting by Dalkey, Helmer and Rescher in the wake of Reichenbach's work.

All in all, the Berlin School has been enormously productive in print. Just to list the publications of the baker's dozen of its main members would require a sizeable volume.

However, the intellectual heritage consists not only of the influential publications of its members but also in the formative intellectual impact that these scholar-scientists made on the successive generations of American graduate students in philosophy whom they helped to train during many years of active teaching in American higher education. In this regard, yet another and by no means insignificant part of the heritage of the Berlin school is represented by a series of younger American philosophers, trained in Pittsburgh and taught there by younger generation members, also worked extensively on issues that had been of concern to earlier phases of the school. This group would include in particular philosophers trained by Grünbaum and Rescher in Pittsburgh (Brian Skyrms, Alberto Coffa, Richard Creath, Patrick Maher, Philip Quinn, and Bas van Fraassen). Then too there are Putnam's many students at Harvard, and the baker's dozen of Earman's students at the University of Pittsburgh, as well as Bruce Buchanan, who had studied with Massey in Michigan and Clark Glymour, a student of Salmon's. Though not members of the school as such, these students of its members deserve to count as a part of its heritage seeing that some of them continued research in the school's historical areas of interest.

One development of ongoing significance emerged from the studies regarding the methodology of prediction and forecasting at the RAND Corporation in the 1950's by Olaf Helmer and his collaborators, especially Norman Dalkey and Nicholas Rescher, in relation to the so-called Delphi methodology of forecasting.²⁰

²⁰ See Nicholas Rescher, *Predicting the Future* (Albany: SUNY Press, 1998), pp. 28-33. This is an area of deliberation and investigation which continues to have a lively and many-sided existence, as is readily seen by

This methodology made a considerable impact on the world of business planning and operation research, but its reception among philosophers was virtually nonexistent.

The Berlin School has also left a legacy by way of founding professional journals that were to play an ongoing role in the development of subsequent philosophy. In this regard pride of place belongs to *Erkenntnis*, which was founded by Reichenbach and Carnap and then re-founded after World War II with Hempel as one of its three editors. And members of the group inaugurated, yet another journal—The *American Philosophical Quarterly*, founded by Rescher, which is dedicated to fostering philosophical thought in the spirit of clarity and exactness typified by the work of the school.

Moreover, the school has also left a substantial institutional legacy based in the University of Pittsburgh, a legacy which includes

- A Center for Philosophy of Science, dedicated to the encouragement and furtherance of research in this field. This center is a haven for visiting scholars and also sponsors numerous conferences and cooperates with cognate organizations in various foreign countries.
- A Department of History and Philosophy of Science which provides doctoral training for young scholars in these fields.
- An Archive for Scientific Philosophy housing the papers of Carnap, Reichenbach, Hempel, Salmon, and others who philosophize on relevant issues (including F. P. Ramsey and Wilfrid Sellars).

It is worthy of note that throughout an entire generation—from its conception in 1961 until 1997—the directorship of the University of Pittsburgh's thriving Center for Philosophy of Science lay in the hands of the younger generation of Berlin

directing one's search engine to: Delphi + prediction. (There were some 100,000 entries on Google in March of 2005.)

School members (successively Grünbaum, Laudan, Rescher, and Massey).²¹

However, as far as doctrine is concerned, the Berlin School left little heritage as a permanent deposit. With the passage of years the younger members of the school—and indeed some of its older ones as well—became open to ideas and doctrines of very diverse orientations. And in particular as regards its initial inclination to the ideology of scientism—to the idea that if a problem is meaningful at all, then it will find a resolution in the teachings of science—this is something increasingly faded into the background—still maintained by some of the younger members of the school (e.g., Grünbaum and Salmon) but rejected by others (e.g., Rescher and Earman). However, the methodological idea that the rigor of thought and precision of expression that typifies scientific work should also make its way into philosophical exposition has maintained a prominent presence in the writing and teaching of the later members of all of the school. Moreover, what was a striking—and as I now view it distinctly unusual—aspect of the Berlin School was the extent to which its members tried to be helpful to one another in matters not only of research but also of career.

Still, in the end the only ties which remained to link the younger members of the Berlin school were their respect for their precursors, their personal affinities, and—in substantial measure—their collegueship at the University of Pittsburgh. And so, while the students of these Berlin school members—and indeed the students of their students and *their* students in turn—continue to proliferate across the academic landscape, nevertheless the school as a school was by the end of the 20th century well enroute to passing from a living force into a historical phenomenon. But that, after all, is the way of schools.

5. CODA

The fragility of things and their vulnerability to the ravages of time and change is an all-too-familiar aspect of the human condition. But one has to be realistic in these matters.

²¹ Moreover, members of the school at various times chaired one or the other of this university's departments of philosophy and of history and philosophy of science (viz., Laudan, Massey, Rescher, and Salmon).

Philosophical movements have their natural lifespan. They arise in a burst of youthful enthusiasm, grow to maturity, and then gradually succumb, if not to new interests, let alone outright opposition, then to a sheer exhaustion of driving impetus. For sure, the Berlin school has much to be proud of—and nothing to regret. It has had a good running and leaves a respectable number of constructive products behind—perhaps more so than is the case with any other single group of twentieth-century philosophical collaborators.²²

BIO-BIBLIOGRAPHICAL SOURCES

Fuller information about the members of the Berlin School can be obtained as follows:

- DALKEY. Rescher 2005.
- DUBISLAV. Mittelstrass 1980-96. Dannenberg 1994.
- EARMAN. See his website: http://www.pitt.edu/~hpsdept/people/fac_pages/earman.html
- GRELLING. Mittelstrass 1980-96. V. Perkhaus in Dannenberg 1994. Luchins 2000.
- GRÜNBAUM. Mittelstrass 1980-96. Brown 1996. Rescher 1997. Grünbaum 2005. See also his website: <http://www.pitt.edu/~grunbaum/>
- HELMER. Rescher 1997, Rescher 2002.
- HEMPEL. Rescher (ed.) 1969. Mittelstrass 1980-96. Esser 1985. Nida-Ruemelin 1991. Brown 1996. Rescher 1997. Benacerraf & Jaffrey 1998. Fetzer (ed.) 2000. Fetzer (ed.) 2002.
- JEFFREY. Constatini & Galavotti 1997

²² This paper has benefited from information supplied by Richard Creath, James Fetzer, John Earman, Adolf Grünbaum, Olaf Helmer, Gerald Massey, Merrilee Salmon, and Gereon Wolters.

- MASSEY. See his website: <http://www.pitt.edu/~gmas/>
- OPPENHEIM. Rescher (ed.) 1969. *N.Y. Times* 1977. Mittelstrass 1980-96. Mittelstrass 1980-96. Rescher 1997. Hempel 2000.
- PUTNAM. Mittelstrass 1980-96. Boolos 1990. Nida Rümelin 1991. Brown 1996.
- REICHENBACH. Reichenbach 1977-1999. Reichenbach 1978. Nida-Rümelin 1991. Hempel 1991. Speck 1992. Haller & Stadler 1993. Dannenberg et. al. 1994. Brown 1996. Gerner 1997. Poser 1998.
- RESCHER. Mittelstrass 1980-96. Nida-Rümelin 1991. Brown 1996. Rescher 1997. Rescher 2002. See also his website: <http://www.pitt.edu/~rescher/>
- SALMON. Fetzer 1988. Brown 1996. Grünbaum 2001.

SECONDARY LITERATURE

- Benacerraf, P. and R. Jeffrey, "Carl Gustav Hempel," *Proceedings and Addresses of the American Philosophical Association*, vol. 71 (1998), pp. 147-49 (Memorial Minute).
- Boolos, George (ed.), *Meaning and Method: Essays in Honor of Hilary Putnam* (New York: Cambridge University Press, 1990).
- Brown, Stuart, et. al. (ed.'s), *Biographical Dictionary of 20th Century Philosophers* (London: Routledge, 1996).
- Center for Philosophy of Science, University of Pittsburgh, *Celebrating 40 Years: A History* (Pittsburgh, Center for Philosophy of Science of the University of Pittsburgh, 2000).
- Constantini, Domenico and Maria Carla Galavotti (eds.), *Dynamics and Causality: Essays in Honor of Richard C. Jeffrey* (Dordrecht: Kluwer, 1997).

- Danneberg, Lutz, Andreas Kamlah, and Lothar Schäfer (ed.'s), *Hans Reichenbach und die Berliner Gruppe* (Braunschweig/Wiesbaden: Vieweg, 1994). [Contains also contricutions on the history of the Berlin Society of Scientific Philosophy, the society associated with teh Berlin School.]
- Essler, W. K., et. al. (ed.'s), *Essays in Honor of C. G. Hempel* (Dordrecht: Reidel, 1985).
- Fetzer, James H. (ed.), *Probability and Causality: Essays in Honor of Wesley C. Salmon* (Dordrecht: Reidel, 1988). [The Appendix offers a complete bibliography of Salmon's publications.]
- Fetzer, James H. (ed.), *Science, Explanation and Rationality: Aspects of the Philosophy of Carl G. Hempel* (Oxford: Oxford University Press, 2000). [See especially the "Editors Introduction" and the "Epilogue" by Wesley C. Salmon.]
- , *The Philosophy of Carl G. Hempel*, ed. by James H. Fetzer (Oxford: Oxford University Press, 2001). [Contains a full bibliography of Hempel's writings as well as information about his intellectual context.]
- Gerner, Karin., *Hans Reichenbach, sein Leben und Wirken, eine wissenschaftliche Biographie* (Osnabrück: Phoebe Autorenpress, 1973).
- Giere, Ronald N. and Alan W. Richardson (eds.), *Origins of Logical Empiricism* (Minneapolis: University of Minnesota Press, 1996).
- Grünbaum, Adolf, "Wesley Salmon: 1925-2001," *Proceedings and Addresses of the American Philosophical Association*, vol., 75 (November 2001), pp. 125-7 (Memorial Minute). Reprinted as "Wesley Salmon's Intellectual Odyssey and Achievements," *Philosophy of Science*, vol. 71 (2004), pp. 922-25.

- , “An Autobiographical-Philosophical Narrative” in A. Jokić (ed.), *Philosophy of Physics and Psychology: Essays in Honor of Adolf Grünbaum* (Amherst, NY: Prometheus Press, 2005).
- Haller, Rudolf and Friedrich Stadler (eds.), *Wien-Berling-Prag. Der Aufstieg der wissenschaftlichen Philosophie Zentenarien Rudolf Carnap-Hans Reichenbach-Edgar Zilsel* (Wien: Holder-Pichler Tempsky, 1993).
- Hempel, C. G., “Hans Reichenbach Remembered,” *Erkenntnis*, vol. 35 (1991), pp. 5-10.
- , “An Intellectual Autobiography” in Fetzer 2000.
- , *Selected Philosophical Essays*, ed. by R. Jeffrey (Cambridge: Cambridge University Press., 2000).
- , *The Philosophy of Carl G. Hempel*, ed. by James Fetzer (Oxford, Oxford University Press, 2001). [Contains a full bibliography of Hempel’s writings.]
- Luchins, Abraham S. and Edith H., “Kurt Grelling: Steadfast Scholar in a Time of Madness,” *Gestalt Theory*, vol. 22 (2000), pp. 228-81.
- Mittelstrass, 1980-96. Juergen Mittelstrass (ed.), *Enzyklopädie der Philosophie und Wissenschaftstheorie* (Mannheim-Wien-Zürich and Stuttgart, 1980-96).
- New York Times*, 24 June 1977, Section D, p. 13. Obituary of Paul Oppenheim.
- New York Times*, 23 November, 1997, Section 1, p. 44. Obituary of Carl G. Hempel.
- Nida-Ruemelin, Julian, *Philosophie der Gegenwart in Einzeldarstellungen* (Stuttgart: Alfred Kröner, 1991).
- Oppenheim, Paul, “Reminiscences of Peter” in Rescher (ed.) 1969, pp. 1-4.

- Poser, Hans and Ulrich Dirks (eds.), *Hans Reichenbach. Philosophie im Umkreis der Physik* (Berlin 1998: Akademie Verlag).
- Reichenbach, Maria, "Memories of Hans Reichenbach" in *Hans Reichenbach: Selected Writings*, 2 vol's (Dordrecht: Reidel, 1978). [Vol. II contains a full bibliography of Reichenbach's publications.]
- Rescher, Nicholas, "H₂O: Hempel-Helmer-Oppenheim," *Philosophy of Science*, vol. 54 (1997), pp. 135-75, (Reprinted in the author's *Profitable Speculations* (Lanham, MD: Rowman & Littlefield, 1997), pp. 69-107. [This article provides a bibliography of the publications of Oppenheim and of Helmer.]
- , *Enlightening Journey: The Autobiography of an American Scholar* (Lanham, MD.: Lexington Books, 2002).
- , "Logicians at RAND," *RAND Alumni Magazine*, Spring, 2005.
- Rescher, Nicholas, (ed.), *Essays in Honor of Carl G. Hempel* (Dordrecht: Reidel, 1969). [Provides a bibliography of Hempel's publications to 1969.]
- Salmon, Wesley C., *Four Decades of Scientific Explanation* (Minneapolis: University of Minnesota Press, 1989).
- Schilpp, Paul Arthur (ed.), *The Philosophy of Rudolf Carnap* (La Salle, Ill.: Open Court, 1963).
- Speck, Josef (ed.), *Grundprobleme der grossen Philosophen. Philsoopher der Neuzeit VI Tarski, Reschenbach, Kraft, Gödel, Neurath* (Göttingen 1992: Vandenhoeck & Ruprecht).
- Wolters, Gereon, "Die pragmatische Vollendung des logischen Empirismus: In Memoriam Carl Gustav Hempel (1905-1997)," *Journal for General Philosophy of Science*, vol. 31 (2000), pp. 205-242.